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# SMOLT MONITORING AT THE HEAD OF LOWER GRANITE RESERVOIR AND LOWER GRANITE DAM

# ANNUAL REPORT 1995

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TABLE OF CONTENTS

## TABLE OF CONTENTS (Cont.)



## LIST OF TABLES

## LIST OF TABLES (Cont.)



## LIST OF FIGURES

## LIST OF FIGURES (Cont.)



## LIST OF APPENDICES

## ABSTRACT

This project monitored the daily passage of chinook salmon *Oncorhynchus tshawytscha* and steelhead trout 0. *mykiss* smolts during the 1995 spring outmigration at migrant traps on the Snake River, Clearwater River, and Salmon River. The 1995 snowpack was below average through February. Heavy precipitation from the Salmon River drainage south, in March through May, provided the best runoff conditions in the Salmon River since the drought began in 1987.

All hatchery chinook salmon released above Lower Granite Dam were marked with a fin clip in 1995. Total annual hatchery chinook salmon catch at the Snake River trap was 1.2 times greater than in 1994. The wild chinook catch was 4.5 times greater than 1994. Hatchery steelhead trout catch was only 76% of 1994 numbers and wild steelhead trout catch was 51% of 1994. The Snake River trap collected nine age 0 chinook salmon. Differences in trap catch between years is due to fluctuations, not only in smolt production, but also differences in trap efficiency and duration of trap operation associated with high flows. Trap operations were terminated for the season due to high flows and trap damage on June 1. The 1995 field season was the first year we tried to reduce trap catch by operating the traps five days a week. This would affect the trap catch comparison between years.

Hatchery chinook salmon catch at the Clearwater River trap was 41% of the 1994 catch and wild chinook salmon catch was 1.1 times higher. Hatchery steelhead trout trap catch was 1.8 times higher than 1994. Wild steelhead trout trap catch was 16% of the 1994 catch. Age 0 chinook salmon catch was only one fish.

Hatchery chinook salmon catch at the Salmon River trap was 1.2 times greater and wild chinook salmon catch was 2.0 times greater in 1995 than the previous year. The 1995 hatchery steelhead trout collection was 54% of the 1994 catch. Wild steelhead trout collection in 1995 was 89% of the 1994 catch.

Travel time (d) and migration rate (km/d) through Lower Granite Reservoir for PIT-tagged chinook salmon and steelhead trout marked at the head of the reservoir were affected by discharge. For fish tagged at the Snake River trap, statistical analysis of 1995 prespill data showed that a 2-fold increase in discharge between 50 and 100 kcfs increased migration rate by 12-fold for hatchery chinook salmon, 4.6-fold for wild chinook salmon, 2.1 times for hatchery steelhead trout, and 2.4 times for wild steelhead.

The statistical analysis for fish that were marked at the Clearwater River trap and then migrated during the prespill condition showed that a 2-fold increase in discharge, from 50 to 100 kcfs, increased migration rate for hatchery chinook salmon by 8.9-fold, 3.5-fold for wild chinook salmon, and 1.6-fold for hatchery steelhead trout. Not enough data were available to do the analysis for wild chinook salmon.

For fish marked at the Salmon River trap, statistical analysis of the 1995 prespill data showed that a 2-fold increase in discharge, from 50 to 100 kcfs, increased migration rate by 4.2 times for hatchery

chinook salmon, 6.8 times for wild chinook salmon, 9.5 times for hatchery steelhead trout, and 6.3 times for wild steelhead trout.

Fish tagged with passive integrated transponder (PIT) tags at the Snake River trap were interrogated at four dams with PIT tag detection systems (Lower Granite, Little Goose, Lower Monumental, and McNary dams). Because of the addition of the fourth interrogation site (Lower Monumental) in 1993, cumulative interrogation data is not comparable with the prior five years (1988-1992). Cumulative interrogations at the four dams for fish marked at the Snake River trap were 73% for hatchery chinook, 81% for wild chinook, 84% for hatchery steelhead, and 84% for wild steelhead. Cumulative interrogations at the four dams for fish PIT-tagged at the Clearwater River trap were 71% for hatchery chinook salmon, 72% for wild chinook salmon, 84% for hatchery steelhead trout, and 80% for wild steelhead trout. Cumulative interrogations at the four dams for fish marked at the Salmon River trap were 64% for hatchery chinook salmon, 75% for wild chinook salmon, 81% for hatchery steelhead trout, and 79% for wild steelhead trout.

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## INTRODUCTION

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) directed the Northwest Power Planning Council (NPPC) to develop programs to mitigate for fish and wildlife losses on the Columbia River system resulting from hydroelectric projects. Section 4(h) of the Act explicitly gives the Bonneville Power Administration (BPA) the authority and responsibility to use its resources "to protect, mitigate, and enhance fish and wildlife to the extent affected by the development and operation of any hydroelectric project on the Columbia River system."

Water storage and regulation for hydroelectric generation severely reduces flows necessary for downstream migration of juvenile steelhead trout *Oncorhynchus mykiss* and chinook salmon 0. *tshawytscha*. In response to the fishery agencies and Indian tribes recommendations for migration flows, the NPPC Columbia River Basin Fish and Wildlife Program proposed a "water budget" for augmenting spring flows.

The federal Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.) listing of Snake River spring/summer and fall chinook salmon in 1992 and the development of a National Marine Fisheries Service (NMFS) Biological Opinion (BIOP) established flow measures for the Snake River. The measures within the BIOP establish flow targets and planning dates for providing those flows. The BIOP also requires monitoring and evaluation of the smolt outmigration. The NMFS established a Technical Management Team (TMT) to oversee implementation of the BIOP measures. The TMT utilizes outmigration monitoring data provided by the Idaho Department of Fish and Game (IDFG) through this project as a basis for implementing measures within the flexibility provided by the BIOP.

To provide information to the Fish Passage Center (FPC) for use by the TMT on smolt movement prior to arrival at the lower Snake River reservoirs, IDFG monitors the daily passage of smolts at the head of Lower Granite Reservoir. This information allows the FPC to request operations for fish passage to the TMT for implementation of BIOP measures to improve passage and migration conditions.

Smolt monitoring is a key component of BIOP implementation under all flow conditions and becomes critical when low flow conditions constrain BIOP measures and reduce migration rates. In years of low flow (drought years), knowledge of when most smolts have left tributaries and entered areas that can be affected by releases of stored water allows managers to make informed decisions regarding implementation of measures within the BIOP. Six low-flow years (1987, 1988, 1990, 1991, 1992, 1994) have occurred during this smolt monitoring project. The indications are that judicious use of the available reservoir storage volumes can greatly enhance the timing and migration rate of juvenile chinook salmon and steelhead trout.

The IDFG smolt monitoring project also collects other useful data on relative species composition, hatchery and wild steelhead trout ratios, travel time, and migration rate. All wild steelhead trout smolts are tagged with PIT tags to determine timing of wild adult steelhead trout one and two years later as they return to spawn (Prentice et al. 1987). By monitoring smolt passage at the head of Lower Granite

Reservoir and at Lower Granite Dam, migration rates (km/d) under various riverine and reservoir conditions can be estimated and compared. Monitoring sites on both the Snake and Clearwater arms of Lower Granite Reservoir and on the Salmon River permit migration timing to be determined for smolts from each drainage. It is possible to determine the relative abundance of hatchery and wild stocks of steelhead trout which can be used to document wild stock rebuilding progress. This Smolt Monitoring Program's information is complementary to other Snake and Columbia River NPPC-supported projects.

## OBJECTIVES

1. Provide daily trap catch data at the head of Lower Granite Reservoir for TMT's use in implementing the NMFS Biological Opinion.

2. Determine riverine travel time from the point of release to the smolt traps (index sites) at the upper end of Lower Granite Reservoir for freeze branded and passive integrated transponder (PIT) tagged smolts.

3. Provide an interrogation site for PIT-tagged smolts, marked on other projects, at the end of their migration in a riverine environment and the beginning of their migration in a reservoir environment.

4. Determine reservoir travel time for hatchery spring/summer chinook salmon, wild spring/summer chinook salmon, hatchery steelhead trout, and wild steelhead trout from the head of Lower Granite Reservoir to Lower Granite Dam using PIT-tagged smolts marked at the traps and PIT-tagged smolts passing the traps from upriver hatchery releases and rearing areas.

5. Determine cumulative interrogation rate at Lower Granite, Little Goose, Lower Monumental, and McNary dams during the spring outmigration period for PIT-tagged hatchery and wild spring/summer chinook salmon, hatchery and wild steelhead trout.

6. Correlate smolt migration rate with river flow for fish moving in riverine and reservoir environments.

7. Determine trap efficiency for each species at each trap over a range of discharges.

8. Evaluate timing of returning adult wild and natural steelhead crossing Lower Granite Dam.

## METHODS

### Releases of Hatchery-Produced Smolts

Anadromous hatchery release information was reported for hatchery smolts which contributed to the 1995 outmigration in the Snake River drainage, upstream of Lower Granite Dam. This information included species, number released, date, release location, number PIT-tagged, number freeze branded, and associated brand.

### Smolt Monitoring Traps

During the 1995 outmigration, four smolt monitoring traps were operated to monitor the passage of juvenile chinook salmon and steelhead trout. One scoop trap (Raymond and Collins 1974) was located on the Clearwater River, near Lewiston, Idaho. A second scoop trap, along with a screw trap, were located on the Salmon River near White Bird, Idaho. The fourth trap, a dipper trap (Mason 19661, was located on the Snake River near Lewiston, Idaho (Figure 1). Smolts were captured, examined, and enumerated daily at the traps and released back to the river. Fork length of up to 100 smolts for each species were measured to the nearest millimeter. Up to 100 hatchery chinook salmon, 75 wild chinook salmon, 60 hatchery steelhead trout, and all wild steelhead trout were PIT-tagged daily, when available. Up to 2,000 fish were examined for hatchery brands at the Snake River trap. Fish were not examined for brands at the other trap locations. Smolts were anesthetized before handling with tricaine methanesulfonate (MS-222). These fish were allowed to recover from the anesthesia before being returned to the river.

Prior to the 1995 outmigration season, the FPC requested that all smolt monitoring projects reduce handling of fish listed under the Endangered Species Act. To comply with this request, sampling regimes and quotas were adjusted at all of this project's collection sites. Sampling periods were based on a standard work week (Monday-Friday) with Saturday and Sunday left available, if necessary, to fill quotas. Once 500 hatchery chinook salmon, 375 wild chinook salmon, 300 hatchery steelhead trout, and 300 wild steelhead trout were PIT-tagged to fulfill the weekly quota, operations were suspended until the beginning of the next sampling period. Generally, the daily PIT tag quotas were observed.

Water temperature (°C) and turbidity (m) were recorded daily at each trap using a centigrade thermometer and 20 cm secchi disk. The Snake River discharge was measured at the U.S. Geological Survey (USGS) Anatone gauge (#13334300) 44.4 km upstream from the Snake River trap. Clearwater River discharge was measured at the USGS Spalding gauge (#13342500) 8.8 km upstream from the Clearwater River trap. Salmon River discharge was measured at the USGS White Bird gauge (#13317000) 1.6 km upstream from the Salmon River trap.

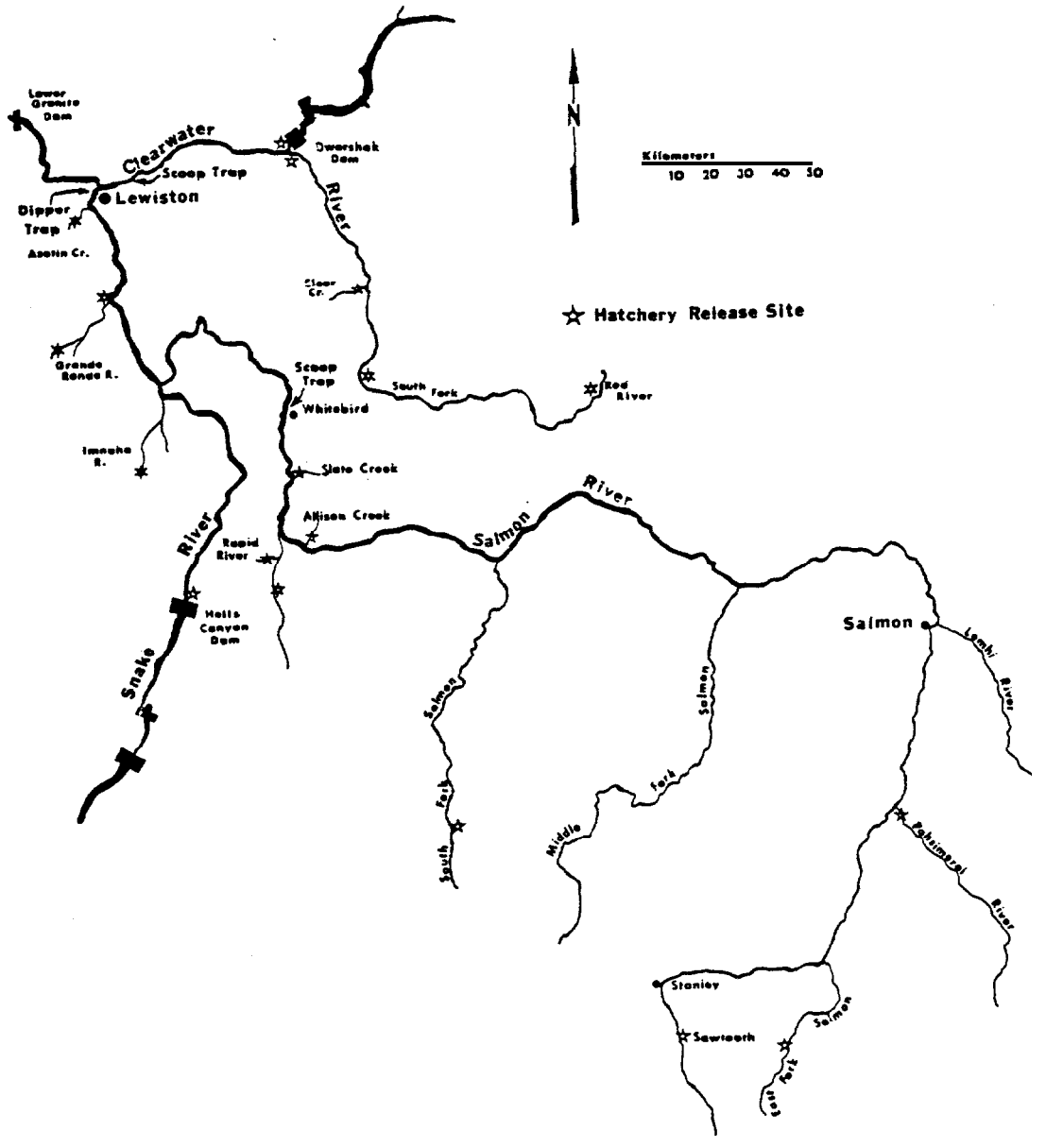


Figure 1. Map of study area.

## Snake River Trap

The Snake River trap was positioned approximately 40 m downstream from the Interstate Bridge between Lewiston, Idaho and Clarkston, Washington. The trap was attached to bridge piers just east of the drawbridge span by steel cables. This location is at the head of Lower Granite Reservoir, 0.5 km upstream from the convergence of the Snake and Clearwater arms. River width and depth at this location are approximately 260 m and 12 m, respectively.

Chinook salmon and steelhead trout smolts were PIT-tagged at the Snake River trap to estimate travel time from the head of Lower Granite Reservoir to Lower Granite Dam. Median travel time of the daily PIT-tagged release groups was converted to migration rate. Migration rate was correlated with mean Lower Granite Reservoir inflow discharge for the number of days equal to the median travel time to determine how changes in discharge affected smolt migration rate through Lower Granite Reservoir.

Snake River trap operation began on March 13 and continued through June 1, 1995. The Snake River Trap was not in operation for **a** total of 15 days during the 1995 season due to mechanical failure, heavy debris loads, or because quotas were reached. All fish captured in the Snake River trap were passively interrogated for PIT tags as they entered the live well. The interrogation and tagging information was sent to the PTAGIS Data Center (managed by Pacific States Marine Fisheries Commission) daily.

During the period of May 23 through June 1, the Snake River trap was only operated for an average of about five hours per day due to high discharge and debris. Trapping operations began at about 1700 hours and were terminated at approximately 2200 hours each day. Due to reduced trapping effort, all catch and passage data reported for the latter portion of May is not representative of what actually occurred during that period of the outmigration.

The PIT tag interrogation system on the Snake River trap consists of an 8-inch PVC pipe with two interrogation coils (D-4 and D-6). Each coil is connected to an exciter card and a PIT tag reader. The system does not have the capability to provide exact time of capture. Since it is checked once daily, the interrogation time is set to 00:00 h. Coil efficiency tests were conducted on the dipper trap interrogation system. Six hundred sixty-three test tags were sent through the system. The reading efficiency was calculated to be 97.4% for both coils combined.

## Clearwater River Trap

The Clearwater River scoop trap was located 10 km upstream from the convergence of the Clearwater River and Snake River arms of Lower Granite Reservoir (4.5 km upstream from slack water). The river channel at this location forms a gentle bend and is 150 to 200 m wide and 4 m to 7 m deep, depending on discharge.

Chinook salmon and steelhead trout smolts were PIT-tagged at the Clearwater River trap to estimate travel time from the head of Lower Granite Reservoir to Lower Granite Dam for Clearwater River fish. Median travel time of the daily PIT-tagged release groups were converted to migration rate. Migration rate was correlated with mean Lower Granite Reservoir inflow discharge for the median travel time to determine how changes in discharge affected smolt migration rate through Lower Granite Reservoir.

Trap operation began March 13 and continued through May 31, 1995 when operations were terminated for the year. Operations were temporarily suspended for 28 days during the season due to mechanical failure, high discharge, or because quotas were reached. All fish were interrogated for PIT tags as the fish were removed from the live well. The tagging and interrogation files were sent to the PTAGIS Data Center daily.

The PIT tag interrogation system on the Clearwater River trap consists of a 4-inch PVC pipe with two interrogation coils (D-O and D-2). Each coil is attached to an exciter card and a PIT tag reader. This system is battery-operated. Coil efficiency tests were not conducted on the Clearwater River trap interrogation system in 1995. Previous coil efficiencies were reported in Buettner and Brimmer(l994).

**Salmon River Trap**

A new location for the Salmon River scoop and screw traps was utilized in 1995. The new Salmon River trap site was located at rkm 103, approximately 17 km upstream from the previous trapping location and 1.6 km downstream from Slate Creek. Both traps were operated at the same location, which was immediately downstream of the upper (there are two) U.S. Highway 95 bridge at Twin Bridges. The new location was chosen to allow the traps to be operated through a wider range of discharges. River width at this location is approximately 90 m and varies with discharge.

Chinook salmon and steelhead trout juveniles were tagged with PIT tags at the Salmon River trap to estimate smolt travel time from the lower portion of the Salmon River to Lower Granite Dam. Median travel time for the daily PIT-tagged release groups was converted to migration rate. Migration rate was correlated with mean Lower Granite Reservoir inflow for the median travel time to determine how changes in discharge affected smolt migration rate through Lower Salmon River and Lower Granite Reservoir.

Trap operation began on March 15 and continued until May 23 when operations were terminated for the season due to mechanical failure associated with high water. Operations were temporarily suspended for nine days during the 1995 field season because weekly quotas had been reached. All fish were interrogated for PIT tags as they were removed from the live well. The tagging and interrogation files were sent to the PTAGIS Data Center daily.

The screw trap was operated alongside the scoop trap for the first three weeks of the field season. The primary function of the screw trap was to collect fish under low flow conditions (<6 kcfs) . A secondary function was to provide additional fish (when needed) for PIT tagging purposes.

The PIT tag interrogation system on the Salmon River trap consists of a 4-inch PVC pipe with two interrogation coils. Each coil is connected to an exciter card (D-81, which is in turn attached to a single PIT tag reader. The reader is connected to a personal computer that contains software which places a date and time stamp with each PIT tag code interrogated. The system is battery powered.

Coil efficiency tests were conducted on the Salmon River trap interrogation system in 1995. Five hundred test tags were sent through the system. Reading efficiency was calculated to be 98.6% for both coils combined.

## Trap Efficiency

Trap efficiency is the proportion of the migration run being sampled. Since trap efficiency may change as river discharge changes, efficiency has been estimated several times through the range of discharge at which the trap was operated. A linear regression equation (Ott 1977) describing the relation of trap efficiency and discharge was derived to estimate efficiency at any given discharge. During the 1995 trap operations, trap efficiencies were not calculated for any of the smolt traps. Previous trap efficiency estimates are reported by Buettner (1991).

## Travel Time and Migration Rates

Migration statistics were calculated for hatchery release groups from release sites to traps. Travel time and migration rates to the traps were calculated using median arrival times at the Snake, Clearwater, and Salmon River traps. Median arrival (or passage) date is the date the 50th percentile fish arrived at the trap or collection facility. Smolts were PIT-tagged at the Snake and Clearwater River traps to determine travel time from the head of Lower Granite Reservoir to Lower Granite Dam. Smolts were PIT-tagged at the Salmon River trap to determine migration rate in a free-flowing section of river plus Lower Granite Reservoir. Distances from release point to recovery location are listed in Table 1. Individual arrival times at the Lower Granite collection facility were determined for each daily release group. A minimum recapture number, sufficient for use in travel time and migration rate estimations, was derived from an empirical distribution function of the travel time for each individual release group (Steinhorst et al. 1988) . If recapture numbers were less than five or less than the number derived from the empirical distribution function, the daily data were combined with another day's data or the data were not used. If they were combined, they were added to daily data from an adjacent release day that had similar discharge and travel time.

Table 1. River mile and kilometer location for the Snake River drainage.

| | Columbia River | | Snake River | | Granite Dam | | trap site | | trap site | | trap site | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mi | km | mi | km | mi | km | | | | | | |
| Asotin Creek rel. site | 470.3 | 756.7 | 146.0 | 234.9 | 38.5 | 61.9 | 6.4 | 10.3 | -- | -- | -- | -- |
| Big Canyon Creek | 585.9 | 942.7 | 261.6 | 420.9 | 154.1 | 247.9 | 122.0 | 196.3 | -- | -- | -- | -- |
| Catherine Creek | 636.9 | 1024.8 | 312.6 | 503.0 | 205.1 | 330.0 | 173.0 | 278.4 | -- | -- | -- | -- |
| Clearwater R. trap site | 470.0 | 756.2 | 145.7 | 234.4 | 38.2 | 61.5 | -- | -- | 0.0 | 0.0 | -- | -- |
| Cottonwood Creek | 521.7 | 839.4 | 197.4 | 317.6 | 89.9 | 144.6 | 57.8 | 93.0 | -- | -- | -- | -- |
| Crooked River | 604.3 | 972.3 | 280.0 | 450.5 | 172.5 | 277.6 | -- | -- | 134.3 | 216.0 | -- | -- |
| Deer Creek | 504.3 | 811.4 | 180.0 | 289.6 | 72.5 | 116.7 | 40.4 | 65.0 | -- | -- | -- | -- |
| Dworshak NFH | 504.3 | 811.4 | 180.0 | 289.6 | 72.5 | 116.6 | -- | -- | 34.3 | 55.2 | -- | -- |
| E.F. Salmon @ trap site | 873.6 | 1405.6 | 549.3 | 883.8 | 441.8 | 710.9 | 409.7 | 659.2 | -- | -- | 297.0 | 478.0 |
| Grande Ronde R. mouth | 493.0 | 793.2 | 168.7 | 271.4 | 61.2 | 98.5 | 29.1 | 46.8 | -- | -- | -- | -- |
| Hazard Creek | 618.7 | 995.5 | 294.4 | 473.7 | 186.9 | 300.7 | 154.8 | 249.1 | -- | -- | 42.1 | 67.9 |
| Hells Canyon Dam | 571.3 | 919.2 | 247.0 | 397.4 | 139.5 | 224.5 | 107.4 | 172.8 | -- | -- | -- | -- |
| Highway 95 boat launch | 473.2 | 761.4 | 148.9 | 239.6 | 41.5 | 66.8 | -- | -- | 3.2 | 5.1 | -- | -- |
| Imnaha Coll. Facility | 565.6 | 910.2 | 241.3 | 388.3 | 133.8 | 215.4 | 101.7 | 163.6 | -- | -- | -- | -- |
| Imnaha River mouth | 516.0 | 830.3 | 191.7 | 309.1 | 84.2 | 135.7 | 52.1 | 83.8 | -- | -- | -- | -- |
| Kooskia NFH | 541.6 | 871.4 | 217.3 | 349.6 | 109.8 | 176.7 | -- | -- | 71.5 | 115.0 | -- | -- |
| Little Sheep Creek | 553.8 | 891.1 | 229.5 | 369.3 | 122.0 | 196.3 | 89.9 | 144.6 | -- | -- | -- | -- |
| Lookingglass Creek | 580.4 | 933.9 | 256.1 | 412.1 | 148.6 | 239.1 | 116.5 | 187.4 | -- | -- | -- | -- |
| Lower Granite Dam | 431.8 | 694.8 | 107.5 | 173.0 | 0.0 | 0.0 | 32.1 | 51.6 | 38.3 | 61.5 | 144.8 | 232.8 |
| Lower Monumental Dam | 365.9 | 588.7 | 41.6 | 66.9 | 65.9 | 106.0 | 98.0 | 157.7 | -- | -- | 192.1 | 308.9 |
| Pahsimeroi Hatchery | 817.5 | 1315.4 | 493.2 | 793.6 | 385.7 | 620.6 | 353.6 | 568.9 | -- | -- | 240.1 | 387.7 |
| Rapid River Hatchery | 605.8 | 974.7 | 281.5 | 452.9 | 174.0 | 280.0 | 141.9 | 228.3 | -- | -- | 29.2 | 47.1 |
| Red River rearing pond | 618.0 | 994.4 | 293.7 | 472.6 | 186.2 | 299.6 | -- | -- | 148.0 | 238.1 | -- | -- |
| Salmon River mouth | 512.5 | 824.6 | 188.2 | 302.8 | 80.7 | 129.8 | 48.6 | 78.2 | -- | -- | 64.1 | 103.0 |
| Salmon River trap site | 576.6 | 927.6 | 252.3 | 405.8 | 144.8 | 232.8 | 112.7 | 181.2 | -- | -- | 0.0 | 0.0 |
| Sawtooth Hatchery | 896.7 | 1444.2 | 573.3 | 922.4 | 465.8 | 749.5 | 433.7 | 697.8 | -- | -- | 321.0 | 516.6 |
| Snake River mouth | 324.3 | 521.8 | 0.0 | 0.0 | 107.5 | 172.9 | 139.6 | 224.6 | 145.7 | 234.5 | 252.3 | 405.8 |
| Snake River trap site | 463.9 | 746.4 | 139.6 | 224.6 | 32.1 | 51.6 | 0.0 | 0.0 | -- | -- | 112.7 | 181.2 |
| S.F. Salmon @ Knox Bridge | 719.7 | 1158.0 | 395.4 | 636.2 | 287.9 | 463.2 | 255.8 | 411.6 | -- | -- | 143.1 | 230.4 |
| Spring Creek | 614.4 | 988.6 | 290.1 | 466.8 | 182.6 | 293.8 | 150.5 | 242.2 | -- | -- | -- | -- |
| Wildcat Creek | 546.2 | 878.8 | 221.9 | 357.0 | 114.4 | 184.3 | 82.3 | 132.4 | -- | -- | -- | -- |

Smolt migration rate/discharge relations through Lower Granite Reservoir were investigated using linear regression analysis after both variables were stratified into 5 kcfs discharge intervals (Mosteller and Tukey 1977) and log (ln) transformed (Zar 1984). The 0.05 level was used to determine significance. This analysis was performed for the PIT-tagged hatchery spring/summer chinook salmon, wild spring/summer chinook salmon, hatchery steelhead trout, and wild steelhead trout groups marked at the Snake, Clearwater, or Salmon River traps.

The migration rate/discharge relations for PIT-tagged chinook salmon, hatchery steelhead trout, and wild steelhead trout were individually examined from 1988 to 1995 using analysis of covariance to determine if there were groups of years with common slopes and intercepts. Plots are used to help identify years that differ when non-homogeneous slopes between years are found. Subsequent analyses were run, without these years, to determine if common slopes and intercepts existed for a smaller subset of years. Also, the analysis of variance was used to determine if there was a sufficient overlap in the covariate (discharge) between years to continue the analysis (Ostle and Mensing 1975). If the final hypothesis of common intercepts was not rejected, then a significant difference in the migration rate/discharge relations between years was not detected and the yearly data were pooled. After pooling, linear regression was used to find the best-fitting equation to describe the relation between migration rate and discharge for an individual species over **several** years.

## Interrogation Rates of PIT-Tagged Fish

Interrogation rates of PIT-tagged fish, marked at the head of Lower Granite Reservoir, to Lower Granite Dam, Little Goose Dam, Lower Monumental, and McNary Dam collection facilities included, data from 1988 to 1995 for the Snake River trap, 1989 to 1995 for the Clearwater River trap, and 1993 to 1995 for the Salmon River trap. The data have been examined to ensure that multiple interrogations within a dam and between dams have been removed.

# RESULTS AND DISCUSSION

## Hatchery Releases

### Chinook Salmon

Chinook salmon released into the Snake River drainage upstream from Lower Granite Dam were reared at ten locations in Idaho and one in Oregon. The Washington Department of Fish and Wildlife did not release any juvenile chinook salmon in the Snake River drainage upstream from Lower Granite Dam that contributed to the 1995 outmigration. A total of 11,633,156 chinook salmon smolts were released at 24 locations in Idaho and 9 locations in Oregon (Table 2).

Table 2. Hatchery chinook salmon released into the Snake River system upriver from Lower Granite Dam contributing to the 1995 outmigration.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Salmon River | | | | |
| South Fork Salmon River @ Knox Bridge (McCall) | Summer | 10/3/94 | 140,172 [1,000] | |
| | | 4/6-8/95 | 1,074,598 [6,599] | |
| South Fork Salmon River @ Buckhorn Creek (McCall) | Summer | 7/22/94 | 36,259 [1,000] | |
| | | 8/12/94 | 8,740 | |
| South Fork Salmon River @ Cabin Creek (McCall) | Summer | 7/21/94 | 51,163 [1,001] | |
| Pahsimeroi River (Pahsimeroi) | Summer | 4/11-14/95 | 147,429 [500] | |
| Rapid River (Rapid River) | Spring | 3/16-4/12/95 | 2,786,919 [2,000] | |
| East Fork Salmon River (Sawtooth) | Spring | 3/28-30/95 | 31,250 [500] | |
| East Fork Salmon River @ East Fork Trap (Sawtooth) | Spring | 4/3/95 | 17,595 | |
| Salmon River @ Sawtooth Weir (Sawtooth) | Spring | 4/5-7/95 | 103,695 [1,500] | |
| West Fork Yankee Fork (Sawtooth) | Spring | 10/19-20/94 | 25,025 [1,000] | |
| Salmon River @ Blaine County Bridge (Sawtooth) | Spring | 10/24/94 Through 3/31/95 | 205,593 [1,600] | |
| | **Drainage Total** | | **4,628,438** | |
| Snake River and Non-Idaho Tributaries | | | | |
| Hells Canyon (Rapid River) | Spring | 3/28-30/95 | 499,536 [501] | |

Table 2. Continued.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Imnaha River @ R.Km. 74.2 (Lookingglass) | Spring | 3/28-5/5/95 | 590,069 [4,000] | |
| Lookingglass Cr. @ R.Km. 3.5 (Lookingglass) | Spring | 4/5-16/95 | 658,230 [2000] | |
| Big Sheep Creek @ R.Km. 33.6-56.0 (Lookingglass) | Spring | 7/19-20/94 | 151,333 | |
| Little Sheeo Creek @ R.Km. 4.8-28.8 (Lookingglass) | Spring | 7/21/94 | 15,180 | |
| Freezeout Creek @ R.Km. 1.6 (Lookingglass) | Spring | 7/21/94 | 7,614 | |
| Imnaha River @ College Creek R.Km. 57.6 (Lookingglass) | Spring | 7/22/94 | 36,240 | |
| Imnaha River @ Horse Creek R.Km. 17.6 (Lookingglass) | Spring | 7/22/94 | 24,260 | |
| Imnaha River @ Lighting Creek R.Km. 8.0 (Lookingglass) | Spring | 7/22/94 | 24,160 | |
| Imnaha River @ Cow Creek R.Km. 6.4 (Lookingglass) | Spring | 7/22/94 | 24,260 | |
| **Drainage Total** | | | **2,030,882** | |
| Clearwater River | | | | |
| Clear Creek (Kooskia NFH) | Spring | 4/12/95 | 722,906 [1,742] | |
| North Fork Clearwater @ Dworshak (Dworshak NFH) | Spring | 4/13-14/95 | 1,311,445 [3,985] | |
| Meadow Creek (Clearwater) | Spring | 7/12-27/94 | 417,000 | |

Table 2. Continued.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Papoose Creek (Clearwater) | Spring | 4/5-6/95 | 55,300 [500] | |
| White Sands Creek (Clearwater) | Spring | 7/6-8/94 | 99,808 [1,000] | |
| (Powell) | | 10/3/94 | 311,690 [2,000] | |
| Squaw Creek (Clearwater) | Spring | 7/5/94 | 14,977 [1,005] | |
| Pete King Creek (Clearwater) | Spring | 7/5/94 | 15,080 [1,000] | |
| Big Flat Creek (Clearwater) | Spring | 7/6-8/94 | 49,954 [1,000] | |
| Walton Creek (Powell) | Spring | 4/12-13/95 | 290,417 [2,400] | |
| Crooked River (Crooked River) | Spring | 4/10-14/95 | 537,908 [4,000] | |
| | | 9/19/94 | 199,255 [1,000] | |
| | | 9/30/94 | 216,280 [1,000] | |
| Red River (Red River) | Spring | 9/23/94 | 320,755 [2,000] | |
| American River (Clearwater) | Spring | 4/5-10/95 | 221,449 [1,200] | |
| Newsome Creek (Clearwater) | Spring | 4/10-11/95 | 189,612 [1,200] | |
| | **Drainage Total** | | **4,973,836** | |
| | **GRAND TOTAL** | | **11,633,156** | |

During the summer and fall of 1994, 15 groups of chinook salmon juveniles were released from Idaho hatcheries, and 7 groups were released from Oregon facilities. All other chinook salmon releases for the 1995 outmigration occurred in the spring of 1995 (Table 2).

### Steelhead Trout

Steelhead trout were reared at five locations in Idaho, one in Washington, and one in Oregon for release into the Snake River drainage upstream from Lower Granite Dam. A total of 9,491,222 steelhead trout smolts were released at 22 locations in Idaho, 6 locations in Oregon, and 2 locations in Washington (Table 3). Fall releases of steelhead trout juveniles have not been included in this total.

## Smolt Monitoring Traps

### Snake River Trap Operation

The Snake River trap captured 26,919 hatchery and 6,564 wild age 1 chinook salmon, 9 age 0 chinook salmon, 23,994 hatchery steelhead trout, 1,750 wild steelhead trout, and 6 sockeye/kokanee salmon *Oncorhynchus nerka* (Table 4).

Hatchery chinook salmon first arrived at the trap on March 20. There was a minor peak in passage of hatchery chinook salmon that began on April 7 and continued through April 14 (Figure 2). There was a second peak in passage that began on April 27 and continued through May 12. Peaks in hatchery chinook salmon passage were associated with increases in Snake River discharge. Less than 1% of the season total of hatchery chinook salmon was collected in March, 40% in April, 59% in May, and less than 1% in June (the trap operated for one day in June).

Wild chinook salmon passage timing was similar to that of hatchery chinook salmon. A minor peak in passage of wild chinook salmon began on April 7 and concluded on April 14. The major peak in passage began on May 1 and lasted until May 13. Peaks in wild chinook salmon passage were associated with increases in Snake River discharge. Less than 1% of the total catch of wild chinook salmon was captured in March, 27% in April, 71% in May, and less than 1% in June (the trap operated for only one day in June).

Physical characteristics were used to differentiate between age 0 chinook salmon and other chinook salmon. Peak trap catch of **age 0** chinook salmon was during May when 100% of the season total (nine fish) was collected. The Snake River trap was not in operation in June and July when the majority of age 0 chinook were expected to have outmigrated in 1995.

There was one major peak in hatchery steelhead trout passage. The peak began on April 14 and subsided on May 19 (Figure 3). During the period of peak passage, 23,437 hatchery steelhead trout, or 98% of the season total, was collected. Following the period of peak passage,

Table 3. Hatchery steelhead trout released into the Snake River system upriver from Lower Granite Dam contributing to the 1995 outmigration.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Salmon River | | | | |
| L. Salmon River @ Hazard Creek (Magic Valley) | B | 4/26-5/1/95 | 342,680 [300] | |
| L. Salmon River @ Warm Springs Bdg. (Niagara Springs) (Hagerman NFH) | A | 4/5-16/95 | 131,152 [295] | |
| | A | 4/10-14/95 & 4/18-28/95 | 163,385 [300] 237,119 [300] | |
| North Fork Salmon River (Magic Valley) | A | 4/13-14/95 | 115,050 [303] | |
| East Fork Salmon River (Magic Valley) | B | 4/19-26/95 | 488,705 [601] | |
| Bruno Landing (Magic Valley) | A | 4/17-19/95 | 162,870 [300] | |
| Lemhi River (Magic Valley) | A | 4/8-17/95 | 198,270 [300] | |
| Pahsimeroi River @ Pahsimeroi Trap (Niagara Springs) | A | 4/3-14/95 | 829,277 [299] | |
| Salmon River @ McNabb Point (Magic Valley) | A | 4/10-12/95 | 207,845 [300] | |
| Salmon River @ Sawtooth Weir (Hagerman NFH) | A | 4/17/95 | 135,196 [600] | |
| | | 4/21/95 | 549,810 [300] | |
| Salmon River @ Torrey's Hole (Hagerman NFH) | A | 4/19/95 | 64,167 [300] | |
| Upper Salmon River @ Slate Creek (Magic Valley) | B | 4/12-22/95 | 215,935 [300] | |
| Lower Salmon River @ Hammer Creek (Niagara Springs) | A | 4/27-28/95 | 97,220 [299] | |

Table 3. Continued.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Lower Salmon River @ Pine Bar Rapids (Niagara Springs) | A | 4/26/95 | 29,400 | |
| | | **Drainage Total** | **3,968,081** | |
| Snake River and Non-Idaho Tributaries | | | | |
| Hells Canyon Dam (Niagara Springs) | A | 4/17-27/95 | 614,560<br>[298] | |
| Catherine Creek (Irrigon) | A | 4/12/95 | 62,513 | |
| Spring Creek @ R.Km. 0.8 (Irrigon) | A | 4/16/95 | 495,137<br>(19,902)<br>(20,088) | RA-J-1<br>LA-J-l |
| | | 5/5/95 | 162,296 | |
| Little Sheep Creek @ R.Km. 8 (Irrigon) | A | 5/1/95 | 287,836<br>(20,551)<br>(20,223)<br>(20,342)<br>[1,500] | PA-J-2<br>LA-J-2<br>PA-J-4 |
| Deer Creek @ R.Km. 0.16 (Irrigon) | A | 4/21/95 | 278,778<br>[1,000] | |
| | | 5/8/95 | 154,196 | |
| Imnaha River @ R.Km. 22.8 (Irrigon) | A | 4/28/95 | 50,676 | |
| Grande Ronde River @ R.Km. 251.2 (Irrigon) | A | 4/10-11/95 | 200,023 | |
| Grande Ronde River @ R.Km. 45.9 (Cottonwood Ponds) | A | 4/5-28/95 | 206,182 | |
| Asotin Creek @ R.Km. 0.8 (Lyons Ferry) | A | 4126195 & 5/1/95 | 22,000<br>13,800 | |
| | | **Drainage Total** | 2,547,997 | |
| Clearwater River | | | | |
| Clearwater River (Dworshak NFH) | B | 4/24-28/95 | 1,213,577<br>(8,477)<br>(9,927)<br>(8,801)<br>(12,710)<br>[4,474] | <br>RD-3L-1<br>LD-3L-1<br>RD-7P-1<br>RA-7P-3 |

Table 3. Continued.

| Release site (hatchery) | Stock | Release date | No. released (No. branded) [No. Pit tagged] | Brand |
|---|---|---|---|---|
| Clear Creek (Dworshak NFH) | B | 4/17-20/95 | 348,118 (9,198) [317] | LD-7P-3 |
| (Clearwater) | B | 4/18/95 | 183,712 [900] | |
| Clearwater River @ Kamiah Bdg. (Dworshak NFH) | B | 4/17-20/95 | 150,746 [327] | |
| South Fork Clearwater River @ R.Km 14.0 (Dworshak NFH) | B | 4/17-20/95 | 281,544 | |
| South Fork Clearwater River @ Mill Creek (Clearwater) | B | 4/19-20/95 | 179,556 [285] | |
| Cottonwood Creek (Dworshak NFH) | B | 4/18-20/95 | 290,613 | |
| (Clearwater) | B | 4/20/95 | 105,402 [290] | |
| South Fork Clearwater River @ MT. Idaho Bdg. (Dworshak NFH) | B | 4/17-18/95 | 96,584 | |
| South Fork Clearwater River @ R.Km. 28.8 (Clearwater) | B | 4/19/95 | 119,292 [290] | |
| | | **Drainage Total** | **2,975,144** | |
| | | **GRAND TOTAL** | **9,491,222** | |

Table 4. Historical catch of hatchery chinook salmon (CH), wild chinook salmon (CW), hatchery steelhead trout (SH), and wild steelhead trout (SW) collected at the Snake, Clearwater, and Salmon River traps for the outmigration years of 1995 through 1993.

| | | Snake River trap | Clearwater River trap | Salmon River trap |
|---|---|---|---|---|
| 1995 | CH | 26,919 | 13,475 | 45,349 |
| | CW | 6,564 | 1,534 | 9,396 |
| | SH | 23,994 | 8,314 | 3,948 |
| | SW | 1,750 | 285 | 499 |
| 1994 | CH | 22,342 | 32,789 | 38,902 |
| | CW | 1,471 | 1,343 | 4,774 |
| | SH | 31,662 | 4,615 | 7,383 |
| | SW | 3,439 | 1,798 | 564 |
| 1993 | CH | 15,271 | 9,761 | 28,326 |
| | CW | 2,683 | 320 | 5,147 |
| | SH | 35,183 | 10,122 | 7,315 |
| | SW | 3,046 | 882 | 948 |

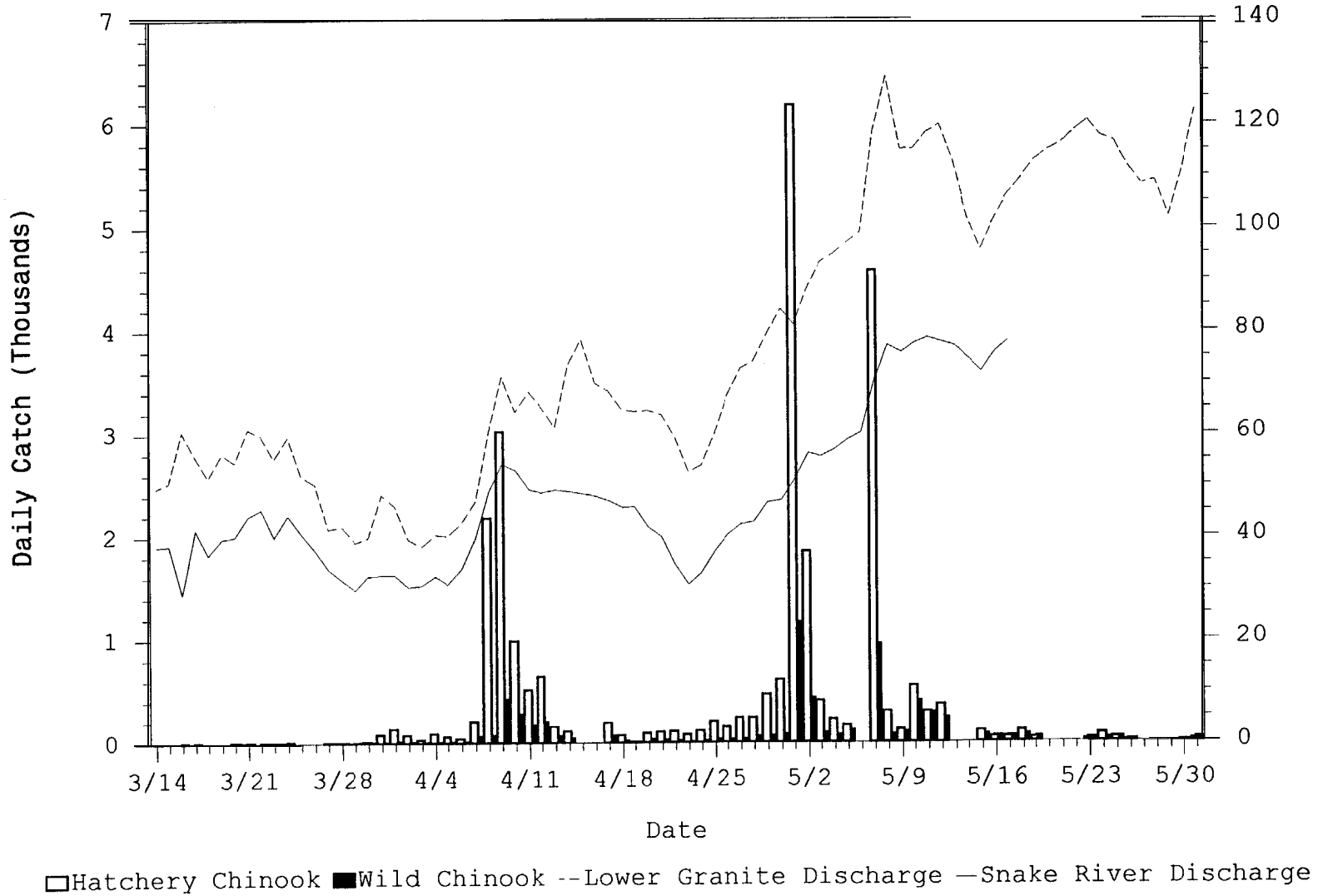


Figure 2. Snake River trap daily catch of hatchery chinook salmon and wild chinook salmon overlaid by Snake River discharge, 1995.

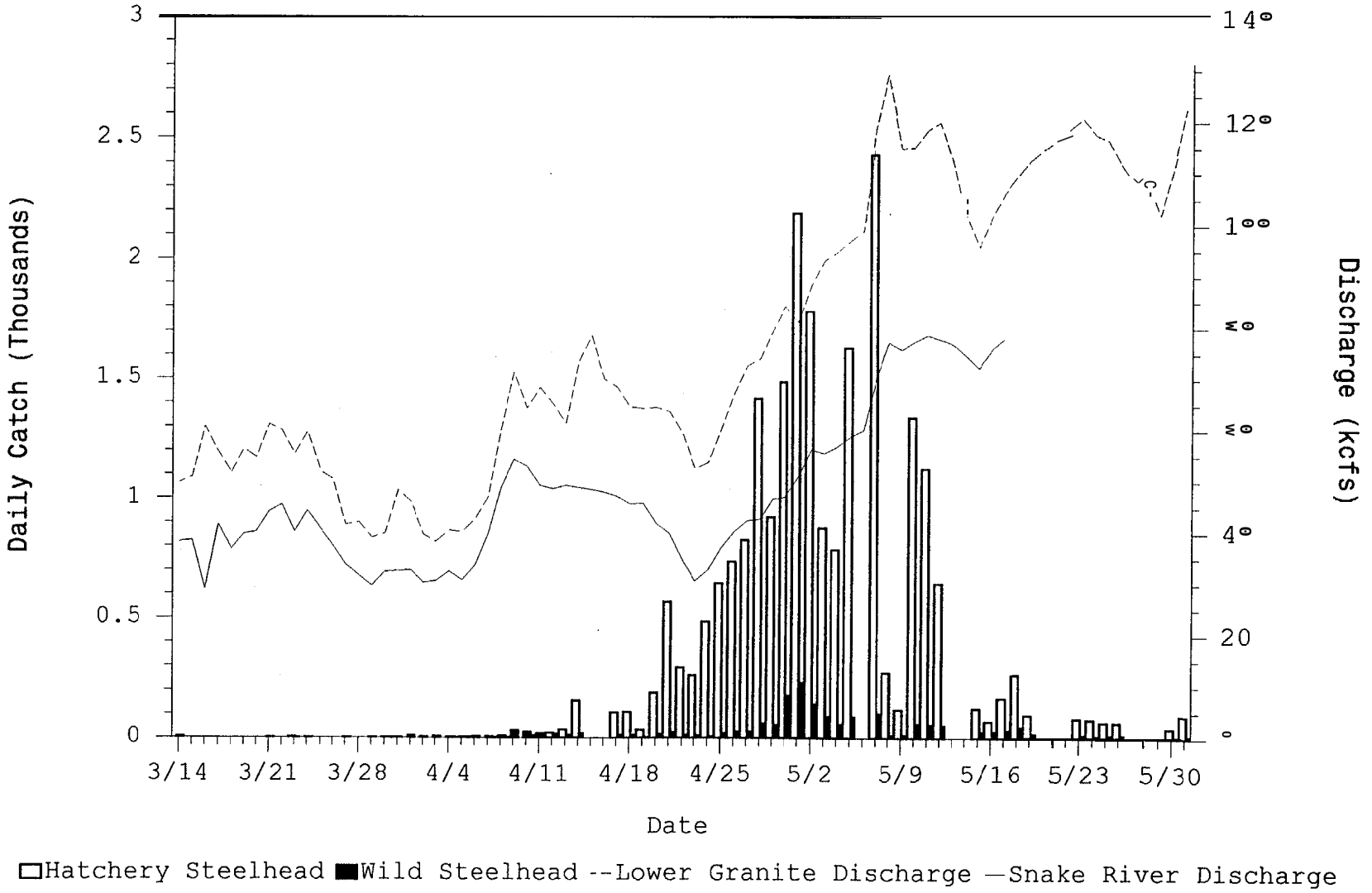


Figure 3. Snake River trap daily catch of hatchery steelhead trout and wild steelhead trout overlaid by Snake River discharge, 1995.

hatchery steelhead trout were collected at a rate of less than 100 per day throughout the remainder of the field season. Analysis of catch by month revealed that less than 1% of the season total was collected in March, 34% in April, 65% in May, and less than 1% in June (the trap was operated one day in June).

Wild steelhead trout passage timing was similar to hatchery steelhead trout passage (Figure 3). Peak passage began on April 28 and subsided on May 12. Seventy-one percent of the total catch for the season was collected during this period. Less than 1% of the total catch of wild steelhead trout was collected in March, 34% in April, 65% in May, and less than 1% in June. Major peaks in passage for both hatchery and wild steelhead trout were associated with increases in discharge. The relation between discharge and passage has been observed in past migration seasons.

Snake River discharge, measured at the Anatone gauge, ranged from 28.9 kcfs to 45.4 kcfs (March). The average discharge in March of 36.4 kcfs was 12.8 kcfs greater than in 1994, 1.5 kcfs less than in 1993, 14.6 kcfs greater than in 1992, and 4.2 kcfs less than in 1989 (1989 and 1993 were similar flow years). The average April discharge was 41.7 kcfs, with a peak of 54.2 kcfs on April 9. The April average discharge was 9.8 kcfs greater than in 1994, 8.2 kcfs less than in 1993, 17.1 kcfs greater than in 1992, but 16.8 kcfs lower than in 1989. The average May discharge was 78.1 kcfs, which was 33.2 kcfs greater than in 1994, 7.6 kcfs less than in 1993, 45.4 kcfs greater than in 1992, and 26 kcfs higher than in 1989. Flows were high at the beginning of June and remained so throughout the month. Average discharge for June was 92.8 kcfs, which was 67.6 kcfs greater than in 1994, 18 kcfs higher than in 1993, 75.9 kcfs greater than in 1992, and 18 kcfs greater than in 1989.

Water temperature at the Snake River trap steadily increased throughout the sampling season (Figure 4). By the end of the season (June 1) water temperature had risen to 14°C.

Secchi disk transparency measurements were taken daily at the Snake River trap. Transparencies fluctuated throughout the trapping season and ranged from 0.2 m to 2.18 m (Figure 4).

**Clear-water River Trap Operation**

The Clearwater River trap captured 13,475 age 1 hatchery chinook salmon, 1,534 age 1 wild chinook salmon, 1 age 0 chinook salmon, 8,314 hatchery steelhead trout, and 285 wild steelhead trout. There were only three sockeye/kokanee salmon captured in 1995 (Table 4).

Numbers of hatchery chinook salmon collected at the Clearwater River trap remained low (<100/d) for the first 25 days of the field season. Numbers began to increase on April 8 and passage of hatchery chinook salmon peaked on April 17. The Clearwater River trap was not in operation from May 3 to May 14 due to high discharge. Approximately 3% of the 1995 total catch was captured in March, about 90% in April, and about 7% in May. In order to reduce handling of chinook salmon smolts, the Clearwater River trap was not operated for three days immediately after the Dworshak and Kooskia National Fish Hatchery releases. The

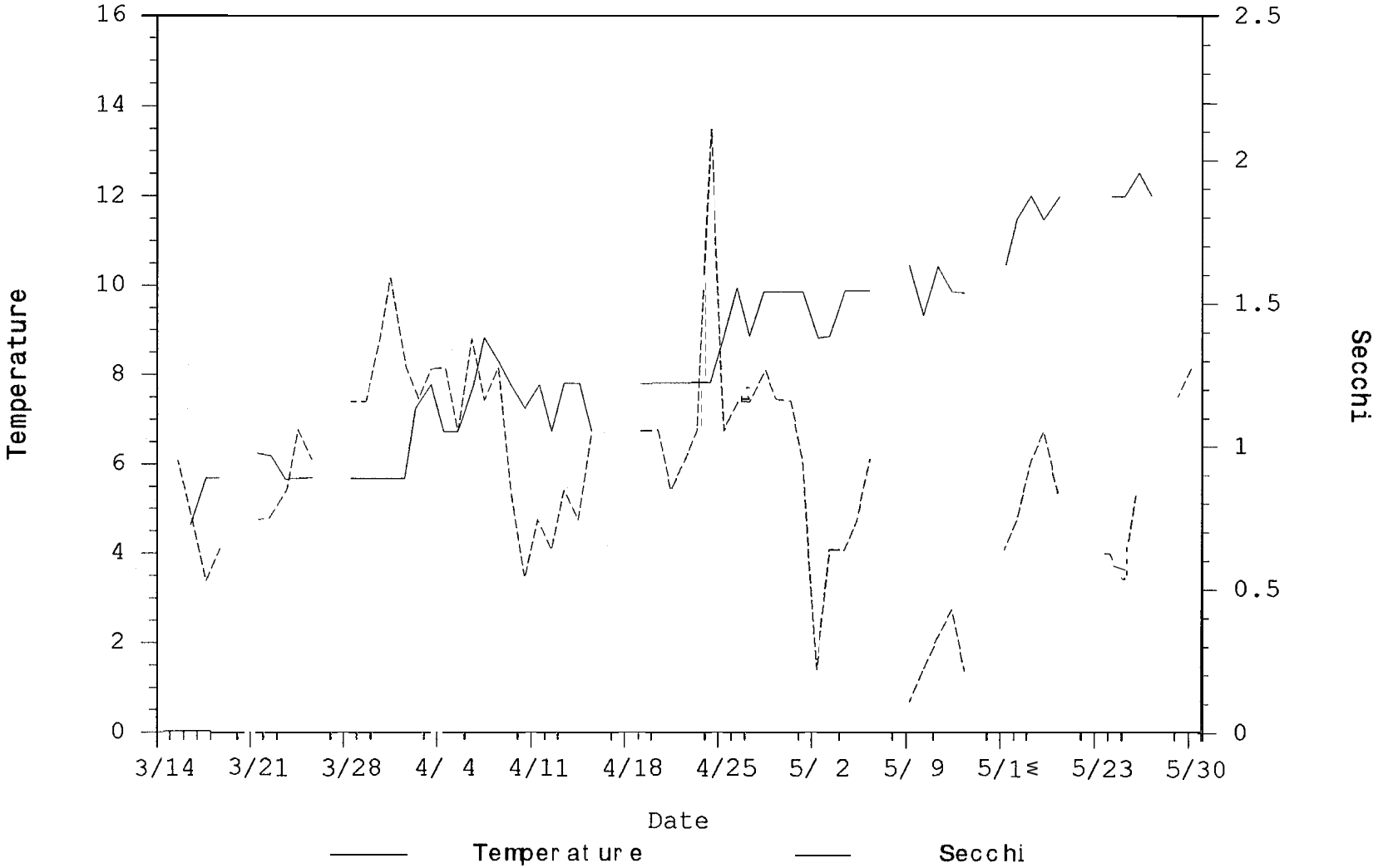


Figure 4. Daily temperatures and secchi disk transparency at the Snake River trap, 1995.

reduction of trap catch associated with this event would affect the percentages captured by month and the number of PIT-tagged fish interrogated from the two releases.

Wild chinook salmon began arriving at the trap in mid-March. Numbers remained low (<10/d) until March 20. Passage of wild chinook salmon began to increase on April 8 and peaked on April 10. Subsequent peaks in passage may have occurred but were not detected due to poor trapping conditions or because the trap was not in operation because weekly quotas had been reached. The timing of wild chinook salmon passage was similar to that of hatchery chinook salmon (Figure 5). Nearly 19% of the wild chinook salmon were collected in March, about 61% in April, and 20% in May.

There was only one peak of hatchery steelhead trout passage observed at the Clearwater River trap in 1995 (Figure 6). The peak began on April 20 and continued for an undetermined amount of time. Operations were temporarily suspended for about the first two weeks of May due to high discharge. A second peak in passage may have occurred while the trap was not in operation. There were no hatchery steelhead trout captured in March. Nearly 94% of the season total was captured in April, and approximately 6% of the season total was collected in May. Normally, about 40% of the hatchery steelhead are captured in April and 60% in May. Few hatchery steelhead were collected in May 1995 because the trap did not fish for 11 days due to high discharge, and when it was operating, flows were high so trap efficiency was low.

Although there were no obvious peaks in wild steelhead trout passage seen in 1995, a small increase in passage was observed from April 4 through April 12. Significant peaks in passage may not have been detected due to poor trap location (trap not in the thalweg) or the trap may have not been in operation when peak passage occurred (Figure 6). Three percent of the total catch of wild steelhead trout was collected in March, 80% in April, and about 17% in May.

Clearwater River discharge, measured at the Spalding gauge, ranged from 7.9 kcfs to 17.8 kcfs and averaged 12.6 kcfs for the month of March. Discharge began to increase in April and ranged from 9.0 kcfs to 37.5 kcfs. The average April discharge of 21.9 kcfs was 2.7 kcfs greater than in 1994, 2.6 kcfs greater than in 1993, but 8.0 kcfs less than in 1989. May discharge ranged from 23.8 kcfs to 53.3 kcfs. The average May discharge of 33.3 kcfs was virtually the same as in 1994 and 1989 but 14.2 kcfs lower than in 1993.

Water temperature measured at the Clearwater River trap ranged from 5°C to 12°C (Figure 7). Water temperatures fluctuated throughout the field season due to large releases of (15-20 kcfs) of cool water from Dworshak Reservoir.

Secchi disk transparency measurements were taken daily at the Clearwater River trap. Transparencies fluctuated throughout the trapping season and ranged from 0.2 m to 1.6 m (Figure 7).

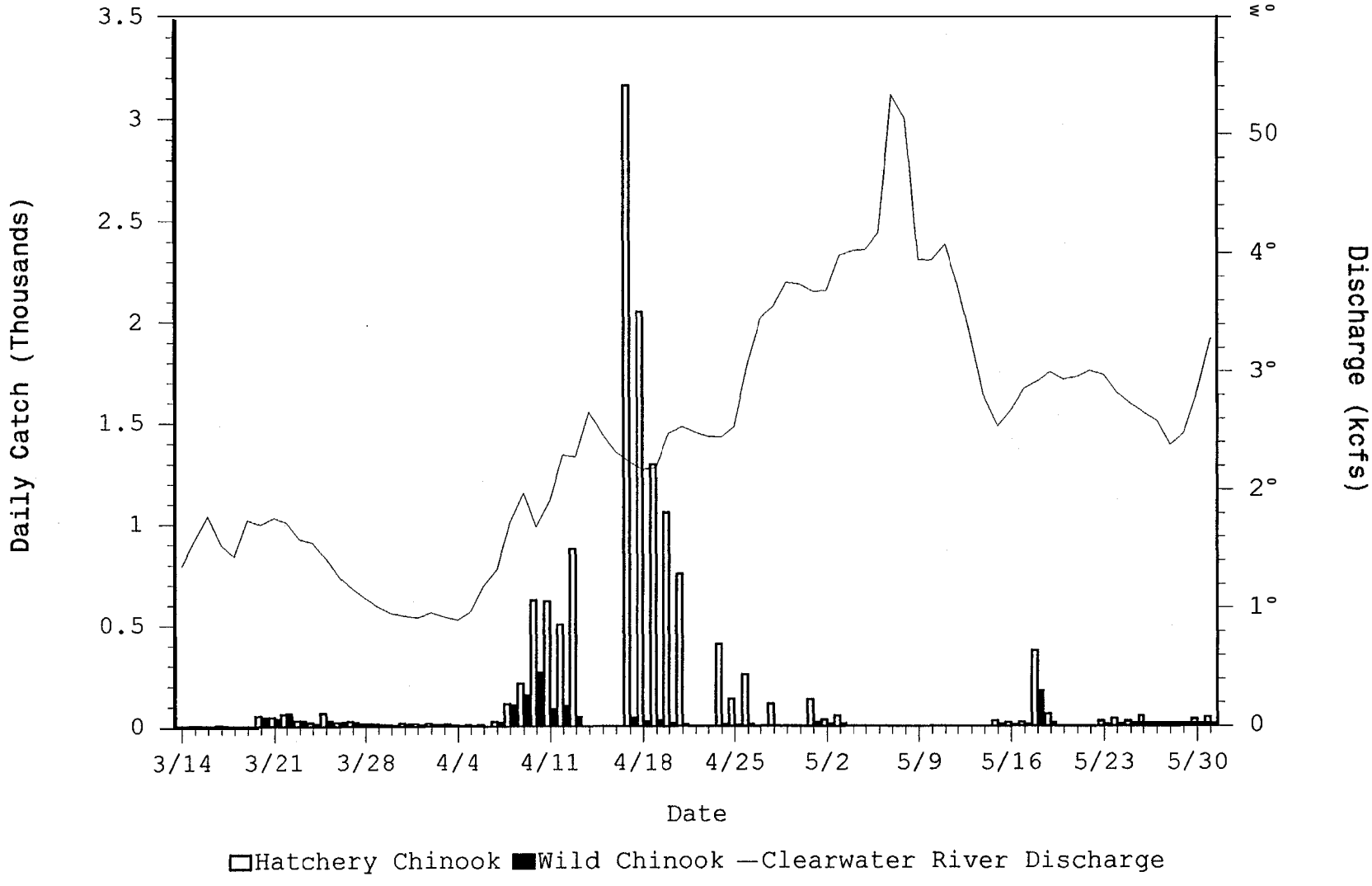


Figure 5. Clearwater River trap daily catch of hatchery chinook salmon and wild chinook salmon overlaid by Clearwater River discharge, 1995.

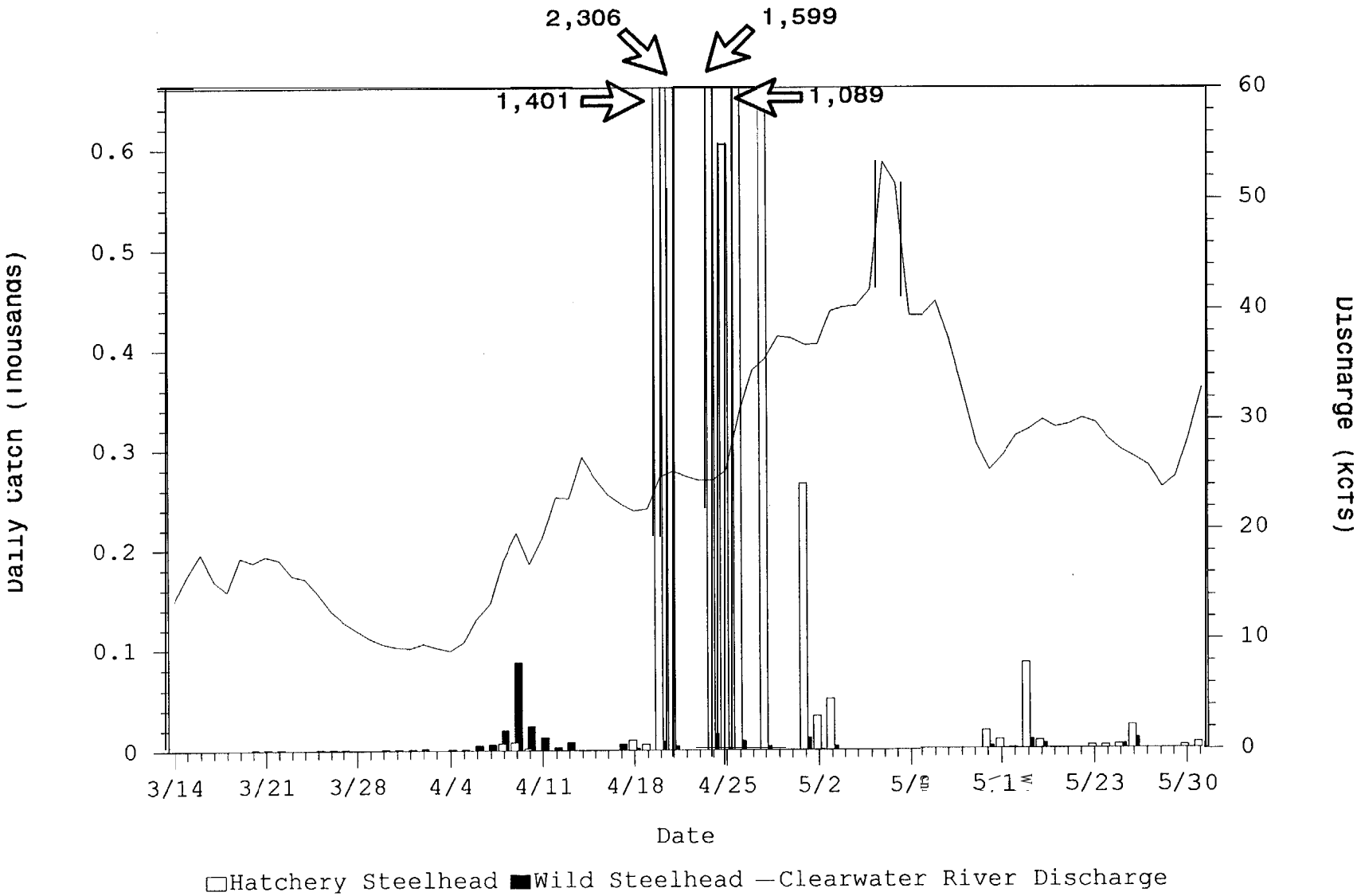


Figure 6. Clearwater River trap daily catch of hatchery steelhead trout and wild steelhead trout overlaid by Clearwater River discharge, 1995.

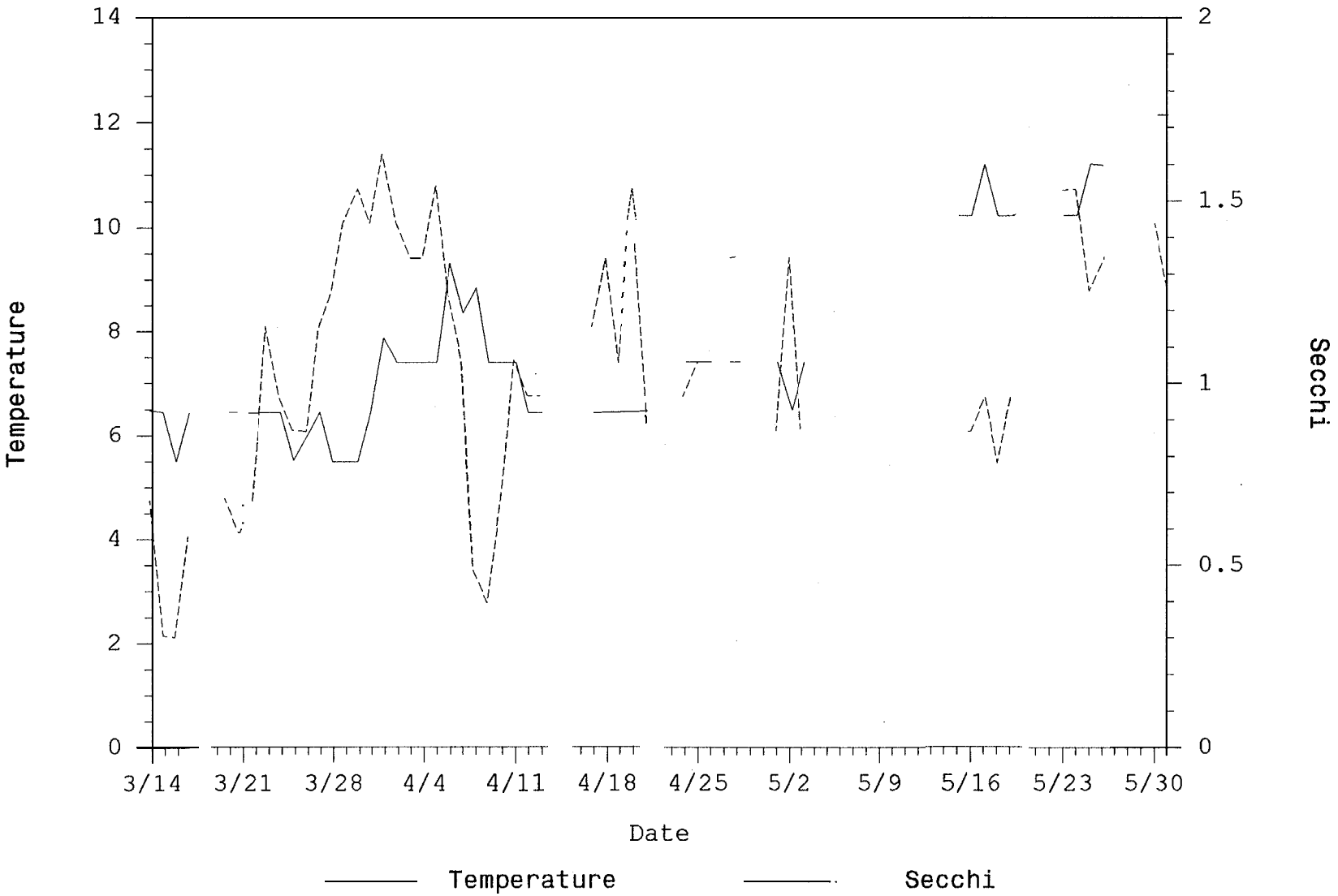


Figure 7. Daily temperature and secchi disk transparency at the Clearwater River trap, 1995.

## Salmon River Trap Operation

The Salmon River scoop trap captured 45,349 age 1 hatchery chinook salmon, 9,396 age 1 wild chinook salmon, 3,948 hatchery steelhead trout, and 499 wild steelhead trout. There were no sockeye/kokanee collected in 1995 (Table 4).

The Salmon River screw trap caught 1,045 hatchery chinook salmon and 376 wild chinook salmon but did not collect any hatchery or wild steelhead trout. The screw trap was not in operation when hatchery and wild steelhead trout outmigrated.

Large numbers (>400/d) of hatchery chinook salmon were collected daily during the latter part of March (Figure 8). Collection numbers increased significantly on March 28 due to the arrival of a large group of hatchery chinook salmon that originated from Rapid River Hatchery. Collections remained high (>200/d) until May 10 when the catch rate dropped to less than 100 per day. Any additional peaks in passage that may have occurred after May 18 were not detected due to poor trap location (trap not in thalweg). Daily trap catch of hatchery chinook salmon remained low (<100/d) for the remainder of the trapping season (Figure 8). The timing of the 1995 hatchery chinook salmon outmigration was several weeks earlier than the timing observed in 1994. The dissimilarity in timing between 1995 and 1994 can be attributed to differing hatchery release dates between the two years. Hatchery chinook salmon originating from Rapid River Hatchery were allowed to migrate nearly a month earlier in 1995 than in 1994. In addition to an earlier release date, hatchery chinook salmon experienced excellent migration conditions due to early spring rains and elevated river discharge. Twenty-four percent of the total catch of hatchery chinook salmon was captured in March (less than 1% collected in March 1994), 70% was collected in April, and 6% in May.

Wild chinook salmon began arriving at the Salmon River trap in high numbers (>50/d) in mid-March. There were three peaks in chinook passage (Figure 8). The first peak began on March 16 and reached its maximum on March 17. The second began on April 5 and peaked on April 10. The third peak started on April 25 and lasted until May 9. Any additional peaks in passage that may have occurred after May 18 were not detected due to poor trap location (trap not in thalweg). Wild chinook salmon outmigrated about two weeks earlier in 1995 than in 1994. Early spring rain and elevated river discharge was probably responsible for the early outmigration of wild chinook salmon in 1995. Nearly 22% of the total catch of wild chinook salmon was collected in March (less than 1% was collected in March 1994), about 59% was captured in April, and 19% in May.

One peak of hatchery steelhead trout passage was observed at the Salmon River trap in 1995. The peak began on April 14 and reached its apex on May 3 (Figure 9). The Salmon River trap was moved out of the thalweg on May 9 due to high discharge. Additional peaks in hatchery steelhead trout that might have occurred after May 9 were not detected due to poor trap location. There were no hatchery steelhead trout captured in March. About 44% of the season total was collected in April and 56% in May.

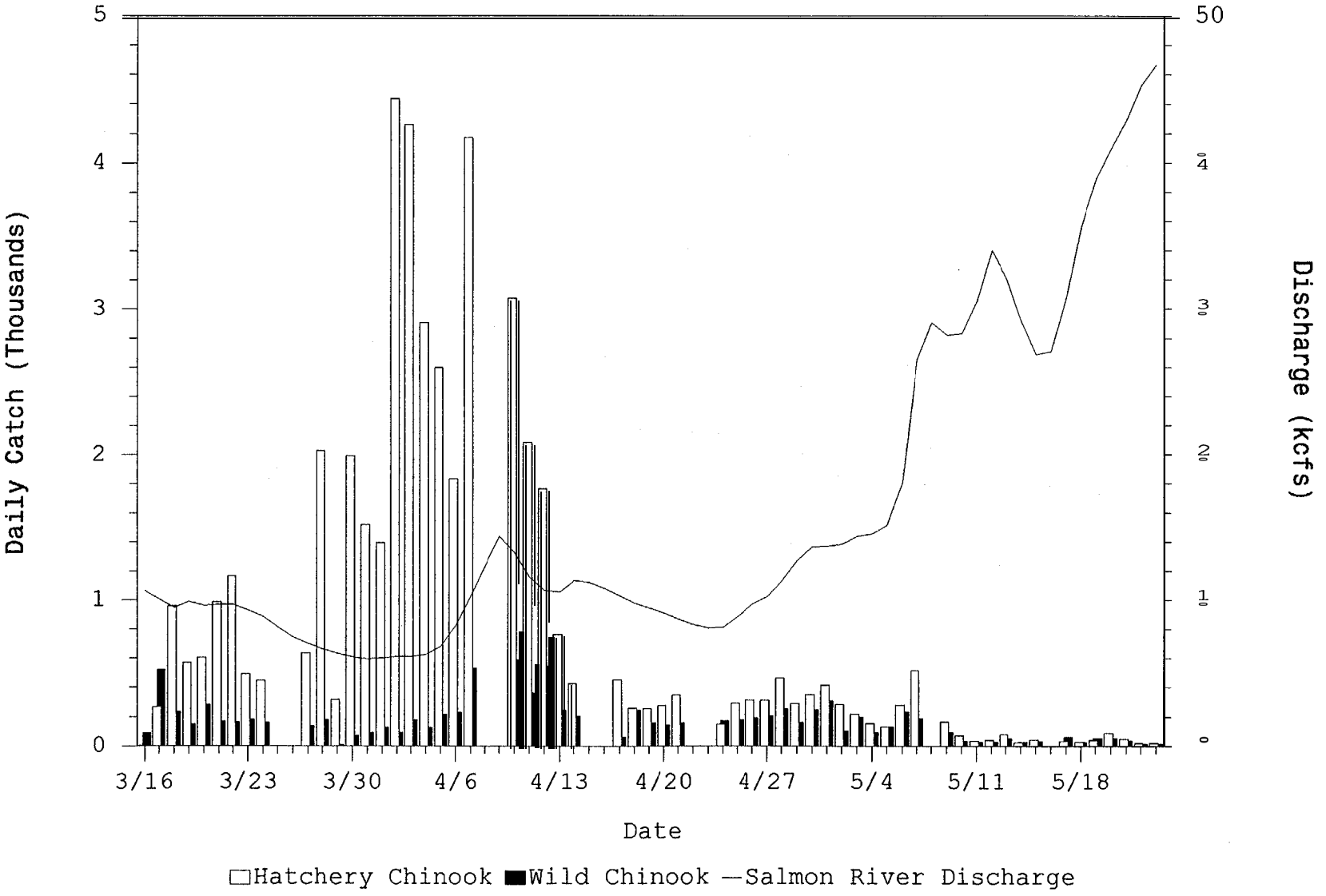


Figure 8. Salmon River trap daily catch of hatchery chinook salmon and wild chinook salmon overlaid by Salmon River discharge, 1995.

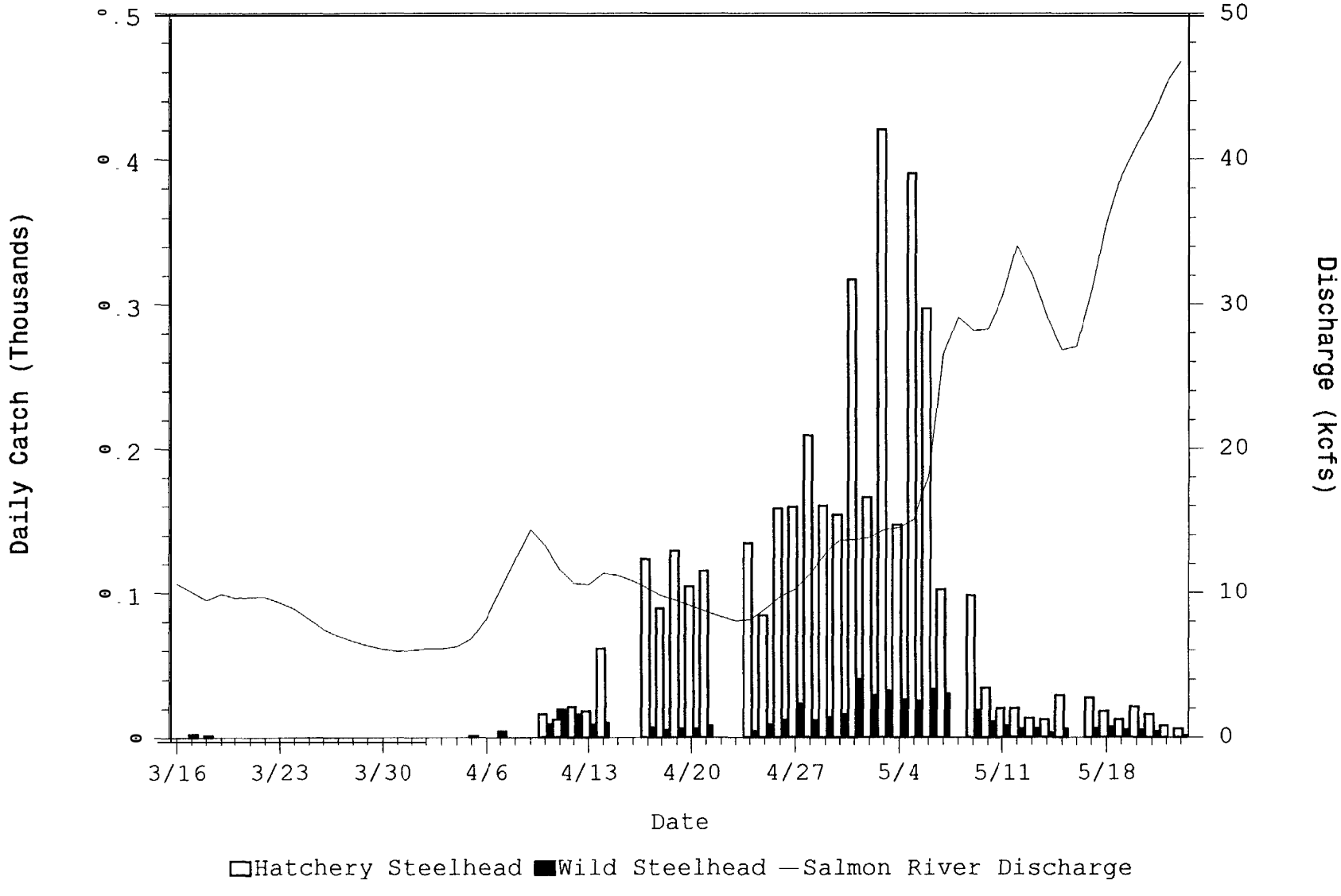


Figure 9. Salmon River trap daily catch of hatchery steelhead trout and wild steelhead trout overlaid by Salmon River discharge, 1995.

Wild steelhead trout began to arrive in small numbers (<5/d) at the beginning of April. Wild steelhead trout passage began to increase on April 10 and peaked on April 11. Passage began to increase again on April 25 and reached its maximum on May 1. Additional peaks in wild steelhead trout passage that might have occurred after May 9 were not detected due to poor trap location. Approximately 38% of the season total was captured in April, and 61% in May.

Salmon River discharge in March, measured at the White Bird gauge, ranged from 4.6 kcfs to 11.0 kcfs and averaged 7.7 kcfs. Average March discharge in 1995 was 3.3 kcfs greater than in 1994 and 2.1 kcfs greater than in 1992. Discharge increased in April and ranged from 6.0 kcfs to 14.4 kcfs. The April average discharge of 9.8 kcfs was 1.0 kcfs lower than in 1994 but 1.0 kcfs greater than in 1993. May average discharge was 32.3 kcfs and ranged from 13.7 kcfs to 49.1 kcfs. May average discharge for 1994 and 1993 was 20.3 kcfs and 38.9 kcfs, respectively.

Water temperatures at the Salmon River trap ranged from 4.0°C to 9.0°C and fluctuated throughout the field season (Figure 10). Secchi disk transparency fluctuated throughout the trapping season and ranged from 0.2 m to 2.4 m (Figure 10).

## Travel Time and Migration Rates

### Release Sites to Snake River Trap

**Hatchery Chinook** Salmon-In 1995, 83 hatchery chinook salmon were interrogated at the Snake River trap. Six chinook salmon released from the Imnaha River trap were captured at the Snake River trap. Migration time ranged from 1 to 12 d with the mean travel time being 3 d. Eleven hatchery chinook released from the Imnaha River Weir between March 28 and April 26 were captured at the Snake River trap. Migration time ranged from 2 to 22 d and averaged 8 d. Nine hatchery chinook released from Lookingglass Hatchery were captured at the Snake River trap. Travel time ranged from 1 to 25 d and averaged 4 d. Nineteen McCall Hatchery chinook salmon released on the South Fork of the Salmon River at the Knox Bridge were captured at the Snake River trap. Travel time varied from 15 to 46 d and averaged 29 d. Five chinook released from Rapid River Hatchery were captured at the trap. Travel time ranged from 8 to 37 d and averaged 24 d.

Twenty-two hatchery chinook salmon tagged at the Salmon River trap were interrogated at the Snake River trap. Travel time ranged from 1 d in early May when flows were high to 41 d in late March when flows were low and averaged 13 d for the season.

**Wild Chinook Salmon-** In 1995, 67 wild chinook salmon were interrogated at the Snake River trap. Forty of the fish were tagged in the spring of 1995, 22 of which were tagged at the Salmon River trap, and 27 were marked in the summer/fall of 1994. Seven wild chinook released from the Grande Ronde River trap were interrogated at the Snake River trap with a travel time of 1 d to 61 d and an average of 13 d. The only other location where wild chinook salmon were released with sufficient

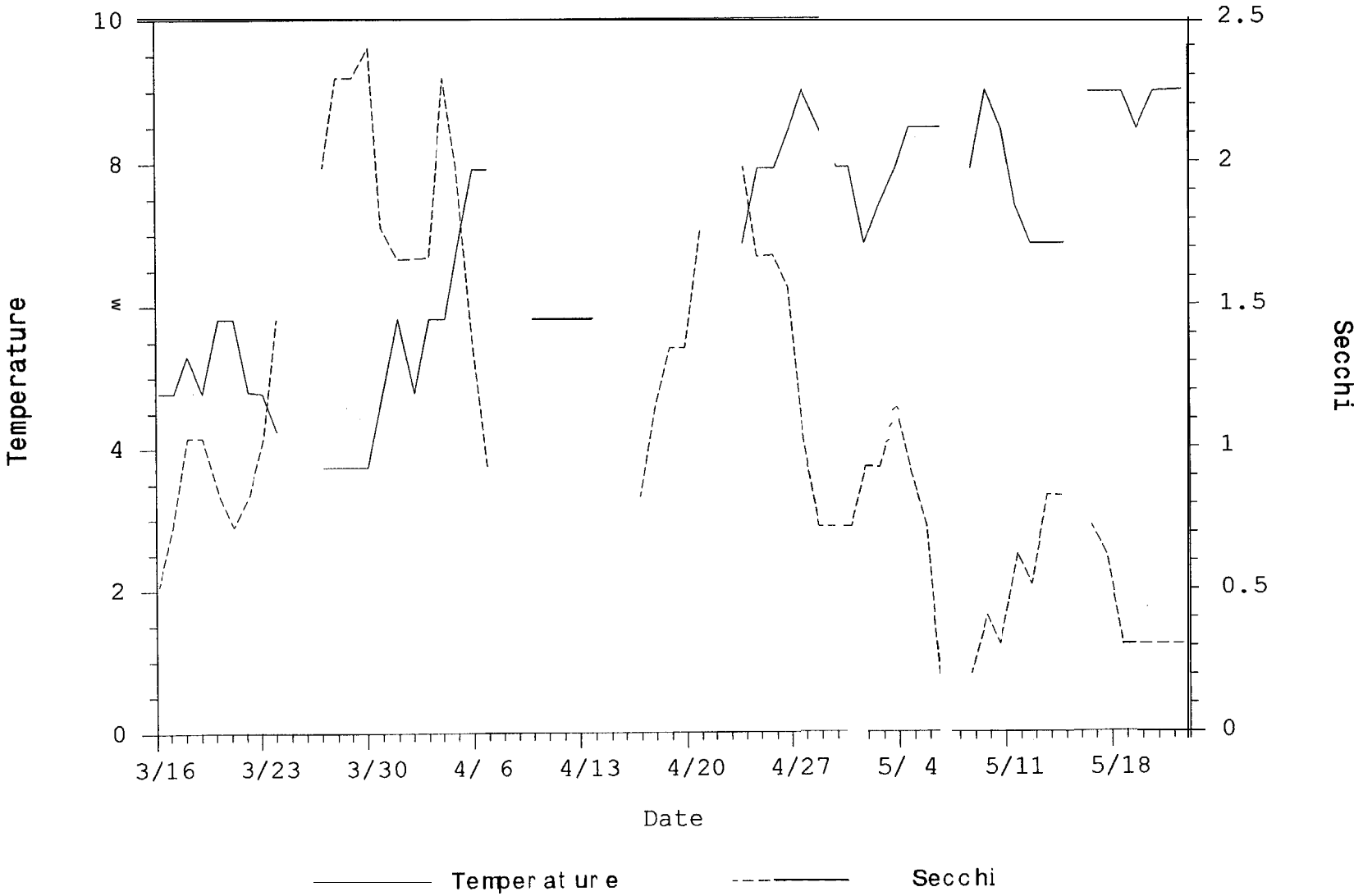


Figure10. Daily temperature and secchi disk transparency at the Salmon River trap, 1995.

numbers interrogated at the Snake River trap was from the Salmon River trap. Travel time from the Salmon River trap to the Snake River trap ranged from 1 d in mid-May when flows were high to 49 d in mid-March when flow and water temperature were low and averaged 14 d for the migration season.

**Hatchery Steelhead** Trout-In 1995, 34 PIT-tagged hatchery steelhead trout were interrogated at the Snake River trap. Nine were from a release from the Big Canyon Facility on Deer Creek. Mean travel time was 8.5 d (23 km/d). Four fish from the Little Sheep Creek group were interrogated at the trap and had an average travel time of 9.4 d (15 km/d). The only other release site which had enough recaptures at the Snake River trap to calculate travel time was the Salmon River trap groups. Travel time ranged from 1 d to 6 d and averaged 1.5 d.

**Wild Steelhead** Trout-In 1995, there were eight PIT-tagged wild steelhead trout interrogated at the Snake River trap. Two were PIT-tagged in the Grande Ronde River, one from the Imnaha River trap, one from the Pahsimeroi River trap, three from the Salmon River trap, and one from the Snake River trap.

**Sockeye Salmon-In** 1995, there was one hatchery sockeye salmon interrogated at the Snake River trap. The fish was released from the Redfish Lake Creek trap on April 19. Travel time was 22 d.

**Release Sites to the Clearwater River Trap**

**Hatchery Chinook** Salmon-In 1995, there were 80 PIT-tagged hatchery chinook salmon interrogated at the Clearwater River trap. This number is considerably less than 1994 (229) because a concerted effort was made in 1995 to reduce fish handling and stress by reducing trap catch. To reduce trap catch of the Dworshak and Kooskia national fish hatcheries releases, the trap was not operated for three days immediately after the releases, and because of this, only one PIT-tagged fish was interrogated from the Dworshak release. Interrogations from other release sites were 4 from American River, 5 from Papoose Creek, 35 from the spring release from Powell Rearing Pond and 3 from the fall release, 19 from the spring release from Crooked River Pond and 1 from the fall release, 1 from the 1994 summer release in Pete King Creek, 1 from Meadow Creek, and 7 from Newsome Creek. Mean travel time for the American River release was 5 d, the Papoose Creek chinook was about 8 d, the Powell Rearing Pond chinook was about 4 d, the Crooked River Pond fish was about 10 d, and the Newsome Creek fish was 8 d.

**Wild Chinook Salmon-In** 1995, there were 13 PIT-tagged wild chinook salmon interrogated at the Clearwater River trap. Release locations for the interrogated fish were as follows: American River (1), Crooked Fork Creek (1), Crooked River (1), Lolo Creek (4), Red River (5), and the lower Clearwater River (1 fall chinook). There were three fish PIT-tagged at the Clearwater River trap that were recaptured by the trap.

**Hatchery Steelhead Trout-In** 1995, 20 PIT-tagged hatchery steelhead trout were interrogated at the Clearwater River trap. Release locations for interrogated fish include: Clear Creek (7), Clearwater River (1), South Fork Clearwater River (2), Clearwater River trap (1), and Dworshak National Fish Hatchery (9). Travel time for the Clear Creek release was 2 d and for the Dworshak National Fish Hatchery release was less than 1 d.

**Wild Steelhead Trout-In 1995,** no PIT-tagged wild steelhead trout were interrogated at the Clearwater River trap.

**Release Sites to the Salmon River Trap**

**Hatchery Chinook Salmon-** In 1995, 80 PIT-tagged hatchery chinook salmon were interrogated at the Salmon River trap. Only two release groups had enough fish interrogated at the trap to calculate travel time; one group was released in the South Fork Salmon River and one from Rapid River Hatchery. Mean travel time for fish from the South Fork Salmon River was 21 d and for the Rapid River group was 3 d.

**Wild Chinook Salmon-In** 1995, 40 PIT-tagged wild chinook salmon were interrogated at the Salmon River trap. Five were from fall and spring tagging on Marsh Creek, eight from fall and spring tagging on the South Fork Salmon River, eight from fall and spring releases from Pahsimeroi River, two from Big Creek, one from Chamberlain Creek, three from the East Fork Salmon River, one from Camps Creek, two from Elk Creek, one from Herd Creek, five from spring and fall releases in the Lemhi River, and three from spring and fall releases at the Sawtooth trap.

**Hatchery Steelhead** Trout-In 1995, five PIT-tagged hatchery steelhead trout were interrogated at the Salmon River trap. Release locations were two from Hazard Creek, two from Herd Creek, and one from Lemhi River.

**Wild Steelhead Trout-In** 1995, one PIT-tagged wild steelhead trout was interrogated at the Salmon River trap. It was released in Rapid River.

**Sockeye** Salmon-In 1995, no PIT-tagged wild or hatchery sockeye salmon were interrogated at the Salmon River trap.

**Head of Lower Granite Reservoir to Lower Granite Dam**

The PIT tag sample rate at the dams changed significantly during the 1995 outmigration mainly due to the initiation of spill. This is the third year since the Smolt Monitoring Project began PIT tagging in 1987 that a significant period of spill occurred. The following example illustrates how median travel time estimates are affected by spill.

A group of fish tagged and released at the Snake River trap passes Lower Granite Dam over a ten-day period. When spill occurs, the facility sampling efficiency for these fish is decreased because a portion of the fish that would normally be sampled, instead pass via spill. Spill during the second half of the passage period could cause the number of fish during that half to be underestimated, making the date the median fish passed Lower Granite earlier than the actual date. Likewise, spill during the first half of the passage period would artificially shift the date of median passage later than the true date. The calculation of mean discharge for the median migration period is affected by the incorrect estimate of the median migration period. If discharge were increasing for the passage period of the above group and spill occurred during the second half thereby making the date of median passage earlier, then mean discharge for that group is also underestimated.

Another effect spill may have on migration rate is that the more highly smolted fish are more buoyant and migrate higher in the water column. They are also the fastest migrating fish (Beeman and Rondorf, in press). The ten-foot-deep debris boom in front of the turbines at Lower Granite Dam may divert a greater portion of these higher floating fish to the spill where they are not interrogated. A.greater portion of the deeper migrating, slower moving fish may migrate through the powerhouse and be collected and subsequently interrogated (Giorgi et al. 1988). This type of bias would incorrectly estimate migration rate with the estimated median migration rate being less than the true rate. This makes any interpretation of the PIT tag data at the dams extremely difficult during the periods of major operational changes. It also means that if fish that **are** collected at Lower Granite Dam are transported, then the portion of the population that passes Lower Granite is no longer representative of the population that arrived at Lower Granite.

**Hatchery Chinook Salmon PIT Tag Groups-In** 1995, hatchery chinook salmon smolts were PIT-tagged at the Snake River trap to provide travel time information through Lower Granite Reservoir. Forty-three daily PIT tag groups (3,927 total PIT-tagged hatchery chinook salmon) were released from the Snake River trap between March 31 and May 31 (Appendix A, Table A-1), providing median travel time estimates ranging from 18.2 d (3.6 km/d) in early April to 3.6 d (21.5 km/d) in mid-May.

Data stratified by 5-kcfs groups (Table 5) were used in a linear regression analysis. Migration rate was significantly related to discharge, indicating that PIT-tagged chinook salmon migration rate increased in Lower Granite Reservoir as discharge increased (Table 6).

The 1995 hatchery chinook salmon PIT tag groups released from the Snake River trap at discharge levels greater than 90 kcfs were affected by spill. As stated above, it is believed that spill compromises the ability to accurately estimate migration rate. If the migration rate/discharge relation is calculated for groups that passed Lower Granite before spill the relation is much stronger (Table 7).

The hatchery chinook salmon migration rate/discharge relation for Snake River trap PIT tag groups was examined to determine if there was

Table 5. Migration rates (km/d) stratified by 5-kcfs intervals from the Snake River trap to Lower Granite Dam, 1995.

| Discharge interval | Hatchery chinook | Wild chinook | Hatchery steelhead | Wild steelhead |
|---|---|---|---|---|
| 40 - 45 | - | | **6.90** | 7.10 |
| 45 - 50 | - | 6.00 | | **7.90** |
| 50 - 55 | | 4.80 | 8.50 | 7.20 |
| 55 - 60 | 3.18 | 8.47 | **12.90** | 12.38 |
| 60 - 65 | 4.44 | **7.39** | 13.30 | **9.62** |
| 65 - 70 | 5.05 | 7.64 | 12.80 | 11.53 |
| 70 - 75 | **7.90** | 10.05 | 12.40 | 15.70 |
| 75 - 80 | **9.30** | **12.90** | 14.30 | 16.15 |
| 80 - 85 | 11.70 | 13.50 | 20.60 | 20.40 |
| 85 - 90 | 12.20 | 13.80 | | 20.20 |
| 90 - 95 | | 11.20 | 17.45 | **20.95** |
| 95 - 100 | 7.80 | 11.60 | 18.10 | 20.33 |
| 100 - 105 | 10.40 | 11.50 | **18.95** | 22.10 |
| 105 - 110 | 10.34 | **9.45** | **19.33** | 30.60 |
| 110 - 115 | **9.57** | **10.01** | 20.25 | 22.64 |
| 115 - 120 | 12.00 | **11.12** | 22.75 | 25.57 |
| 120 - 125 | | | 26.00 | **31.90** |
| 125 - 130 | | - | 21.10 | 22.50 |
| 130 - 135 | 12.70 | - | | |
| 135 - 140 | | | | |

Table 6. Linear regression statistics for migration rate/discharge relation by species, rearing type, and trap, using data stratified by 5-kcfs intervals, 1995.

| Species | Trap | N | Intercept | Slope | $r^2$ | P |
|---|---|---|---|---|---|---|
| Hatchery chinook | SNK | 12 | -4.931 | 1.569 | 0.662 | 0.001 |
| | CLW | 12 | -6.312 | 1.834 | 0.904 | <0.001 |
| | SAL | 13 | -5.199 | 1.768 | 0.930 | <0.001 |
| Wild chinook | SNK | 15 | -0.698 | 0.667 | 0.354 | 0.019 |
| | CLW | 6 | -4.142 | 1.371 | 0.819 | 0.013 |
| | SAL | 13 | -3.165 | 1.416 | 0.698 | co.001 |
| Hatchery steelhead | SNK | 14 | -1.258 | 0.907 | 0.822 | <0.001 |
| | CLW | 11 | -0.681 | 0.727 | 0.640 | 0.003 |
| | SAL | 12 | -3.480 | 1.567 | 0.628 | 0.002 |
| Wild steelhead | SNK | 13 | -2.380 | 1.190 | 0.814 | <0.001 |
| | CLW | 5 | -1.884 | 1.055 | 0.614 | 0.117 |
| | SAL | 9 | -4.371 | 1.838 | 0.874 | <0.001 |

Table 7. Linear regression statistics for migration rate/discharge relation by species, rearing type, and trap, using data prior to spill which has been stratified by 5-kcfs intervals, 1995.

| Species | Trap | N | Intercept | Slope | $r^2$ | P |
|---|---|---|---|---|---|---|
| Hatchery chinook | SNK | 7 | -13.518 | 3.584 | **0.975** | **CO.001** |
| | CLW | 6 | -11.828 | 3.160 | **0.972** | <0.001 |
| | SAL | 7 | -6.445 | 2.062 | 0.838 | 0.004 |
| Wild chinook | SNK | 8 | -7.213 | 2.206 | **0.891** | **CO.001** |
| | CLW | 5 | -5.850 | 1.788 | 0.863 | 0.022 |
| | SAL | 8 | -8.896 | 2.775 | 0.924 | <0.001 |
| Hatchery steelhead | SNK | 6 | -2.030 | 1.089 | **0.479** | 0.128 |
| | CLW | 5 | -0.590 | 0.715 | 0.606 | 0.121 |
| | SAL | 6 | -10.674 | 3.246 | 0.905 | 0.003 |
| Wild steelhead | SNK | 6 | -2.563 | 1.234 | 0.607 | 0.068 |
| | CLW | -- | -- | -- | -- | -- |
| | SAL | 6 | -7.930 | 2.660 | 0.910 | 0.003 |

a difference in this relation among the eight years of available data (1988-1995). Due to the inability to differentiate between hatchery and wild, the 1988 through 1992 chinook salmon data were a combination of both hatchery and wild. Probably less than 10% of the chinook PIT-tagged in those years were wild. The analysis of covariance was used with the data averaged by 5-kcfs groups. The analysis showed a significant difference in the slope of the migration rate/discharge relation between years at the 0.05 level of significance ($F=9.163$, $N=76$, $P<0.001$). A graph of the data showed that 1989, 1993 prespill, and 1995 prespill data had slightly steeper slopes (Figure 11). With the three years' data removed, a significant difference in the slopes was not detected ($F=1.161$, $N=45$, $P=0.345$). The analysis of variance was used to determine if there was a sufficient overlap in the covariate (discharge) between years to continue with the analysis of covariance ($F=3.583$, $N=45$, $P<0.067$). The analysis of covariance was continued using the 1988, 1990-1992, and 1994 data to determine if there was a significant difference in the intercepts (height) of the lines. The analysis was unable to detect a difference in the intercepts ($F=2.393$, $N=45$, $P=0.067$) and the data were pooled. Linear regression analysis was conducted ($r^2=0.851$, $N=45$, $p<0.000$). The best linear regression equation was:

$$\ln(\text{migration rate}) = -3.485 + 1.306 \ln(\text{mean discharge}).$$

The analysis of covariance was conducted on the three years data (1989, 1993 prespill, 1995 prespill) that were removed from the above analysis. No significant difference was detected between the slopes of the three years' data ($F=1.807$, $N=24$, $P=0.193$), but a significant difference was detected in the intercepts ($F=56.971$, $N=24$, $P<0.000$). A graph showed that the height of the 1989 data was different. The analysis was continued using the 1993 and 1995 prespill data and no significant difference in the intercept could be detected ($F=2.570$, $N=14$, $P=0.137$). The two years data were pooled and the linear regression analysis conducted ($r^2=0.916$, $N=14$, $P<0.000$). The best linear regression equation was:

$$\ln(\text{migration rate}) = -12.069 + 3.261 \ln(\text{mean discharge}).$$

Comparing the 1988 through 1995 migration rate/discharge equations for chinook, it is apparent that in the discharge range between 30 and 150 kcfs, all years showed the same basic pattern: as discharge increases, migration rate increases (Figure 11). The amount of increase between 60 and 100 kcfs is consistent for 1988, 1990 to 1992, and 1994 (2.0-fold) but considerably higher for 1989 (5.6-fold) and 1993 prespill and 1995 prespill (5.3-fold).

Thirty daily groups (totaling 2,467 hatchery chinook salmon) were released from the Clearwater River trap between March 21 and May 30 (Appendix A, Table A-5) providing median travel time estimates ranging from 29.7 d (2.1 km/d) in late March to 4.1 d (14.0 km/d) at the end of May.

Migration rate and discharge data stratified by 5-kcfs groups (Table 8) were used for a linear regression analysis. The linear regression analysis of the Clearwater River hatchery chinook salmon PIT tag data showed a significant correlation between migration rate and discharge

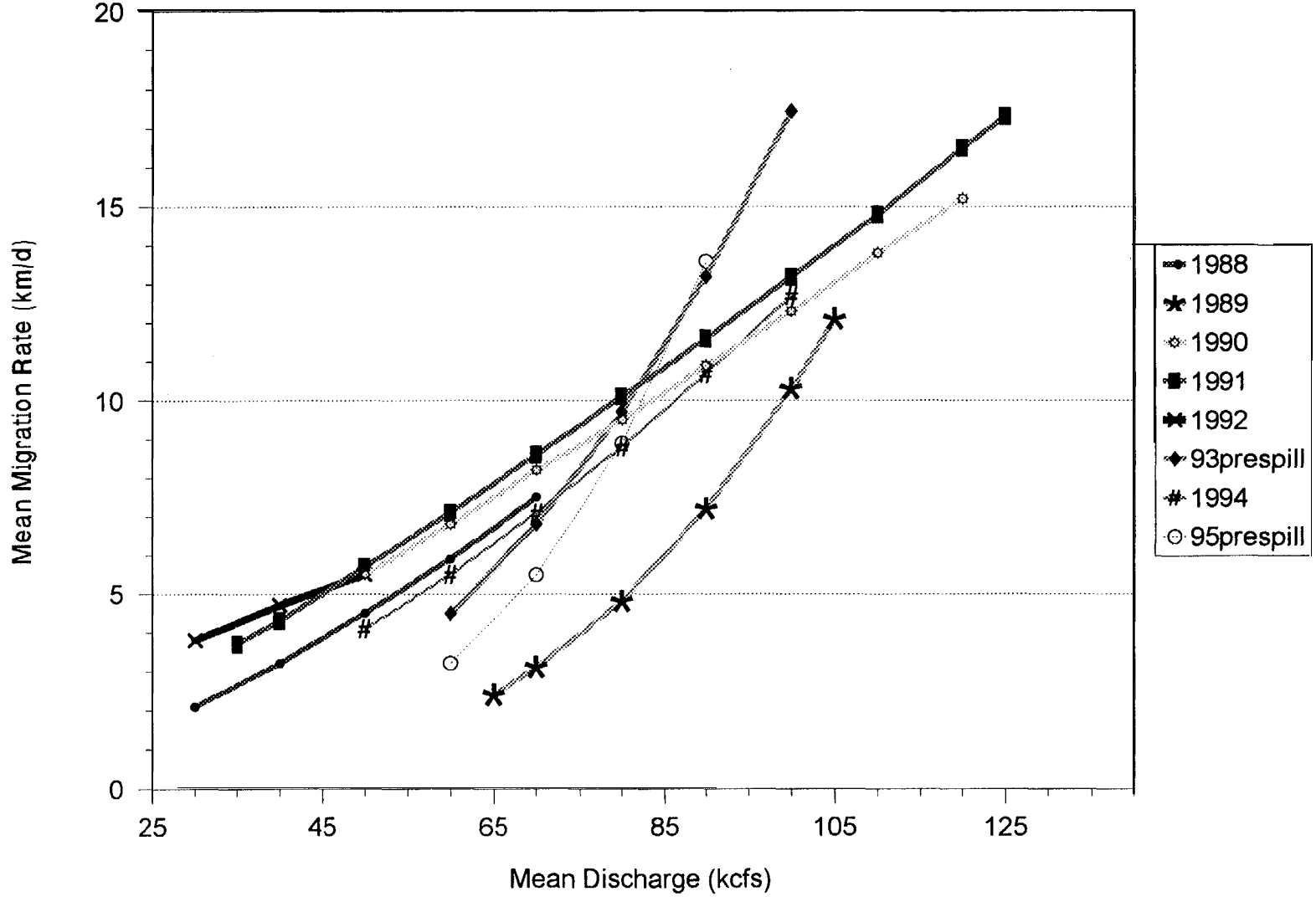


Figure 11 Chinook salmon migration rate/discharge relations for Snake River trap PIT-tag groups, 1988-1995.

Table 8. Migration rates (km/d) stratified by 5-kcfs intervals from the Clearwater River trap to Lower Granite Dam, 1995.

| Discharge interval | Hatchery chinook | Wild chinook | Hatchery steelhead | Wild steelhead |
|---|---|---|---|---|
| 40 - 45 | | 8.20 | | |
| 45 - 50 | 6.10 | 3.32 | | 5.40 |
| 50 - 55 | 2.56 | 3.68 | | 3.45 |
| 55 - 60 | 3.28 | 6.14 | 11.00 | 11.73 |
| 60 - 65 | 3.53 | 6.40 | 10.20 | 10.67 |
| 65 - 70 | 4.79 | 6.20 | 13.27 | 9.91 |
| 70 - 75 | 6.80 | 8.75 | 12.80 | 13.05 |
| 75 - 80 | 7.00 | 13.30 | 12.55 | 20.40 |
| 80 - 85 | | | | |
| 85 - 90 | | | | 13.90 |
| 90 - 95 | 5.90 | 11.90 | 11.50 | |
| 95 - 100 | | | 11.10 | |
| 100 - 105 | 8.50 | 4.95 | 17.60 | 13.10 |
| 105 - 110 | 10.37 | 9.97 | 14.40 | |
| 110 - 115 | 11.80 | 8.15 | 18.05 | 24.40 |
| 115 - 120 | 10.90 | 8.30 | | |
| 120 - 125 | | | 19.90 | 19.00 |
| 125 - 130 | 14.00 | | | |
| 130 - 135 | | 10.70 | | |
| 135 - 140 | | | | |

(Table 6). The regression analysis showed that 90% of the variation in migration rate was accounted for by change in discharge.

The 1995 hatchery chinook salmon PIT tag groups released from the Clearwater River trap at discharge levels greater than 90 kcfs were affected by spill. If the migration rate/discharge relation is calculated for groups that passed Lower Granite before spill the relation is only slightly stronger (Table 7).

Fifty-eight daily groups (totaling 5,074 hatchery chinook salmon) were released from the Salmon River trap from March 16 through May 23 (Appendix A, Table A-9) providing median travel time estimates ranging from 37.1 d (5.8 km/d) in mid-March to 7.5 d (28.8 km/d) in early May.

Data stratified by 5-kcfs groups (Table 9) were used in the regression analysis. The linear regression analysis of the Salmon River hatchery chinook salmon PIT tag data showed a strong correlation between migration rate and discharge (Table 6).

**Wild Chinook Salmon PIT Tag** Groups-In 1995, wild chinook salmon smolts were PIT-tagged at the Snake River trap to provide travel time information through Lower Granite Reservoir. Thirty-seven daily groups (totaling 2,067 wild chinook salmon) were released from the Snake River trap from March 31 through May 31 (Appendix A, Table A-2).

Data stratified by 5-kcfs groups (Table 5) were used in the regression analysis. The linear regression analysis of the Snake River wild chinook salmon PIT tag data detected a significant correlation between migration rate and discharge, although $r^2$ was relatively poor (Table 6).

The 1995 wild chinook salmon PIT tag groups released from the Snake River trap at discharge levels greater than 90 kcfs were affected by spill. As stated above, it is believed that spill compromises the ability to accurately estimate migration rate. If the migration rate/discharge relation is calulated for groups that passed Lower Granite before spill the relation is much stronger (Table 7).

In 1995, 14 daily groups (totaling 1,051 wild chinook salmon) were PIT-tagged at the Clearwater River trap for migration rate analysis from March 21 through May 30 (Appendix A, Table A-6).

Data stratified by 5-kcfs groups (Table 8) were used in the regression analysis. The linear regression analysis of the Clearwater River wild chinook salmon PIT tag data detected a significant correlation between migration rate and discharge (Table 6).

In 1995, wild chinook salmon smolts were PIT tagged at the Salmon River trap to provide travel time information through Lower Granite Reservoir. Fifty-three daily groups (totaling 3,937 wild chinook salmon) were released from the Salmon River trap from March 16 through May 23 (Appendix A, Table A-10).

Data stratified by 5-kcfs groups (Table 9) were used in the regression analysis. The linear regression analysis of the Salmon River

Table 9. Migration rates (km/d) stratified by 5-kcfs intervals from the Salmon River trap to Lower Granite Dam, 1995.

| Discharge interval | Hatchery chinook | Wild chinook | Hatchery steelhead | Wild steelhead |
|---|---|---|---|---|
| 50 - 55 | 7.80 | 8.35 | - | 7.30 |
| 55 - 60 | 6.39 | 12.32 | | 16.95 |
| 60 - 65 | 7.93 | 15.93 | 19.20 | 24.70 |
| 65 - 70 | 10.48 | 16.51 | 19.26 | 21.48 |
| 70 - 75 | 10.83 | 28.55 | 30.10 | 33.25 |
| 75 - 80 | 12.07 | 25.80 | 40.40 | 44.50 |
| 80 - 85 | 18.30 | 30.65 | 42.10 | 55.90 |
| 85 - 90 | | 31.30 | 47.80 | 54.75 |
| 90 - 95 | 17.80 | 28.40 | | 59.70 |
| 95 - 100 | 21.65 | | 28.90 | 69.70 |
| 100 - 105 | 22.00 | 28.35 | 37.53 | 48.15 |
| 105 - 110 | 21.20 | 27.05 | 36.10 | |
| 110 - 115 | 20.25 | 28.48 | 47.83 | 60.43 |
| 115 - 120 | 22.85 | 26.57 | 50.44 | 63.32 |
| 120 - 125 | | | 81.30 | 87.20 |

wild chinook salmon PIT tag data detected a significant correlation between migration rate and discharge (Table 6).

The 1995 wild chinook salmon PIT tag groups released from the Salmon River trap at discharge levels greater than 90 kcfs were affected by spill. If the migration rate/discharge relation is calulated for groups that passed Lower Granite before spill the relation is much stronger (Table 7).

**Hatchery Steelhead Trout PIT Tas** Groups-Sufficient numbers of hatchery steelhead trout were PIT-tagged daily at the Snake River trap to provide 38 daily release groups (2,244 individual fish) for median migration rate calculations through Lower Granite Reservoir from March 31 through May 31 (Appendix A, Table A-3). Median travel time ranged from 5.1 to 1.8 d (10.2 km/d to 28.2 km/d migration rate) and averaged 3.2 d (17.5 km/d).

Linear regression analysis detected a significant relation between migration rate in Lower Granite Reservoir and average Lower Granite inflow (Table 5) for PIT-tagged hatchery steelhead trout groups (Table 6). The equation shows that as discharge increases, migration rate increases.

The hatchery steelhead trout migration rate/discharge relation for Snake River trap PIT tag groups **was** examined to determine if there was a difference in this relation between years (1988-1995). The analysis of covariance was used with the data averaged by 5-kcfs groups. The analysis showed a significant difference in the slope of the migration rate/discharge relation between years ($F=3.241$, $N=82$, $P<0.005$).

The slope of the regression line for 1988, 1992, and 1994 was slightly less steep than the other years' data (Figure 12). Interestingly, these three years are the poorest flow years of the present drought. After removing the three years' data, a significant difference in the slopes was not detected between the remaining years ($F=0.488$, $N=55$, $P=0.744$). The analysis of covariance was continued and a significant difference was detected in the intercepts (heights) of the four years' data ($F=5.227$, $N=55$, $P=0.001$). Figure 12 shows the differences are minor, so the data were pooled, despite the difference in the height of the lines, and the regression analysis was run. A very strong relation was found between migration rate and discharge ($r^2=0.871$, $N=55$, $P<0.001$). The linear regression equation was:

$$\ln(\text{migration rate}) = -4.177 + 1.556 \ln(\text{mean discharge}).$$

The analysis of covariance was used with the three years' data (1988, 1992, and 1994), which were removed from the above analysis, and no significant difference between years was detected ($F=0.013$, $N=27$, $P=0.987$). The analysis of covariance was continued and a significant difference was detected in the intercepts (heights) of the three years' data ($F=4.618$, $N=27$, $P=0.021$). Figure 12 shows that the differences are not major, so the data were pooled despite the difference in the height of the lines and the regression analysis was run. A very strong relation was found between migration rate and discharge ($r^2=0.865$, $N=27$, $P<0.001$). The linear regression equation was:

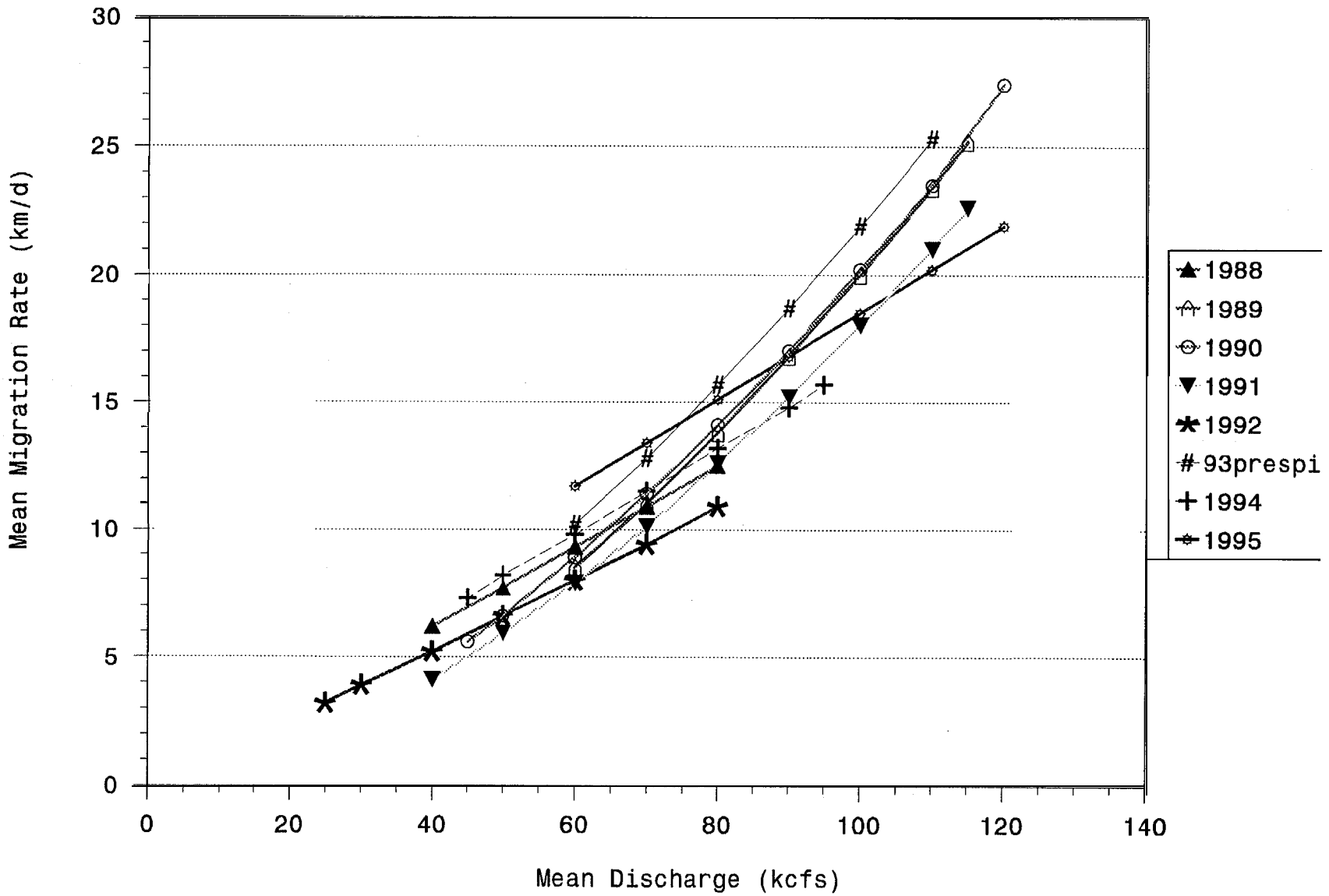


Figure 12. Hatchery steelhead migration rate/discharge relations for Snake River trap PIT-tag groups, 1988-1995.

ln (migration rate) = -2.568 + 1.163 ln (mean discharge).

Using the two data sets from above, a 2-fold increase in discharge will translate into a 2.9-fold increase in migration rate through Lower Granite Reservoir for the first group and a 2.2-fold increase for the second group of hatchery steelhead marked at the Snake River trap. Fish from the three severe drought years had slightly faster migration rates below 65 kcfs and slightly slower migration rates above 65 kcfs than do fish from the higher flow years, implying the importance to fish migration of other factors (water temperature, migration timing, stock, smoltification, etc.) are greater in extreme low flow years. These data also imply that the other factors do not move fish as well as higher flow does thereby emphasizing the importance of discharge to move fish downriver.

Thirteen groups of hatchery steelhead trout (867 fish) were PIT-tagged at the Clearwater River trap in 1995 for use in median migration rate calculations through Lower Granite Reservoir (Appendix A, Table A-7). Median travel time ranged from 7.3 to 3.1 d (8.4 km/d to 19.9 km/d) and averaged 4.9 d (13.2 km/d).

Data stratified by 5-kcfs groups were used in the regression analysis (Table 8). Linear regression analysis detected a significant relation between migration rate in Lower Granite Reservoir and average Lower Granite inflow for PIT-tagged hatchery steelhead trout groups (Table 6). The equation shows that as discharge increases, migration rate increases.

Thirty-one groups of hatchery steelhead trout (1,556 fish) were PIT-tagged at the Salmon River trap in 1995 for use in median migration rate calculations to Lower Granite Reservoir (Appendix A, Table A-11). Median travel time ranged from 14.1 to 2.7 d (15.3 km/d to 81.3 km/d) and averaged 7.2 d (36.8 km/d).

Data stratified by 5-kcfs groups were used in the regression analysis (Table 9). The linear regression analysis detected a significant relation between migration rate in Lower Granite Reservoir and average Lower Granite discharge for PIT-tagged hatchery steelhead trout groups marked at the Salmon River trap (Table 6). The equation shows that as discharge increases, migration rate increases.

The 1995 hatchery steelhead trout PIT tag groups released from the Salmon River trap at discharge levels greater than 90 kcfs were affected by spill. If the migration rate/discharge relation is calulated for groups that passed Lower Granite before spill the relation is much stronger (Table 7). Not only did the correlation coefficient improve but the effect of discharge on migration rate became much more pronounced. A 2-fold increase in discharge accounted for a 3-fold increase in migration rate when the entire season's data are included and a 9.5-fold increase when prespill data are used. As explained earlier, spill affects the ability to accurately estimate migration rate.

**Wild Steelhead Trout PIT Tas** Groups-Sufficient numbers of wild steelhead trout were PIT-tagged at the Snake River trap to provide 32 daily release groups (1,537 fish) for estimating travel time and

migration rate to Lower Granite Dam (Appendix A, Table A-4). Median travel time ranged from 5.6 d (9.2 km/d) to 1.6 d (32.0 km/d) and averaged 2.9 d (19.7 km/d).

Data stratified by 5-kcfs groups were used in the regression analysis (Table 5). Linear regression analysis showed a strong significant relation between median migration rate in Lower Granite Reservoir and mean discharge for PIT-tagged wild steelhead trout groups (Table 6). The analysis shows that 81% of the variation in migration rate is accounted for by changes in discharge. In other words, migration rate is very dependent on discharge; the higher the discharge, the faster wild steelhead trout migrate.

The wild steelhead trout migration rate/discharge relation for fish released from the Snake River trap was examined to see if this relation was constant over years. The analysis of covariance was used to determine if there was a significant difference between years (1988-1995) in migration rates using groups averaged by 5-kcfs intervals. The analysis showed no significant difference in the slopes between years for wild steelhead trout migration rate/discharge relations ($F=1.626$, $N=86$, $P=0.142$). The analysis was continued and no significant difference was detected in the intercepts (heights) of the regression lines between years ($F=0.985$, $N=86$, $P=0.449$). The data were pooled and the linear regression analysis was run using the log transformed data ($r^2=0.840$, $N=86$, $P<0.001$). The best linear regression equation was:

$$\ln(\text{migration rate}) = -1.920 + 1.079 \ln(\text{mean discharge}).$$

The analysis indicates that 84% of the variation in migration rate for PIT-tagged wild steelhead trout released from the Snake River trap between 1988 and 1995 was accounted for by changes in discharge. The equation shows that a 2-fold increase in discharge will increase migration rate 2.1 times.

Nine wild steelhead trout PIT-tagged groups (268 fish) were released from the Clearwater River trap in 1995 for median migration rate calculations through Lower Granite Reservoir (Appendix A, Table A-8). Median travel time ranged from 6.5 d to 2.6 d (9.5 to 23.7 km/d respectively) and averaged 4.6 d (13.4 km/d).

Data stratified by 5-kcfs groups were used in the regression analysis (Table 8). The linear regression analysis was unable to detect a significant relation between migration rate and discharge for wild steelhead trout groups released from the Clearwater River trap (Table 6). The inability to detect a relation was due to the lack of data over a wide discharge range. Six of the nine data points occurred at a discharge range between 60 and 70 kcfs. As observed in previous years (Buettner and Brimmer 1992, 1994), too little migration rate data and/or data over a narrow discharge range reduces the ability to estimate the effects of discharge on migration rate.

Fourteen groups of wild steelhead trout (435 fish) were PIT-tagged at the Salmon River trap in 1995 for use in median migration rate calculations to Lower Granite Dam (Appendix A, Table A-12). Median travel time ranged from 10.5 to 2.5 d (20.5 km/d to 87.2 km/d) and averaged 4.8 d (44.9 km/d).

Data stratified by 5-kcfs groups were used in the regression analysis (Table 9). The linear regression analysis detected a significant relation between migration rate in Lower Granite Reservoir and average Lower Granite discharge for PIT-tagged wild steelhead trout groups marked at the Salmon River trap (Table 6). The equation shows that **as** discharge increases, migration rate increases.

The 1995 wild steelhead trout PIT tag groups released from the Salmon River trap at discharge levels greater than 95 kcfs were affected by spill. If the migration rate/discharge relation is calculated for groups that passed Lower Granite before spill the correlation coefficient changes very little but the slope of the regression line steepens considerably (Table 7). Not only did the correlation coefficient improve but the effect of discharge on migration rate became much more pronounced. A 2-fold increase in discharge accounted for a 3.6-fold increase in migration rate when the entire season's data are included and a 6.3-fold increase when prespill data are used. As explained earlier, spill effects the ability to accurately estimate migration rate.

## Interrwation of PIT-Taqged Fish

Interrogation data in 1995 are not directly comparable with the earlier years. All species-run-rearing types will be underestimated due to a reduction in collection efficiency during spill at the dams. During other times of the season, the interrogation rate may vary sporadically due to fluctuations in turbine operations. The fourth collection facility in the system, at Lower Monumental Dam, became operational in 1993, and therefore total interrogations may be greater beginning in 1993 than in previous years. Therefore, any comparison in trends of cumulative detections at dams must be done cautiously, in a manner that incorporates these additional factors.

Interrogation rate of Snake River trap daily release groups for PIT-tagged hatchery chinook salmon and wild chinook salmon at Lower Granite Dam, after combining to remove groups with inadequate sample size, ranged from 23.3% to 60.0% and 32.9% to 74.1% respectively (Appendix B, Tables B-l and B-2). Cumulative interrogation rate (including Lower Granite, Little Goose, Lower Monumental, and McNary dams) ranged between 59.4% and 86.0% and averaged 73.1% for hatchery fish. Wild chinook salmon ranged between 72.4% and 90.2% and averaged 80.9% (Table 10).

Interrogation rate of Clearwater River trap daily release groups for PIT-tagged hatchery chinook salmon and wild chinook salmon at Lower Granite Dam, after combining to remove groups with inadequate sample size, ranged from 23.3% to 57.1% and 33.3% to 53.2%, respectively (Appendix B, Table B-5, B-6). Percent interrogation for wild chinook salmon tagged at the Clearwater River trap may be misleading because of low sample size. Cumulative interrogation, including Lower Granite, Little Goose, Lower Monumental, and McNary dams, ranged between 57.9% and 81.4% and averaged 70.6% for hatchery chinook (Table 10). Wild chinook salmon ranged between 62.9% and 84.1% and averaged 72.5% (Table 10).

Interrogation rates of Salmon River trap daily release groups for PIT-tagged hatchery chinook salmon and wild chinook salmon at Lower Granite Dam, after combining to remove groups with inadequate sample

Table 10. Interrogations of PIT-tagged fish from the Snake River trap, 1987-1995; Clearwater River trap, 1989-1995; and Salmon River trap, 1993-1995 at downstream collection facilities.

| Site | Year | Species | Number Tagged | Number Interrogated/Site | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower Granite | | Little Goose | | Lower Monumental | | McNary | | Total | |
| | | | | No | % | No | % | No | % | No | % | No | % |
| Snake | 1995 | CH | 3,927 | 1,646 | 41.9 | 643 | 16.4 | 43⊙ | 11.0 | 153 | ⊟.9 | 2,872 | 73.1 |
| | 1994 | CH | 2,844 | 885 | 31.1 | 332 | 11.7 | 223 | 7.8 | 329 | 11.⊠ | 1,769 | 62.2 |
| | 1993 | CH | 3,203 | 1,336 | 41.7 | 494 | 15.4 | 246 | 7.7 | 134 | 4.⊠ | 2,210 | 69.0 |
| | 1992 | CH | 410 | 166 | 40.5 | 83 | 20.2 | - | ⊙.0 | 48 | 11·7 | 297 | 72.4 |
| | 1995 | CW | 2,067 | 1,023 | 49.5 | 366 | 17.7 | 216 | 10.5 | 68 | 3.3 | 1,673 | 80.9 |
| | 1994 | CW | 934 | 354 | 37.9 | 95 | 10.2 | 82 | 8.8 | 83 | 8.9 | 614 | 65.7 |
| | 1993 | CW | 1,125 | 576 | 51.2 | 150 | 13.3 | 57 | 5.1 | 46 | 4.1 | 829 | 73.7 |
| | 1992 | CU | 615 | 249 | 40.5 | 106 | 17.2 | - | 0.0 | 72 | 11.7 | 427 | 69.4 |
| | 1991 | CU | 2,131 | 929 | 43.6 | 409 | 19.2 | - | 0.0 | 115 | 5.4 | 1,453 | 68.2 |
| | 1990 | CU | 2,245 | 956 | 42.6 | 310 | 13.8 | - | 0.0 | 180 | 8.0 | 1,446 | 64.4 |
| | 1989 | CU | 6,222 | 2,384 | 38.3 | 1,367 | 22.0 | - | 0.0 | 482 | 7.7 | 4,233 | 68.0 |
| | 1988 | CU | 3,767 | 1,237 | 32.8 | 543 | 14.4 | - | 0.0 | 299 | 7.9 | 2,079 | 55.2 |
| | 1987[b] | CU | 3,275 | 1,067 | 32.6 | 338 | 10.3 | - | 0.0 | 308 | 9.4 | 1,713 | 52.3 |
| | 1995 | SH | 2,244 | 1,477 | 65.8 | 236 | 10.5 | 165 | 7.4 | 19 | 0.8 | 1,897 | 84.5 |
| | 1994 | SH | 3,239 | 1,298 | 40.1 | 216 | 6.7 | 112 | 3.5 | 40 | 1.2 | 1,666 | 51.4 |

Table 10. Continued.

| Site | Year | Species | Number Tagged | Number Interrogated/Site | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower Granite | | Little Goose | | Lower Monumental | | McNary | | Total | |
| | | | | No | % | No | % | No | % | No | % | No | % |
| Snake | 1993 | SH | 2,521 | 1,925 | 76.4 | 235 | 9.3 | 63 | 2.5 | 13 | 0.5 | 2,236 | 88.7 |
| | 1992 | SH | 3,904 | 1,496 | 38.3 | 227 | 5.8 | - | 0.0 | 30 | 0.8 | 1,753 | 44.9 |
| | 1991 | SH | 2,577 | 2,032 | 78.9 | 268 | 10.4 | - | 0.0 | 11 | 0.4 | 2,311 | 89.7 |
| | 1990 | SH | 3,112 | 2,272 | 73.0 | 282 | 9.1 | - | 0.0 | 33 | 1.1 | 2,587 | 83.1 |
| | 1989 | SH | 2,525 | 1,773 | 70.2 | 268 | 10.6 | - | 0.0 | 35 | 1.4 | 2,076 | 82.2 |
| | 1988 | SH | 1,743 | 1,069 | 61.3 | 190 | 10.9 | - | 0.0 | 12 | 0.7 | 1,271 | 72.9 |
| | 1987 | SH | 827 | 324 | 39.2 | 52 | 6.3 | - | 0.0 | 6 | 0.7 | 382 | 46.2 |
| | 1995 | SW | 1,537 | 967 | 62.9 | 195 | 12.7 | 122 | 7.9 | 13 | 0.8 | 1,297 | 84.4 |
| | 1994 | SW | 2,840 | 1,546 | 54.4 | 319 | 11.2 | 158 | 5.6 | 51 | 1.8 | 2,074 | 73.0 |
| | 1993 | SW | 2,867 | 1,982 | 69.1 | 267 | 9.3 | 133 | 4.6 | 32 | 1.1 | 2,414 | 84.2 |
| | 1992 | SW | 2,538 | 1,511 | 59.5 | 307 | 12.1 | - | 0.0 | 31 | 1.2 | 1,849 | 72.9 |
| | 1991 | SW | 3,549 | 2,266 | 63.8 | 625 | 17.6 | - | 0.0 | 66 | 1.9 | 2,957 | 83.3 |
| | 1990 | SW | 3,078 | 2,016 | 65.5 | 356 | 11.6 | - | 0.0 | 60 | 1.9 | 2,432 | 79.0 |
| | 1989 | SW | 1,798 | 1,170 | 65.1 | 240 | 13.3 | - | 0.0 | 52 | 2.9 | 1,462 | 81.3 |
| | 1988 | SW | 1,186 | 698 | 58.9 | 166 | 14.0 | - | 0.0 | 20 | 1.7 | 884 | 74.5 |
| | 1987 | SW | 464 | 229 | 49.4 | 48 | 10.3 | - | 0.0 | 8 | 1.7 | 285 | 61.4 |
| Clearwater | 1995 | CH | 2,467 | 950 | 38.5 | 414 | 16.8 | 269 | 10.9 | 109 | 4.4 | 1,742 | 70.6 |
| | 1994 | CH | 1,998 | 500 | 25.0 | 192 | 9.6 | 188 | 9.4 | 247 | 12.4 | 1,127 | 56.4 |

Table 10. Continued.

| Site | Year | Species | Number Tagged | Number Interrogated/Site | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower Granite | | Little Goose | | Lower Monumental | | McNary | | Total | |
| | | | | No | % | No | % | No | % | No | % | No | % |
| Clearwater | 1993 | CH | 1,624 | 553 | 34.1 | 193 | 11.9 | 106 | 6.5 | 77 | 4.7 | 929 | 57.2 |
| | 1992 | CH | 5,200 | 1,654 | 31.8 | 745 | 14.3 | - | 0.0 | 429 | 8.3 | 2,828 | 54.4 |
| | 1995 | CW | 1,051 | 464 | 44.1 | 173 | 16.5 | 88 | 3.4 | 37 | 3.5 | 762 | 72.5 |
| | 1994 | CW | 761 | 308 | 40.5 | 94 | 12.4 | 81 | 10.6 | 41 | 5.4 | 524 | 68.9 |
| | 1993 | CW | 293 | 134 | 45.0 | 43 | 14.4 | 25 | 8.4 | 18 | 6.0 | 220 | 73.8 |
| | 1992 | CU | 1,461 | 502 | 34.4 | 202 | 13.8 | - | 0.0 | 136 | 9.3 | 840 | 57.5 |
| | 1991 | CU | 3,943 | 1,483 | 37.6 | 618 | 15.9 | - | 0.0 | 235 | 6.0 | 2,336 | 60.5 |
| | 1990 | CU | 4,242 | 1,359 | 32.0 | 674 | 15.9 | - | 0.0 | 281 | 6.6 | 2,314 | 54.6 |
| | 1989 | CU | 2,441 | 756 | 31.0 | 452 | 18.5 | - | 0.0 | 140 | 5.7 | 1,348 | 55.2 |
| | 1995 | SH | 867 | 602 | 69.4 | 69 | 8.0 | 56 | 6.5 | 3 | 0.3 | 730 | 84.2 |
| | 1994 | SH | 1,250 | 729 | 58.3 | 119 | 9.5 | 30 | 2.4 | 10 | 0.8 | 888 | 71.0 |
| | 1993 | SH | 1,102 | 813 | 73.8 | 79 | 7.2 | 24 | 2.2 | 6 | 0.5 | 922 | 83.7 |
| | 1992 | SH | 1,567 | 823 | 52.5 | 118 | 7.5 | - | 0.0 | 6 | 0.4 | 947 | 60.4 |
| | 1991 | SH | 1,215 | 926 | 76.2 | 89 | 7.3 | - | 0.0 | 3 | 0.2 | 1,018 | 83.8 |
| | 1990 | SH | 1,228 | 880 | 71.7 | 63 | 5.1 | - | 0.0 | 10 | 0.8 | 953 | 77.6 |

Table 10. Continued.

| Site | Year | Species | Number Tagged | Number Interrogated/Site | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower Granite | | Little Goose | | Lower Monumental | | McNary | | Total | |
| | | | | No | % | No | % | No | % | No | % | No | % |
| Clearwater | 1989 | SH | 290 | 173 | 59.7 | 16 | 5.5 | - | 0.0 | 2 | 0.7 | 191 | 65.9 |
| | 1995 | SW | 268 | 157 | 58.6 | 40 | 14.9 | 16 | 6.0 | 1 | 0.4 | 214 | 79.9 |
| | 1994 | SW | 1,297 | 421 | 32.5 | 150 | 11.6 | 106 | 8.2 | 24 | 1.9 | 701 | 54.0 |
| | 1993 | SW | 849 | 560 | 66.0 | 106 | 12.5 | 58 | 6.8 | 9 | 1.1 | 733 | 86.3 |
| | 1992 | SW | 2,996 | 1,599 | 53.4 | 477 | 15.9 | - | 0.0 | 113 | 3.8 | 2,189 | 73.1 |
| | 1991 | SW | 1,300 | 767 | 59.0 | 126 | 9.7 | - | 0.0 | 22 | 1.7 | 915 | 70.4 |
| | 1990 | SW | 727 | 409 | 56.3 | 102 | 14.0 | - | 0.0 | 28 | 3.9 | 539 | 74.1 |
| | 1989 | SW | 104 | 53 | 51.0 | 16 | 15.4 | - | 0.0 | 3 | 2.9 | 72 | 69.2 |
| Salmon | 1995 | CH | 5,074 | 1,777 | 35.0 | 757 | 14.9 | 531 | 10.5 | 186 | 3.7 | 3,251 | 64.1 |
| | 1994 | CH | 3,633 | 870 | 23.9 | 322 | 8.9 | 258 | 7.1 | 358 | 9.9 | 1,808 | 49.8 |
| | 1993 | CH | 3,138 | 1,144 | 36.5 | 385 | 12.3 | 233 | 7.4 | 157 | 5.0 | 1,919 | 61.2 |
| | 1995 | CW | 3,937 | 1,790 | 45.5 | 689 | 17.5 | 366 | 9.3 | 122 | 3.1 | 2,967 | 75.4 |
| | 1994 | CW | 2,913 | 1,113 | 38.2 | 287 | 9.9 | 188 | 6.5 | 202 | 6.9 | 1,790 | 61.4 |

Table 10. Continued.

| Site | Year | Species | Number Tagged | Number Interrogated/Site | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower Granite | | Little Goose | | Lower Monumental | | McNary | | Total | |
| | | | | No | % | No | % | No | % | No | % | No | % |
| Salmon | 1993 | CW | 2,169 | 1,112 | 51.3 | 286 | 13.2 | 125 | 5.8 | 91 | 4.2 | 1,614 | 74.4 |
| | 1995 | SH | 1,556 | 937 | 60.2 | 190 | 12.2 | 118 | 7.6 | 14 | 0.9 | 1,259 | 80.9 |
| | 1994 | SH | 2,596 | 1,001 | 38.6 | 164 | 6.3 | 70 | 2.7 | 36 | 1.4 | 1,271 | 49.0 |
| | 1993 | SH | 1,641 | 1,203 | 73.3 | 112 | 6.8 | 44 | 2.7 | 13 | 0.8 | 1,372 | 83.6 |
| | 1995 | SW | 435 | 251 | 57.7 | 59 | 13.6 | 32 | 7.4 | 1 | 0.2 | 343 | 78.9 |
| | 1994 | SW | 532 | 260 | 48.9 | 44 | 8.3 | 32 | 6.0 | 10 | 1.9 | 346 | 65.0 |
| | 1993 | SW | 902 | 575 | 63.7 | 73 | 8.1 | 36 | 4.0 | 5 | 0.6 | 689 | 76.4 |

[a]CH=hatchery chinook, CW=wild chinook, CU=unknown chinook, SH=hatchery steelhead, SW=wild steelhead.
[b]Bias may exist as only "quality" fish were tagged.

size, ranged from 24.0% to 56.1% and averaged 35.0% for hatchery fish (Appendix B, Table B-9). Wild chinook salmon ranged from 33.3% to 60.5% and averaged 45.5% (Appendix B, Table B-10). Hatchery chinook cumulative interrogation, including Lower Granite, Little Goose, Lower Monumental, and McNary dams, ranged from 50.0% to 81.2% and averaged 64.1%. Wild chinook salmon cumulative interrogation rates ranged between 64.0% and 89.3% and averaged 75.4% (Table 10).

Percent interrogation of Snake River trap hatchery steelhead trout and wild steelhead trout daily PIT tag release groups at Lower Granite Dam, after combining to remove groups with small sample size, ranged from 36.1% to 84.6% (Appendix B, Table B-3). Wild steelhead trout ranged from 39.5% to 100% ,(Appendix B, Table B-4). Seasonal cumulative interrogation rate of PIT-tagged hatchery steelhead trout to Lower Granite, Little Goose, Lower Monumental, and McNary dams ranged between 72.9% and 95.2% and averaged 84.5% (Table 10). Wild steelhead trout cumulative interrogation rates ranged between 60.0% and 100% and averaged 84.4% (Table 10).

Percent interrogation of Clearwater River trap hatchery steelhead trout daily PIT tag release groups at Lower Granite Dam, after combining to remove groups with small sample size, ranged from 42.4% to 83.3% (Appendix B, Table B-7). Wild steelhead ranged from 50.0% to 87.5% (Appendix B, Table B-8) . Interrogation rates at Lower Granite, Little Goose, Lower Monumental, and McNary dams, combined, for Clearwater River trap hatchery steelhead trout daily PIT tag release groups ranged from 69.4% to 92.3% and averaged 84.2% (Table 10). Wild steelhead trout groups ranged from 66.7% to 89.5% and averaged 79.9% (Table 10).

Percent interrogation of Salmon River trap hatchery steelhead trout daily PIT tag release groups at Lower Granite Dam, after combining to remove groups with small sample size, ranged from 43.3% to 78.3% (Appendix B, Table B-11). Wild steelhead trout ranged from 39.5% to 81.2% (Appendix B, Table B-12) . Seasonal cumulative interrogation rate of PIT-tagged hatchery steelhead trout to Lower Granite, Little Goose, Lower Monumental, and McNary dams ranged between 70.0% to 90.0% and averaged 80.9% (Table 10). Wild steelhead trout ranged from 60.0% to 92.9% and averaged 78.9% (Table 10).

## SUMMARY

Hatchery chinook salmon releases above Lower Granite Dam were 145% of 1994 numbers and 208% of 1993's total. Hatchery steelhead trout releases remained stable at 1994 and 1993 numbers. Hatchery production of chinook salmon in the Clearwater River drainage was 195%, the Snake River and non-Idaho tributaries 83%, and the Salmon River drainage 106% of 1994. Although total hatchery steelhead trout production above Lower Granite was about the same as in 1994, production in the Clearwater River drainage was 117%, the Grande Ronde was 105%, and the Salmon River was 91% of last year's total. Hatchery production of chinook salmon and steelhead trout released above Lower Granite Dam was 11,633,156 and 9,491,222, respectively, in 1995.

The Snake River trap was operated on the east side of the river from March 13 through June 1, and was out of operation for 15 days during this

period due to high flow, mechanical failures, and because quotas were reached. The Snake River trap captured 26,919 age 1 hatchery chinook salmon, 6,564 wild chinook salmon, 9 age 0 chinook salmon, 23,994 hatchery steelhead trout, 1,750 wild steelhead trout, and 6 sockeye/kokanee.

The Clearwater River trap was operated from March 13 through May 31. The trap was out of operation for 28 days during the season due to mechanical failure, high discharge, or because PIT-tagging quotas were reached. Clearwater River trap catch was 13,475 age 1 hatchery chinook salmon, 1,534 age 1 wild chinook salmon, 1 age 0 chinook salmon, 8,314 hatchery steelhead trout, and 285 wild steelhead trout.

The Salmon River trap was moved to rkm 103 to allow the trap to be operated through a wider range of discharge. Trap operations began on March 15 and continued until May 23. Trap catch was 45,349 age 1 hatchery chinook salmon, 9,396 age 1 wild chinook salmon, 3,948 hatchery steelhead trout and 499 wild steelhead trout.

Fish were PIT-tagged for migration rate statistics at all three traps. The number of fish PIT-tagged at the Snake River trap was 9,775, Clearwater River trap was 4,653, and Salmon River trap was 11,002.

A significant migration rate/discharge relation was detected for hatchery chinook salmon released from each of the three traps to Lower Granite Dam. A significant migration rate/discharge relation was detected for wild chinook salmon from the three traps to Lower Granite Dam. A significant migration rate/discharge relation was detected for hatchery steelhead trout released from each of the three traps to Lower Granite Dam. A significant migration rate/discharge relation was detected for wild steelhead trout from the Snake and Salmon River traps. A significant relation was not detected for wild steelhead from the Clearwater River trap. The inability to detect a relation for wild steelhead trout from the Clearwater River trap was probably due to the lack of data over a wide range of discharge and the inconsistent collection efficiency at Lower Granite Dam caused by operational changes during the 1995 outmigration.

In all instances where the migration rate/discharge relation was significant, the same trend was seen; as discharge increased migration rate increased. A 40 kcfs (60-100) increase in discharge would generally produce about a 2-fold increase in migration rate for hatchery chinook salmon released from the Snake River trap during the low flow years 1988, 1990-1992, and 1994, and about a S-fold increase for near normal flow years 1989, 1993, and 1995. Hatchery and wild steelhead trout released from the Snake River trap both showed about a 2- to 3-fold increase in migration rate with a 2-fold increase in discharge.

The four-dam interrogation rates for 1995 were only comparable to 1994 and 1993, because of the addition of a new collection facility at Lower Monumental Dam in 1993. The comparability between the three years is questionable because the collection efficiency changed during the outmigration due to operational changes and spill at the dams.

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## APPENDIX A.

**Travel time to Lower Granite Dam for fish PIT tagged at Smolt Monitoring Project traps on the Snake, Salmon, and Clearwater rivers,** 1995.

Table A-l. PIT-tagged hatchery chinook salmon travel time, with 95% confidence intervals, from the Snake River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/31 | 16.93 | 21.03 | 12.99 | 39 | 49.4 | 56.06 |
| 4/1 | la.22 | 21.57 | 15.92 | 53 | 39.0 | 57.65 |
| 4/2,3 | 15.66 | 23.89 | 10.76 | 39 | 37.5 | 57.96 |
| 4/4 | 13.24 | 18.11 | 10.74 | 37 | 41.6 | 60.11 |
| 4/5 | 14.50 | 22.31 | 9.64 | 23 | 40.4 | 62.53 |
| 4/6 | 14.12 | 17.73 | 8.25 | 15 | 38.5 | 64.14 |
| 4/7 | 12.82 | 16.55 | 10.30 | 46 | 46.5 | 65.79 |
| 4/a | 13.39 | 17.66 | 11.73 | 43 | 41.3 | 67.14 |
| 4/9 | 13.96 | 18.71 | 10.74 | 40 | 39.6 | 66.83 |
| 4/10 | 13.05 | 15.89 | 11.14 | 58 | 56.3 | 66.50 |
| 4/11 | 15.71 | 17.10 | 11.59 | 55 | 55.0 | 64.61 |
| 4/12 | 14.16 | 16.02 | 11.45 | 49 | 49.5 | 64.17 |
| 4/13 | 14.27 | 14.81 | 12.24 | 49 | 49.0 | 64.32 |
| 4/14 | 13.27 | 13.77 | 12.54 | 60 | 60.0 | 64.56 |
| 4/17 | 10.73 | 11.54 | 10.37 | 47 | 48.0 | 62.75 |
| 4/18 | 9.90 | 12.69 | 9.44 | 33 | 50.0 | 62.20 |
| 4/20 | 9.03 | 10.44 | 8.05 | 44 | 49.4 | 63.02 |
| 4/21 | 9.12 | 10.35 | 7.45 | 41 | 42.7 | 64.69 |
| 4/22 | a.14 | 8.65 | 6.67 | 49 | 47.6 | 64.83 |
| 4/23 | 7.72 | 8.37 | 6.17 | 40 | 55.6 | 67.92 |
| 4/24 | 6.43 | 6.89 | 5.35 | 49 | 49.0 | 67.80 |
| 4/25 | 6.53 | 7.89 | 5.67 | 45 | 45.0 | 74.04 |
| 4/26 | 5.79 | 6.70 | 5.57 | 55 | 55.0 | 76.37 |
| 4/27 | 5.34 | 5.97 | 4.36 | 35 | 35.0 | 78.20 |
| 4/28 | 4.53 | 6.51 | 3.85 | 46 | 46.9 | 81.38 |
| 4/29 | 4.31 | 5.52 | 3.66 | 38 | 38.0 | 83.25 |
| 4/30 | 4.24 | 6.12 | 3.67 | 38 | 31.7 | 86.67 |
| 5/1 | 6.83 | 7.76 | 4.67 | 40 | 40.4 | 95.89 |
| 5/2 | 6.38 | 6.69 | 5.38 | 41 | 41.0 | 98.35 |
| 5/3 | 4.97 | 6.24 | 4.02 | 31 | 31.0 | 100.34 |
| 5/4 | 4.97 | 5.44 | 4.56 | 39 | 39.4 | 107.48 |
| 5/5 | 3.99 | 4.78 | 3.62 | 43 | 43.0 | 110.67 |
| 5/8 | 5.33 | 6.27 | 4.55 | 31 | 31.0 | 119.28 |
| 5/9 | 5.78 | a.13 | 4.34 | 24 | 24.0 | 113.65 |
| 5/10 | 5.59 | 7.72 | 4.34 | 27 | 26.7 | 110.45 |
| 5/11 | 5.26 | 6.62 | 4.24 | 32 | 31.7 | 109.54 |
| 5/12 | 4.59 | 6.25 | 2.61 | 35 | 35.0 | 106.18 |
| 5/15 | 5.45 | 7.03 | 4.58 | 33 | 33.0 | 105.06 |
| 5/16 | 5.95 | 7.31 | 3.47 | 10 | 23.3 | 110.08 |
| 5/17 | 4.51 | 5.62 | 3.29 | 19 | 41.3 | 111.82 |
| 5/18 | 4.38 | 4.61 | 3.67 | 35 | 35.4 | 113.22 |
| 5/19 | 3.62 | 5.65 | 3.36 | 16 | 48.5 | 115.50 |
| 5/22,25,26,31 | 6.06 | 8.50 | 4.07 | 24 | 44.4 | 110.78 |

[a]Confidence intervals calculated with nonparametric statistics.

Table A-2. PIT-tagged wild chinook salmon travel time, with 95% confidence intervals, from the Snake River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/31-4/1-3 | 11.83 | 16.39 | LO.15 | 17 | 47.2 | 51.85 |
| 4/4,5,6 | 8.61 | 12.98 | 7.99 | la | 64.3 | 57.72 |
| 4/7 | 7.08 | 8.83 | 6.45 | 31 | 50.8 | 62.40 |
| 4/8 | 6.07 | 7.53 | 5.39 | 31 | 54.4 | 64.98 |
| 4/9 | 7.51 | a.39 | 6.46 | 42 | 58.3 | 68.91 |
| 4/10 | 7.54 | 8.42 | 6.34 | 45 | 60.8 | 68.56 |
| 4/11 | 6.30 | 6.84 | 5.86 | 43 | 57.3 | 69.33 |
| 4/12 | 7.71 | 8.62 | 6.56 | 42 | 56.8 | 68.10 |
| 4/13 | 7.14 | 9.00 | 5.42 | 41 | 67.2 | 68.53 |
| 4/14 | 7.78 | 11.15 | 6.17 | 22 | 55.0 | 68.31 |
| 4/17 | 6.42 | 8.06 | 5.09 | 34 | 54.8 | 64.05 |
| 4/18,20 | 6.33 | 8.46 | 5.57 | 22 | 52.4 | 58.93 |
| 4/21,22 | 6.46 | 7.45 | 5.12 | 18 | 50.0 | 59.40 |
| 4/23[b] | 6.07 | 0 | 0 | 2 | 40.0 | 63.32 |
| 4/24,25 | 5.61 | 7.52 | 4.41 | 26 | 63.4 | 72.87 |
| 4/26 | 4.22 | 4.93 | 2.87 | 11 | 42.3 | 73.25 |
| 4/27 | 3.69 | 4.31 | 3.36 | 20 | 74.1 | 77.47 |
| 4/28 | 4.38 | 4.69 | 3.68 | 27 | 50.9 | 79.62 |
| 4/29 | 3.82 | 4.74 | 3.47 | 26 | 45.6 | 83.25 |
| 4/30 | 3.60 | 5.04 | 2.88 | 29 | 54.7 | 86.67 |
| 5/1 | 3.88 | 5.47 | 3.03 | 35 | 48.6 | 89.33 |
| 5/2 | 4.62 | 5.92 | 3.66 | 13 | 37.1 | 94.40 |
| 5/3 | 4.43 | 5.03 | 3.66 | 29 | 38.7 | 95.90 |
| 5/4 | 4.47 | 4.61 | 3.92 | 34 | 50.0 | 102.15 |
| 5/5 | 3.58 | 3.88 | 3.46 | 35 | 47.3 | 110.67 |
| 5/8 | 3.18 | 4.11 | 2.74 | 33 | 44.0 | 119.53 |
| 5/9 | 4.37 | 4.87 | 2.88 | 35 | 46.7 | 116.90 |
| 5/10 | 4.03 | 5.21 | 3.59 | 33 | 45.2 | 116.30 |
| 5/11 | 3.69 | 4.85 | 3.37 | 25 | 32.9 | 113.03 |
| 5/12 | 5.27 | 6.66 | 3.66 | 33 | 44.0 | 106.18 |
| 5/15 | 5.65 | 7.57 | 4.87 | 27 | 42.2 | 106.67 |
| 5/16 | 6.39 | a.34 | 5.25 | 22 | 44.9 | 110.08 |
| 5/17 | 5.20 | 7.88 | 3.55 | 21 | 42.0 | 111.82 |
| 5/18 | 4.68 | 6.34 | 4.06 | 29 | 41.4 | 114.28 |
| 5/19 | 4.59 | 7.13 | 3.86 | 17 | 45.9 | 116.50 |
| 5/22 | 6.31 | 14.17 | 5.29 | 14 | 43.8 | 115.53 |
| 5/24 | 9.13 | 13.32 | 5.25 | 19 | 54.3 | 114.63 |
| 5/31 | 5.55 | 11.22 | 4.91 | la | 54.5 | 136.17 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-3. PIT-tagged hatchery steelhead travel time, with 95% confidence intervals, from the Snake River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/31[b] | 7.45 | 0 | 0 | 1 | 100.0 | 42.11 |
| 4/5[b] | 6.08 | 0 | 0 | 1 | 100.0 | 54.17 |
| 4/6[b] | 3.86 | 0 | 0 | 2 | 100.0 | 55.17 |
| 4/9[b] | 2.96 | 0 | 0 | 1 | 100.0 | 67.83 |
| 4/11,12 | 4.25 | 6.55 | 2.82 | 22 | 81.5 | 69.50 |
| 4/13 | 3.89 | 4.33 | 2.91 | 25 | 75.8 | 70.68 |
| 4/14 | 4.54 | 5.46 | 3.75 | 44 | 73.3 | 70.86 |
| 4/17 | 4.71 | 6.74 | 2.94 | 50 | 80.6 | 65.00 |
| 4/18 | 4.02 | 5.07 | 3.51 | 47 | 78.3 | 64.17 |
| 4/19 | 3.17 | 4.74 | 2.73 | 24 | 75.0 | 64.07 |
| 4/20 | 3.71 | 4.35 | 2.83 | 58 | 82.9 | 59.95 |
| 4/21 | 3.98 | 4.64 | 3.63 | 45 | 75.0 | 57.28 |
| 4/22 | 4.56 | 5.45 | 3.89 | 51 | 83.6 | 58.56 |
| 4/23 | 5.05 | 5.90 | 4.06 | 45 | 76.3 | 61.20 |
| 4/24 | 4.26 | 5.75 | 3.70 | 53 | 82.8 | 63.38 |
| 4/25 | 4.19 | 5.73 | 3.73 | 47 | 79.7 | 68.43 |
| 4/26 | 4.12 | 4.57 | 3.50 | 48 | 81.4 | 73.25 |
| 4/27 | 3.71 | 4.35 | 3.54 | 46 | 76.7 | 77.47 |
| 4/28 | 3.51 | 3.72 | 2.81 | 44 | 73.3 | 79.62 |
| 4/29 | 2.64 | 2.84 | 2.44 | 47 | 77.0 | 81.53 |
| 4/30 | 2.75 | 2.97 | 2.61 | 50 | 83.3 | 84.53 |
| 5/1 | 2.20 | 3.53 | 2.05 | 29 | 48.3 | 84.75 |
| 5/2 | 2.95 | 3.68 | 2.68 | 30 | 50.0 | 92.07 |
| 5/3 | 2.97 | 3.42 | 2.43 | 30 | 50.0 | 94.90 |
| 5/4 | 2.85 | 3.91 | 1.87 | 29 | 48.3 | 96.83 |
| 5/5 | 2.81 | 3.46 | 2.51 | 28 | 46.7 | 104.63 |
| 5/8 | 1.98 | 2.43 | 1.76 | 50 | 80.6 | 121.80 |
| 5/9 | 2.33 | 3.40 | 2.04 | 32 | 53.3 | 114.90 |
| 5/10 | 2.06 | 2.45 | 1.76 | 40 | 66.7 | 116.60 |
| 5/11 | 1.83 | 2.45 | 1.58 | 31 | 50.8 | 118.90 |
| 5/12 | 2.03 | 2.45 | 1.65 | 30 | 47.6 | 116.00 |
| 5/15 | 2.65 | 4.08 | 1.73 | 31 | 49.2 | 101.07 |
| 5/16 | 2.77 | 3.90 | 1.93 | 27 | 44.3 | 105.67 |
| 5/17 | 2.40 | 3.73 | 2.07 | 30 | 45.5 | 107.80 |
| 5/18 | 2.70 | 3.81 | 1.82 | 22 | 36.1 | 112.27 |
| 5/19 | 2.25 | 2.67 | 1.76 | 30 | 50.8 | 113.70 |
| 5/22 | 2.42 | 3.38 | 2.09 | 26 | 42.6 | 119.50 |
| 5/24 | 3.31 | 3.62 | 2.63 | 46 | 71.9 | 115.30 |
| 5/25 | 3.07 | 3.85 | 2.56 | 46 | 75.4 | 112.23 |
| 5/26 | 2.88 | 3.44 | 2.67 | 44 | 72.1 | 109.73 |
| 5/30 | 2.47 | 2.89 | 2.12 | 25 | 64.1 | 116.75 |
| 5/31 | 2.45 | 2.59 | 2.27 | 70 | 76.9 | 127.80 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-4. PIT-tagged wild steelhead trout travel time, with 95% confidence intervals, from the Snake River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval[a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 4/1[b] | 10.52 | 0 | 0 | 4 | 66.7 | 50.65 |
| 4/2[b] | 7.28 | 0 | 0 | 2 | 100.0 | **43.96** |
| 4/3[b] | 6.52 | 0 | 0 | 1 | 25.0 | 48.47 |
| 4/4[b] | 22.96 | 0 | 0 | 2 | 66.7 | 60.83 |
| 4/5[b] | 5.41 | 0 | 0 | 2 | 66.7 | 52.16 |
| 4/6[b] | 5.70 | 0 | 0 | 1 | 25.0 | 58.85 |
| 4/7[b] | 5.95 | 0 | 0 | 3 | 75.0 | 62.60 |
| 4/8[b] | 3.75 | 0 | 0 | 1 | 50.0 | **65.90** |
| 4/9 | 4.04 | 4.94 | 3.42 | 15 | 51.7 | 67.15 |
| 4/10,11 | 5.59 | 8.68 | **3.79** | 19 | 65.5 | **69.33** |
| 4/12,13 | 4.91 | 7.37 | 3.40 | 15 | 60.0 | **69.56** |
| 4/14 | 3.27 | 4.95 | 2.66 | 14 | 77.8 | 73.83 |
| 4/17 | 5.32 | 10.16 | 2.65 | 11 | 78.6 | 65.00 |
| 4/18,20 | 3.67 | 6.85 | **2.69** | 15 | 57,6 | **59.95** |
| 4/21 | 3.99 | 4.60 | 3.07 | 18 | 85.7 | 57.28 |
| 4/22,23 | 3.67 | 4.35 | 3.44 | 20 | 74.1 | 58.38 |
| 4/25 | 3.66 | 5.42 | 2.74 | 15 | 78.9 | 68.43 |
| 4/26 | 2.71 | 3.74 | 2.64 | 22 | 81.5 | 71.20 |
| 4/27 | 3.28 | 3.70 | 2.50 | 19 | 70.4 | 75.27 |
| 4/28 | 3.10 | 3.43 | **2.69** | 49 | 83.1 | 79.13 |
| 4/29 | 2.57 | 2.67 | 2.46 | 39 | 72.2 | 81.53 |
| 4/30 | 2.50 | 2.53 | 2.41 | 160 | **92.0** | 82.60 |
| 5/1 | 2.55 | 2.85 | 2.33 | 156 | **69.6** | 87.53 |
| 5/2 | 2.57 | 3.63 | 2.43 | 24 | 17.3 | 92.07 |
| 5/3 | 2.37 | 2.48 | 2.31 | 51 | 58.0 | 93.90 |
| 5/4 | 2.70 | 2.81 | 2.41 | 28 | 50.0 | 96.83 |
| 5/5 | 2.43 | 2.76 | 1.88 | 34 | **39.5** | 97.90 |
| 5/8 | 1.62 | 1.92 | 1.50 | 9 | 81.8 | 121.80 |
| 5/9 | 1.98 | 3.98 | 1.20 | 8 | 80.0 | 114.90 |
| 5/10 | 1.93 | 2.32 | 1.62 | 53 | 86.9 | 116.60 |
| 5/11 | 1.61 | 2.34 | 1.39 | 10 | 18.2 | 118.90 |
| 5/12 | 2.15 | 2.56 | 1.70 | 27 | 54.0 | 116.00 |
| 5/15 | 2.49 | 4.09 | 2.31 | 15 | 62.5 | 98.50 |
| 5/16 | 2.34 | 3.54 | 1.71 | 19 | 76.0 | 103.80 |
| 5/17 | 1.69 | 3.17 | 1.40 | 16 | 53.3 | 107.80 |
| 5/18 | 2.17 | 3.26 | 1.63 | 17 | **39.5** | 111.05 |
| 5/19 | 1.89 | 2.59 | 1.33 | 12 | 80.0 | 113.70 |
| 5/22 | 2.28 | 4.34 | 1.78 | 14 | 82.4 | 119.50 |
| 5/24,25 | 3.34 | 4.20 | 2.15 | 8 | 100.0 | 112.23 |
| 5/26 | 2.50 | 3.66 | 2.20 | 10 | 100.0 | 110.10 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

**Table A-5. PIT-tagged hatchery chinook salmon travel time, with 95% confidence intervals, from the Clearwater River trap to Lower Granite Dam, 1995.**

| Release date | Median travel time (day) | Confidence Interval [a] Lower | Upper | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/21 | 28.97 | 35.00 | 25.62 | 24 | 57.1 | 54.68 |
| 3/22 | 25.30 | 29.12 | 20.12 | 27 | 47.4 | 52.88 |
| 3/23,24 | 27.62 | 32.69 | 21.34 | 21 | 44.9 | 54.61 |
| 3/25 | 29.66 | 33.32 | 21.13 | 23 | 36.5 | 55.14 |
| 3/26,27,28 | 22.39 | 29.40 | 20.25 | 23 | 54.8 | 53.80 |
| 3/29,30,31-4/1 | 17.39 | 25.78 | 10.10 | 19 | 38.8 | 56.06 |
| 4/2,3,5,6,7 | 12.69 | 18.52 | 10.12 | 22 | 37.3 | 62.25 |
| 4/8 | 10.43 | 12.19 | a.93 | 45 | 46.4 | 67.97 |
| 4/9 | 11.45 | 15.57 | 10.39 | 56 | 55.4 | 68.03 |
| 4/10 | 13.86 | 17.22 | 10.04 | 48 | 47.5 | 65.50 |
| 4/11 | 16.36 | 17.32 | 14.18 | 41 | 41.4 | 64.61 |
| 4/12 | 16.66 | 17.76 | 15.88 | 39 | 38.6 | 65.41 |
| 4/13 | 15.24 | 16.40 | 13.76 | 47 | 48.0 | 64.87 |
| 4/17 | 15.87 | 20.33 | 14.41 | 33 | 34.7 | 68.58 |
| 4/18 | 14.44 | 17.51 | 12.15 | 38 | 39.2 | 67.18 |
| 4/19 | 12.35 | 13.24 | 10.55 | 35 | 35.7 | 66.24 |
| 4/20 | 11.25 | 16.48 | 9.64 | 31 | 31.0 | 66.43 |
| 4/21 | 12.35 | 16.51 | 10.37 | 33 | 33.3 | 69.65 |
| 4/24 | a.99 | 11.36 | 7.81 | 40 | 40.8 | 73.38 |
| 4/25 | 9.23 | 12.20 | 7.51 | 32 | 31.7 | 77.76 |
| 4/26 | a.44 | 10.64 | 6.69 | 35 | 35.4 | 79.96 |
| 4/28 | 10.51 | 13.14 | 8.78 | 37 | 34.3 | 94.31 |
| 5/1 | 7.84 | 10.89 | 7.17 | 35 | 34.3 | 100.00 |
| 5/2,3 | 6.63 | 7.78 | 5.45 | 21 | 25.6 | 106.47 |
| 5/15,16 | 7.00 | 13.35 | 4.61 | 12 | 27.3 | 111.29 |
| 5/18 | 5.36 | 5.86 | 4.73 | 55 | 42.6 | 114.28 |
| 5/19 | 5.63 | 7.54 | 3.64 | 14 | 23.3 | 116.67 |
| 5/25 | 4.06 | 6.63 | 2.77 | 17 | 45.9 | 111.42 |
| 5/26 | 5.14 | 6.59 | 3.98 | 20 | 41.7 | 108.42 |
| 5/30 | 4.39 | 5.52 | 3.82 | 28 | 36.8 | 125.03 |

[a] Confidence intervals calculated with nonparametric statistics.

Table A-6. PIT-tagged wild chinook salmon travel time, with 95% confidence intervals, from the Clearwater River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Lower | Upper | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/21 | 23.07 | 26.98 | 18.48 | 17 | 48.6 | 50.88 |
| 3/22 | 21.86 | 25.58 | 20.89 | 33 | 53.2 | 50.42 |
| 3/23,24,25 | 20.78 | 24.16 | 19.08 | 25 | 37.9 | 50.26 |
| 3/26,27,28 | 18.38 | 22.46 | 16.97 | 25 | 49.0 | 49.66 |
| 3/29[b] | 23.11 | 0 | 0 | 4 | 50.0 | 56.23 |
| 3/30[b] | 27.32 | 0 | 0 | 2 | 50.0 | 57.17 |
| 3/31[b] | 14.90 | 0 | 0 | 4 | 40.0 | 53.67 |
| 4/1[b] | 7.50 | 0 | 0 | 3 | 42.9 | 44.20 |
| 4/2[b] | 10.13 | 0 | 0 | 4 | 44.4 | 51.12 |
| 4/3[b] | 14.13 | 0 | 0 | 4 | 40.0 | 58.54 |
| 4/4[b] | 13.32 | 0 | 0 | 2 | 66.7 | 60.11 |
| 4/5[b] | 10.88 | 0 | 0 | 1 | 50.0 | 61.02 |
| 4/6[b] | 5.32 | 0 | | 1 | 100.0 | **56.98** |
| 4/7,8 | a.92 | **11.21** | a.060 | 50 | 53.2 | **67.93** |
| 4/9 | 11.04 | 12.23 | 9.35 | 31 | **41.9** | 68.03 |
| 4/10 | 9.22 | 11.62 | a.55 | 34 | 45.3 | **68.11** |
| 4/11 | 9.08 | 12.39 | 7.63 | 35 | 46.7 | 68.11 |
| 4/12 | 9.20 | 13.41 | 7.05 | 30 | 41.7 | 67.69 |
| 4/13 | 9.50 | 13.09 | 5.65 | 19 | 40.4 | 66.70 |
| 4/17,18 | 13.62 | 20.03 | 11.06 | 16 | 33.3 | 66.26 |
| 4/19,20 | 9.71 | 17.30 | a.24 | la | 40.9 | 63.14 |
| 4/21[b] | 6.35 | 0 | 0 | 1 | 12.5 | 59.40 |
| 4/24[b] | 6.65 | 0 | 0 | 2 | **28.6** | 70.13 |
| 4/25[b] | 7.45 | 0 | 0 | 2 | 33.3 | 74.04 |
| 4/26[b] | 4.62 | 7.15 | 3.95 | 6 | 60.0 | 75.42 |
| 4/28[b] | 27.43 | 0 | 0 | 2 | 66.7 | **104.89** |
| 5/1,2,3,15 | 6.20 | **7.95** | 4.66 | 20 | 38.7 | **98.35** |
| 5/18 | 6.71 | 10.68 | 5.58 | 48 | 49.5 | **115.63** |
| 5/19[b] | **8.28** | 44.04 | 3.49 | 7 | 46.7 | **116.05** |
| 5/25[b] | 6.43 | 0 | 0 | 2 | 22.2 | **109.77** |
| 5/26[b] | 7.00 | 0 | 0 | 4 | 44.4 | **113.96** |
| 5/30[b] | 5.73 | 7.95 | 4.15 | 11 | 44.0 | 130.40 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-7. PIT-tagged hatchery steelhead trout travel time, with 95% confidence intervals, from the Clearwater River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Lower | Upper | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 4/8[b] | 3.42 | 0 | 0 | 3 | 42.9 | 65.13 |
| 4/9[b] | 4.17 | 10.32 | 2.90 | 6 | 75.0 | 67.15 |
| 4/10[b] | 6.93 | 0 | 0 | 2 | 100.0 | 68.60 |
| 4/18[b] | 5.71 | 10.81 | 2.47 | 6 | 60.0 | 61.42 |
| 4/19 | 5.38 | 6.15 | 4.33 | 75 | 82.4 | 60.80 |
| 4/20 | 5.61 | 6.30 | 4.79 | 74 | 82.2 | 58.93 |
| 4/21 | 7.29 | 9.73 | 5.35 | 64 | 71.9 | 61.27 |
| 4/24 | 5.38 | 7.21 | 4.45 | 43 | 71.7 | 65.48 |
| 4/25 | 4.80 | 6.78 | 3.84 | 44 | 74.6 | 70.62 |
| 4/26 | 5.63 | 6.12 | 4.72 | 50 | 83.3 | 76.37 |
| 4/28 | 4.33 | 4.94 | 3.79 | 73 | 80.2 | 79.62 |
| 5/1 | 5.37 | 7.43 | 4.03 | 35 | 58.3 | 90.84 |
| 5/2 | 5.56 | 6.63 | 3.58 | 19 | 55.9 | 98.35 |
| 5/3,15,16 | 4.55 | 5.77 | 3.47 | 43 | 55.8 | 100.34 |
| 5/18 | 3.46 | 4.43 | 2.63 | 36 | 42.4 | 112.27 |
| 5/19,25,26 | 3.57 | 6.21 | 2.87 | 21 | 61.8 | 107.80 |
| 5/30 | 3.09 | 4.77 | 2.41 | 9 | 100.0 | 122.17 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-8. PIT-tagged wild steelhead trout travel time, with 95% confidence intervals, from the Clearwater River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/22[b] | 25.43 | 0 | 0 | 1 | 100.0 | 52.88 |
| 3/30[b] | 11.46 | 0 | 0 | 1 | 100.0 | 46.61 |
| 3/31[b] | 13.75 | 0 | 0 | 1 | 100.0 | 52.26 |
| 4/6,7,8 | 5.31 | 7.38 | 3.39 | 16 | 53.3 | 65.74 |
| 4/9 | 4.12 | 4.93 | 3.47 | 47 | 54.0 | 67.15 |
| 4/10 | 4.13 | 6.15 | 3.13 | 15 | 65.2 | 64.67 |
| 4/11,12,13 | 6.47 | 9.62 | 3.44 | 15 | 62.5 | 69.33 |
| 4/18,19,20 | 5.33 | 6.67 | 3.39 | 11 | 68.8 | 60.80 |
| 4/21,24 | 5.63 | 8.80 | 3.56 | 16 | 80.0 | 67.80 |
| 4/25,26,28 | 3.49 | 7.11 | 3.01 | 11 | 73.3 | 71.20 |
| 5/1 | 4.42 | 4.99 | 2.45 | 7 | 58.3 | 89.33 |
| 5/3[b] | 5.45 | 0 | 0 | 2 | 50.0 | 100.34 |
| 5/15[b] | 4.14 | 0 | 0 | 1 | 33.3 | 103.15 |
| 5/18,26 | 2.55 | 3.33 | 2.24 | 12 | 63.2 | 109.73 |
| 5/30[b] | 3.24 | 0 | 0 | 1 | 100.0 | 122.17 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

**Table A-9.** **PIT-tagged hatchery chinook** salmon travel time, with 95% confidence intervals, from the Salmon River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/16[b] | 25.76 | 0 | 0 | 1 | 50.0 | 50.58 |
| 3/17 | 36.33 | 40.91 | 33.23 | 58 | 38.7 | 55.44 |
| 3/18 | 34.65 | 40.42 | 30.76 | 69 | 34.5 | 55.43 |
| 3/19 | 37.14 | 40.68 | 29.75 | 56 | 37.3 | 55.52 |
| 3/20 | 28.81 | 38.64 | 25.04 | 31 | 31.0 | 54.33 |
| 3/21 | 28.82 | 34.72 | 27.49 | 32 | 32.0 | 54.68 |
| 3/22 | 33.79 | 38.53 | 27.47 | 30 | 30.0 | 55.36 |
| 3/23 | 35.71 | 37.43 | 31.19 | 43 | 43.0 | 56.18 |
| 3/24 | 35.71 | 38.08 | 30.22 | 36 | 36.4 | 56.70 |
| 3/27 | 32.08 | 35.15 | 29.50 | 33 | 32.4 | 56.43 |
| 3/28 | 30.88 | 34.53 | 22.87 | 31 | 31.0 | 56.91 |
| 3/29 | 33.50 | 34.92 | 30.79 | 30 | 30.0 | 60.02 |
| 3/30 | 32.41 | 33.41 | 29.05 | 46 | 46.0 | 60.02 |
| 3/31 | 28.88 | 30.49 | 23.08 | 38 | 38.0 | 59.22 |
| 4/3 | 25.06 | 27.48 | 23.45 | 32 | 31.7 | 60.39 |
| 4/4 | 27.68 | 29.14 | 24.15 | 33 | 33.0 | 63.94 |
| 4/5 | 24.91 | 26.47 | 23.39 | 46 | 46.0 | 63.38 |
| 4/6 | 22.49 | 24.06 | 20.98 | 49 | 49.0 | 63.24 |
| 4/7 | 24.04 | 25.25 | 21.30 | 43 | 43.0 | 66.08 |
| 4/10 | 25.55 | 27.59 | 21.57 | 38 | 38.0 | 71.62 |
| 4/11 | 20.77 | 23.11 | 19.63 | 46 | 46.0 | 67.85 |
| 4/12 | 19.93 | 22.45 | 19.44 | 41 | 40.2 | 67.83 |
| 4/13 | 20.28 | 22.02 | 19.23 | 45 | 45.0 | 69.00 |
| 4/14 | 18.51 | 19.94 | 17.21 | 37 | 37.0 | 69.41 |
| 4/17 | 20.56 | 21.53 | 17.55 | 31 | 31.6 | 76.14 |
| 4/18 | 18.12 | 21.21 | 14.67 | 24 | 24.0 | 72.98 |
| 4/19 | 17.68 | 18.92 | 14.13 | 35 | 35.4 | 74.89 |
| 4/20 | 16.95 | 20.20 | 13.12 | 25 | 25.0 | 75.52 |
| 4/21 | 16.54 | 18.45 | 12.66 | 29 | 29.0 | 78.68 |
| 4/24 | 13.02 | 14.58 | 10.70 | 26 | 26.5 | 80.31 |
| 4/25 | 14.88 | 20.58 | 13.04 | 25 | 25.3 | 90.13 |
| 4/26 | 10.79 | 15.19 | 9.28 | 25 | 26.0 | 84.56 |
| 4/27 | 11.55 | 15.71 | 9.73 | 29 | 29.6 | 92.49 |
| 4/28 | 10.62 | 11.56 | 8.78 | 34 | 34.0 | 94.31 |
| 4/29 | 10.28 | 12.55 | 7.11 | 27 | 27.0 | 96.35 |
| 4/30 | 9.66 | 10.45 | 9.14 | 38 | 31.6 | 99.89 |
| 5/1 | 9.81 | 10.83 | 9.06 | 37 | 37.0 | 102.98 |
| 5/2 | 12.45 | 11.46 | 9.27 | 24 | 24.0 | 108.24 |
| 5/3 | 7.86 | 9.24 | 6.64 | 27 | 27.3 | 107.54 |
| 5/4 | 9.49 | 12.87 | 6.67 | 29 | 29.0 | 111.67 |
| 5/5 | 7.49 | 12.03 | 5.62 | 29 | 29.0 | 112.96 |
| 5/6 | 9.65 | 11.56 | 6.99 | 43 | 43.0 | 112.33 |
| 5/7 | 8.48 | 12.86 | 5.75 | 20 | 20.4 | 116.10 |
| 5/9 | 13.57 | 17.19 | 11.53 | 39 | 39.0 | 111.18 |
| 5/10 | 13.05 | 19.36 | 8.07 | 22 | 31.9 | 110.90 |
| 5/11,12 | 11.84 | 14.24 | 9.81 | 25 | 32.9 | 110.75 |
| 5/13,14 | 12.30 | 14.95 | 10.71 | 37 | 35.9 | 110.58 |
| 5/15 | 9.75 | 12.76 | 7.30 | 21 | 48.8 | 111.26 |
| 5/16,17 | 10.93 | 16.81 | 7.67 | 20 | 39.2 | 113.85 |
| 5/18,19 | 9.44 | 11.17 | 6.77 | 26 | 38.8 | 115.19 |
| 5/20 | 9.88 | 10.60 | 8.10 | 42 | 49.4 | 113.50 |
| 5/21 | 9.93 | 11.60 | 8.38 | 25 | 53.2 | 113.12 |
| 5/22,23 | 10.32 | 12.65 | 7.37 | 23 | 56.1 | 113.77 |

[a] Confidence intervals calculated with nonparaxnetric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-10. PIT-tagged wild chinook salmon travel time, with 95% confidence intervals, from the Salmon River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured. (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/16 | 28.49 | 33.14 | 26.09 | 33 | 44.6 | 51.73 |
| 3/17 | 30.22 | 31.68 | 28.25 | 70 | 47.0 | 53.36 |
| 3/18 | 31.56 | 39.42 | 26.54 | 38 | 50.7 | 54.62 |
| 3/19 | 30.07 | 39.94 | 25.36 | 31 | 41.3 | 54.40 |
| 3/20 | 27.18 | 31.37 | 24.67 | 36 | 48.0 | 53.24 |
| 3/21 | 30.28 | 40.81 | 24.47 | 38 | 51.4 | 55.00 |
| 3/22 | 25.50 | 28.05 | 23.43 | 45 | 60.0 | 53.53 |
| 3/23 | 27.91 | 35.33 | 24.91 | 36 | 48.0 | 54.61 |
| 3/24 | 27.53 | 33.05 | 24.11 | 37 | 48.1 | 54.94 |
| 3/27 | 24.29 | 32.38 | 21.07 | 28 | 31.3 | 54.68 |
| 3/28 | 20.41 | 26.68 | 18.34 | 31 | 41.3 | 53.69 |
| 3/29[b] | 18.07 | 0 | 0 | 4 | 50.0 | 53.44 |
| 3/30 | 17.62 | 20.24 | 15.70 | 35 | 50.7 | 55.16 |
| 3/31 | 17.91 | 22.46 | 15.80 | 44 | 47.8 | 56.74 |
| 4/1 | 15.68 | 19.73 | 13.69 | 21 | 38.9 | 56.56 |
| 4/2 | 17.41 | 19.42 | 14.19 | 46 | 51.1 | 58.34 |
| 4/3 | 13.07 | 15.05 | 11.29 | 43 | 58.1 | 57.67 |
| 4/4 | 12.95 | 14.70 | 11.26 | 43 | 57.3 | 60.11 |
| 4/5 | 13.34 | 15.41 | 10.88 | 44 | 59.5 | 62.25 |
| 4/6 | 12.79 | 14.46 | 9.75 | 43 | 57.3 | 64.13 |
| 4/7 | 12.15 | 15.00 | 10.32 | 46 | 60.5 | 65.92 |
| 4/10 | 16.21 | 20.10 | 13.08 | 36 | 46.8 | 64.42 |
| 4/11 | 17.95 | 20.54 | 13.28 | 31 | 42.5 | 65.51 |
| 4/12 | 15.68 | 17.42 | 14.26 | 32 | 42.7 | 64.88 |
| 4/13 | 15.83 | 18.52 | 14.23 | 34 | 45.3 | 65.43 |
| 4/14 | 14.53 | 17.25 | 12.96 | 29 | 39.2 | 65.71 |
| 4/17 | 11.27 | 11.78 | 9.85 | 28 | 47.5 | 62.75 |
| 4/18 | 13.21 | 16.01 | 11.91 | 37 | 41.1 | 66.11 |
| 4/19 | 11.88 | 12.55 | 11.32 | 42 | 56.0 | 66.24 |
| 4/20 | 11.60 | 12.45 | 10.45 | 31 | 41.3 | 67.65 |
| 4/21 | 10.26 | 10.62 | 8.57 | 39 | 52.0 | 66.63 |
| 4/24 | 7.66 | 9.52 | 7.41 | 35 | 41.3 | 71.50 |
| 4/25 | 7.43 | 10.84 | 6.74 | 29 | 38.7 | 74.04 |
| 4/26 | 8.34 | 9.74 | 7.29 | 30 | 40.0 | 79.96 |
| 4/27 | 7.91 | 10.45 | 6.84 | 37 | 49.3 | 83.40 |
| 4/28 | 6.31 | 9.31 | 5.42 | 26 | 34.7 | 83.33 |
| 4/29 | 6.89 | 8.19 | 5.97 | 36 | 48.0 | 88.24 |
| 4/30 | 7.58 | 9.26 | 7.21 | 33 | 44.0 | 94.41 |
| 5/1 | 7.82 | 8.42 | 6.80 | 26 | 34.7 | 100.00 |
| 5/2 | 7.38 | 8.69 | 6.87 | 26 | 34.7 | 102.70 |
| 5/3 | 6.54 | 8.66 | 5.89 | 26 | 35.1 | 106.47 |
| 5/4 | 5.67 | 6.94 | 5.29 | 29 | 39.2 | 108.70 |
| 5/5 | 5.30 | 6.42 | 4.35 | 28 | 37.8 | 111.50 |
| 5/6 | 5.90 | 8.99 | 4.51 | 30 | 40.0 | 115.63 |
| 5/7 | 5.88 | 7.07 | 3.88 | 24 | 32.4 | 119.08 |
| 5/9 | 7.72 | 10.38 | 6.13 | 37 | 50.0 | 109.86 |
| 5110 | 6.49 | 9.48 | 4.57 | 17 | 48.6 | 110.45 |
| 5/11,12 | 9.07 | 12.84 | 7.11 | 18 | 34.0 | 108.60 |
| 5/13 | 10.20 | 11.82 | 7.99 | 23 | 46.0 | 108.89 |
| 5/14,15 | 8.83 | 10.66 | 7.04 | 20 | 33.3 | 110.57 |
| 5/16,17 | 8.21 | 9.60 | 6.10 | 42 | 51.9 | 114.45 |
| 5/18,19 | 9.61 | 11.77 | 8.17 | 35 | 44.3 | 114.57 |
| 5/20 | 8.41 | 12.96 | 7.58 | 27 | 49.1 | 115.50 |
| 5/21,22,23 | 12.76 | 14.80 | 8.34 | 30 | 42.3 | 118.88 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-ll.PIT-tagged hatchery steelhead travel time, with 95% confidence intervals, from the Salmon River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Mean discharge (kcfs) |
|---|---|---|---|---|---|---|
| 4/10,11 | 10.49 | 19.81 | 5.08 | 16 | 100.0 | 67.72 |
| 4/12 | 14.05 | 22.53 | 5.85 | 11 | 55.0 | 64.17 |
| 4/13 | 11.80 | 16.17 | 6.72 | 12 | 66.7 | 64.43 |
| 4/14 | 10.69 | 17.59 | 6.80 | 41 | 67.2 | 64.73 |
| 4/17 | 12.39 | 14.20 | 8.39 | 46 | 76.7 | 63.68 |
| 4/18 | 13.48 | 14.81 | 9.83 | 37 | 61.7 | 66.11 |
| 4/19 | 12.31 | 14.91 | 11.39 | 46 | 76.7 | 66.24 |
| 4/20 | 8.65 | 12.13 | 6.69 | 38 | 63.3 | 63.02 |
| 4/21 | 11.36 | 15.74 | 9.73 | 39 | 65.0 | 67.95 |
| 4/24 | 7.66 | 8.52 | 6.76 | 43 | 71.7 | 71.50 |
| 4/25 | 6.72 | 8.45 | 5.70 | 37 | 61.7 | 74.04 |
| 4/26 | 5.60 | 6.03 | 5.15 | 37 | 62.7 | 76.37 |
| 4/27 | 5.09 | 5.85 | 4.68 | 38 | 63.3 | 78.20 |
| 4/28 | 5.12 | 5.78 | 4.76 | 47 | 78.3 | 81.38 |
| 4/29 | 4.51 | 7.69 | 4.04 | 33 | 55.0 | 85.22 |
| 4/30 | 8.81 | 9.13 | 6.67 | 33 | 55.0 | 98.23 |
| 5/1 | 8.11 | 8.76 | 7.59 | 30 | 48.4 | 100.00 |
| 5/2 | 6.44 | 7.30 | 5.77 | 31 | 51.7 | 98.35 |
| 5/3 | 5.48 | 5.90 | 4.63 | 26 | 43.3 | 100.34 |
| 5/4 | 4.76 | 5.73 | 4.22 | 34 | 56.7 | 107.48 |
| 5/5 | 3.80 | 4.29 | 3.51 | 31 | 51.7 | 110.67 |
| 5/6 | 3.06 | 3.30 | 2.90 | 35 | 58.3 | 115.27 |
| 5/7 | 2.65 | 3.60 | 2.46 | 39 | 62.9 | 120.57 |
| 5/9 | 3.73 | 4.91 | 2.98 | 37 | 61.7 | 116.90 |
| 5/10,11 | 3.46 | 4.60 | 3.06 | 24 | 63.2 | 116.73 |
| 5/12,13 | 8.08 | 10.35 | 4.29 | 15 | 46.9 | 107.40 |
| 5/14,15 | 6.80 | 8.61 | 4.61 | 19 | 54.3 | 108.01 |
| 5/16 | 5.06 | 6.16 | 4.50 | 12 | 44.4 | 108.88 |
| 5/17,18 | 4.03 | 5.58 | 3.40 | 16 | 48.5 | 110.75 |
| 5/19,20 | 6.54 | 9.34 | 3.18 | 18 | 54.5 | 116.53 |
| 5/21 | 3.88 | 5.17 | 3.47 | 10 | 66.7 | 118.15 |
| 5/22[b] | 6.65 | 0 | 0 | 4 | 50.0 | 114.60 |
| 5/23[b] | 9.72 | 0 | 0 | 3 | 50.0 | 115.22 |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

Table A-12. PIT-tagged wild steelhead travel time, with 95% confidence intervals, from the Salmon River trap to Lower Granite Dam, 1995.

| Release date | Median travel time (day) | Confidence Interval [a] Upper | Lower | Number captured | Percent captured (%) | Average discharge (kcfs) |
|---|---|---|---|---|---|---|
| 3/17[b] | 41.25 | 0 | 0 | 1 | **100.0** | 55.82 |
| 3/18 | [b]29.49 | 0 | 0 | 1 | **100.0** | **53.29** |
| 4/5,7,10,11 | 7.51 | 16.34 | 5.64 | 25 | 75.8 | 68.60 |
| 4/12,13,14 | 10.52 | 13.74 | 7.10 | 24 | 75.0 | 65.41 |
| 4/.7,18,19,20,21 | **8.59** | 10.07 | 6.80 | 26 | 81.3 | **61.94** |
| 4/24,25,26,27 | 4.80 | 5.45 | 4.54 | 25 | 53.2 | 78.20 |
| 4/28 | 4.37 | 4.41 | 3.68 | 9 | 75.0 | **79.62** |
| 4/29 | 3.85 | 5.18 | 3.62 | 8 | 57.1 | 83.25 |
| 4/30 | 3.64 | 5.51 | 3.46 | 9 | 56.2 | 86.67 |
| 5/1 | 4.28 | 4.53 | 3.64 | 18 | 45.0 | **89.33** |
| 5/2 | 3.61 | 4.57 | 3.16 | 12 | 41.4 | **93.28** |
| 5/3,4 | 4.70 | 5.53 | 4.14 | 15 | **39.5** | 100.34 |
| 5/5 | 3.33 | **3.39** | 2.98 | 12 | 48.0 | 104.63 |
| 5/6 | **2.69** | **2.93** | 2.47 | 18 | 54.5 | 115.27 |
| 5/7 | 2.47 | **2.69** | 2.37 | 17 | 56.7 | 123.45 |
| 5/9 | 2.80 | 4.31 | 2.33 | 9 | 60.0 | 116.00 |
| 5/11[b] | 3.75 | 0 | 0 | 2 | 50.0 | 113.03 |
| 5/12[b] | 3.16 | 0 | 0 | 3 | 50.0 | 111.30 |
| 5/13[b] | 6.02 | 0 | 0 | 4 | 66.7 | 104.48 |
| 5/14[b] | **3.09** | 0 | 0 | 2 | 66.7 | **99.63** |
| 5/18[b] | 3.87 | 0 | 0 | 1 | **100.0** | 113.22 |
| 5/19[b] | 3.83 | 0 | 0 | 2 | 40.0 | 115.50 |
| 5/20[b] | 4.20 | 0 | 0 | 5 | **100.0** | 117.45 |
| 5/21[b] | 3.77 | 0 | 0 | 2 | 50.0 | **118.15** |
| 5/23[b] | 3.70 | 0 | 0 | 1 | **100.0** | **116.60** |

[a] Confidence intervals calculated with nonparametric statistics.
[b] Not used in statistical analysis because analysis showed too few recaptures.

## APPENDIX B.

**Interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams of fish PIT-tagged at Smolt Monitoring Project traps on the Snake, Salmon, and Clearwater rivers, 1995.**

Table B-1. PIT-tagged hatchery chinook salmon interrogations at Lower Granite, Little Goose, Lower Monumental and McNary dams from the Snake River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/31 | 79 | 39 | 49.4 | 11 | 13.9 | 6 | 7.6 | 5 | 6.3 | 61 | 77.2 |
| 4/1 | 136 | 53 | 39.0 | 33 | 24.3 | 8 | 5.9 | 7 | 5.1 | 101 | 74.3 |
| 4/2,3 | 104 | 39 | 37.5 | 15 | 14.4 | 9 | 8.7 | 5 | 4.8 | 68 | 65.4 |
| 4/4 | 89 | 37 | 41.6 | 14 | 15.7 | 7 | 7.9 | 1 | 1.1 | 59 | 66.3 |
| 4/5 | 57 | 23 | 40.4 | 7 | 12.3 | 8 | 14.0 | 2 | 3.5 | 40 | 70.2 |
| 4/6 | 39 | 15 | 38.5 | 5 | 12.8 | 7 | 17.9 | 1 | 2.6 | 28 | 71.8 |
| 4/7 | 99 | 46 | 46.5 | 9 | 9.1 | 7 | 7.1 | 4 | 4.0 | 66 | 66.7 |
| 4/8 | 104 | 43 | 41.3 | 13 | 12.5 | 8 | 7.7 | 7 | 6.7 | 71 | 68.3 |
| 4/9 | 101 | 40 | 39.6 | 16 | 15.8 | 6 | 5.9 | 4 | 4.0 | 66 | 65.3 |
| 4/10 | 103 | 58 | 56.3 | 13 | 12.6 | 4 | 3.9 | 3 | 2.9 | 78 | 75.7 |
| 4/11 | 100 | 55 | 55.0 | 6 | 6.0 | 9 | 9.0 | 5 | 5.0 | 75 | 75.0 |
| 4/12 | 99 | 49 | 49.5 | 13 | 13.1 | 10 | 10.1 | 3 | 3.0 | 75 | 75.8 |
| 4/13 | 100 | 49 | 49.0 | 18 | 18.0 | 6 | 6.0 | 2 | 2.0 | 75 | 75.0 |
| 4/14 | 100 | 60 | 60.0 | 12 | 12.0 | 8 | 8.0 | 6 | 6.0 | 86 | 86.0 |
| 4/17 | 98 | 47 | 48.0 | 17 | 17.3 | 3 | 3.1 | 5 | 5.1 | 72 | 73.5 |
| 4/18 | 66 | 33 | 50.0 | 3 | 4.5 | 10 | 15.2 | 2 | 3.0 | 48 | 72.7 |
| 4/20 | 89 | 44 | 49.4 | 17 | 19.1 | 8 | 9.0 | 1 | 1.1 | 70 | 78.7 |
| 4/21 | 96 | 41 | 42.7 | 21 | 21.9 | 11 | 11.5 | 4 | 4.2 | 77 | 80.2 |
| 4/22 | 103 | 49 | 47.6 | 10 | 9.7 | 14 | 13.6 | 1 | 1.0 | 74 | 71.8 |
| 4/23 | 72 | 40 | 55.6 | 9 | 12.5 | 7 | 9.7 | 5 | 6.9 | 61 | 84.7 |
| 4/24 | 100 | 49 | 49.0 | 13 | 13.0 | 12 | 12.0 | 3 | 3.0 | 77 | 77.0 |
| 4/25 | 100 | 45 | 45.0 | 14 | 14.0 | 10 | 10.0 | 4 | 4.0 | 73 | 73.0 |
| 4/26 | 100 | 55 | 55.0 | 14 | 14.0 | 8 | 8.0 | 2 | 2.0 | 79 | 79.0 |
| 4/27 | 100 | 35 | 35.0 | 20 | 20.0 | 11 | 11.0 | 3 | 3.0 | 69 | 69.0 |
| 4/28 | 98 | 46 | 46.9 | 15 | 15.3 | 12 | 12.2 | 5 | 5.1 | 78 | 79.6 |
| 4/29 | 100 | 38 | 38.0 | 19 | 19.0 | 14 | 14.0 | 3 | 3.0 | 74 | 74.0 |
| 4/30 | 120 | 38 | 31.7 | 31 | 25.8 | 16 | 13.3 | 7 | 5.8 | 92 | 76.7 |
| 5/1 | 99 | 40 | 40.4 | 20 | 20.2 | 18 | 18.2 | 3 | 3.0 | 81 | 81.8 |
| 5/2 | 100 | 41 | 41.0 | 15 | 15.0 | 15 | 15.0 | 6 | 6.0 | 77 | 77.0 |
| 5/3 | 100 | 31 | 31.0 | 22 | 22.0 | 12 | 12.0 | 5 | 5.0 | 70 | 70.0 |
| 5/4 | 99 | 39 | 39.4 | 16 | 16.2 | 9 | 9.1 | 7 | 7.1 | 71 | 71.7 |
| 5/5 | 100 | 43 | 43.0 | 15 | 15.0 | 15 | 15.0 | 4 | 4.0 | 77 | 77.0 |
| 5/8 | 100 | 31 | 31.0 | 12 | 12.0 | 17 | 17.0 | 2 | 2.0 | 62 | 62.0 |
| 5/9 | 100 | 24 | 24.0 | 21 | 21.0 | 15 | 15.0 | 4 | 4.0 | 64 | 64.0 |
| 5/10 | 101 | 27 | 26.7 | 17 | 16.8 | 10 | 9.9 | 6 | 5.9 | 60 | 59.4 |
| 5/11 | 101 | 32 | 31.7 | 21 | 20.8 | 17 | 16.8 | 4 | 4.0 | 74 | 73.3 |
| 5/12 | 100 | 35 | 35.0 | 13 | 13.0 | 20 | 20.0 | 4 | 4.0 | 72 | 72.0 |
| 5/15 | 100 | 33 | 33.0 | 25 | 25.0 | 15 | 15.0 | 3 | 3.0 | 76 | 76.0 |
| 5/16 | 43 | 10 | 23.3 | 12 | 27.9 | 5 | 11.6 | 2 | 4.7 | 29 | 67.4 |

Table B-1. Continued.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/17 | 46 | 19 | 41.3 | 9 | 19.6 | 5 | 10.9 | 0 | 0.0 | 33 | 71.7 |
| 5/18 | 99 | 35 | 35.4 | 22 | 22.2 | 10 | 10.1 | 2 | 2.0 | 69 | 69.7 |
| 5/19 | 33 | 16 | 48.5 | 6 | 18.2 | 5 | 15.2 | 1 | 3.0 | 28 | 84.8 |
| 5/22,25 26,31 | 54 | 24 | 44.4 | 9 | 16.6 | 3 | 5.6 | 0 | 0.0 | 36 | 66.7 |
| Total: | 3927 | 1646 | | 643 | | 430 | | 153 | | 2872 | |

Table B-2. PIT-tagged wild chinook salmon interrogations at Lower Granite, Little Goose, Lower Monumental and McNary dams from the Snake River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/31-4/1-3 | 36 | 17 | 47.2 | 7 | 19.4 | 4 | 11.1 | 2 | 5.56 | 30 | 83.3 |
| 4/4-6 | 28 | 18 | 64.3 | 2 | 7.14 | 1 | 3.57 | 0 | 0 | 21 | 75 |
| 4/7 | 61 | 31 | 50.8 | 9 | 14.8 | 5 | 8.2 | 2 | 3.3 | 47 | 77.0 |
| 4/8 | 57 | 31 | 54.4 | 9 | 15.8 | 4 | 7.0 | 3 | 5.3 | 47 | 82.5 |
| 4/9 | 72 | 42 | 58.3 | 6 | 8.3 | 8 | 11.1 | 5 | 6.9 | 61 | 84.7 |
| 4/10 | 74 | 45 | 60.8 | 8 | 10.8 | 6 | 8.1 | 4 | 5.4 | 63 | 85.1 |
| 4/11 | 75 | 43 | 57.3 | 5 | 6.7 | 4 | 5.3 | 5 | 6.7 | 57 | 76.0 |
| 4/12 | 74 | 42 | 56.8 | 6 | 8.1 | 4 | 5.4 | 6 | 8.1 | 58 | 78.4 |
| 4/13 | 61 | 41 | 67.2 | 5 | 8.2 | 5 | 8.2 | 2 | 3.3 | 53 | 86.9 |
| 4/14 | 40 | 22 | 55.0 | 4 | 10.0 | 5 | 12.5 | 2 | 5.0 | 33 | 82.5 |
| 4/17 | 62 | 34 | 54.8 | 13 | 21.0 | 6 | 9.7 | 0 | 0.0 | 53 | 85.5 |
| 4/18,20 | 42 | 22 | 52.4 | 10 | 23.8 | 2 | 4.8 | 1 | 2.4 | 35 | 83.3 |
| 4/21,22 | 36 | 18 | 50.0 | 4 | 11.1 | 4 | 11.1 | 3 | 8.3 | 29 | 80.6 |
| 4/23 | 5 | 2 | 40.0 | 2 | 40.0 | 0 | 0.0 | 0 | 0.0 | 4 | 80.0 |
| 4/24,25 | 41 | 26 | 63.4 | 9 | 22.0 | 2 | 4.9 | 0 | 0.0 | 37 | 90.2 |
| 4/26 | 26 | 11 | 42.3 | 7 | 26.9 | 3 | 11.5 | 1 | 3.8 | 22 | 84.6 |
| 4/27 | 27 | 20 | 74.1 | 3 | 11.1 | 1 | 3.7 | 0 | 0.0 | 24 | 88.9 |
| 4/28 | 53 | 27 | 50.9 | 14 | 26.4 | 6 | 11.3 | 0 | 0.0 | 47 | 88.7 |
| 4/29 | 57 | 26 | 45.6 | 10 | 17.5 | 7 | 12.3 | 3 | 5.3 | 46 | 80.7 |
| 4/30 | 53 | 24 | 45.3 | 12 | 22.6 | 8 | 15.1 | 2 | 3.8 | 46 | 86.8 |
| 5/1 | 72 | 40 | 55.6 | 15 | 20.8 | 5 | 6.9 | 1 | 1.4 | 61 | 84.7 |
| 5/2 | 35 | 13 | 37.1 | 6 | 17.1 | 5 | 14.3 | 2 | 5.7 | 26 | 74.3 |
| 5/3 | 75 | 29 | 38.7 | 19 | 25.3 | 14 | 18.7 | 2 | 2.7 | 64 | 85.3 |
| 5/4 | 68 | 34 | 50.0 | 19 | 27.9 | 4 | 5.9 | 1 | 1.5 | 58 | 85.3 |
| 5/5 | 74 | 35 | 47.3 | 17 | 23.0 | 8 | 10.8 | 3 | 4.1 | 63 | 85.1 |
| 5/8 | 75 | 33 | 44.0 | 10 | 13.3 | 13 | 17.3 | 5 | 6.7 | 61 | 81.3 |
| 5/9 | 75 | 35 | 46.7 | 9 | 12.0 | 13 | 17.3 | 0 | 0.0 | 57 | 76.0 |
| 5/10 | 73 | 33 | 45.2 | 15 | 20.5 | 7 | 9.6 | 2 | 2.7 | 57 | 78.1 |
| 5/11 | 76 | 25 | 32.9 | 19 | 25.0 | 9 | 11.8 | 2 | 2.6 | 55 | 72.4 |
| 5/12 | 75 | 33 | 44.0 | 8 | 10.7 | 11 | 14.7 | 3 | 4.0 | 55 | 73.3 |
| 5/15 | 64 | 27 | 42.2 | 17 | 26.6 | 7 | 10.9 | 3 | 4.7 | 54 | 84.4 |
| 5/16 | 49 | 22 | 44.9 | 13 | 26.5 | 4 | 8.2 | 1 | 2.0 | 40 | 81.6 |

Table B-2. Continued.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/17 | 50 | 21 | 42.0 | 11 | 22.0 | 5 | 10.0 | 1 | 2.0 | 38 | 76.0 |
| 5/18 | 70 | 29 | 41.4 | 19 | 27.1 | 4 | 5.7 | 1 | 1.4 | 53 | 75.7 |
| 5/19 | 37 | 17 | 45.9 | 8 | 21.6 | 6 | 16.2 | 0 | 0.0 | 31 | 83.8 |
| 5/22 | 32 | 14 | 43.8 | 4 | 12.5 | 9 | 28.1 | 0 | 0.0 | 27 | 84.4 |
| 5/24 | 35 | 19 | 54.3 | 6 | 17.1 | 4 | 11.4 | 0 | 0.0 | 29 | 82.9 |
| 5/25 | 6 | 3 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 50.0 |
| 5/26 | 13 | 5 | 38.5 | 2 | 15.4 | 1 | 7.7 | 0 | 0.0 | 8 | 61.5 |
| 5/31 | 33 | 14 | 42.4 | 4 | 12.1 | 2 | 6.1 | 0 | 0.0 | 20 | 60.6 |
| Total: | 2067 | 1023 | | 366 | | 216 | | 68 | | 1673 | |

Table B-3. PIT-tagged hatchery steelhead interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Snake River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/31 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/5 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/6 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 100.0 |
| 4/9 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/11,12 | 26 | 22 | 84.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 22 | 84.6 |
| 4/13 | 33 | 25 | 75.8 | 1 | 3.0 | 2 | 6.1 | 1 | 3.0 | 29 | 87.9 |
| 4/14 | 60 | 44 | 73.3 | 5 | 8.3 | 6 | 10.0 | 1 | 1.7 | 56 | 93.3 |
| 4/17 | 62 | 50 | 80.6 | 2 | 3.2 | 0 | 0.0 | 0 | 0.0 | 52 | 83.9 |
| 4/18 | 60 | 47 | 78.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 47 | 78.3 |
| 4/19 | 32 | 24 | 75.0 | 2 | 6.2 | 0 | 0.0 | 0 | 0.0 | 26 | 81.2 |
| 4/20 | 70 | 58 | 82.9 | 1 | 1.4 | 4 | 5.7 | 0 | 0.0 | 63 | 90.0 |
| 4/21 | 60 | 45 | 75.0 | 3 | 5.0 | 1 | 1.7 | 0 | 0.0 | 49 | 81.7 |
| 4/22 | 61 | 51 | 83.6 | 1 | 1.6 | 1 | 1.6 | 1 | 1.6 | 54 | 88.5 |
| 4/23 | 59 | 45 | 76.3 | 4 | 6.8 | 0 | 0.0 | 0 | 0.0 | 49 | 83.1 |
| 4/24 | 64 | 53 | 82.8 | 3 | 4.7 | 0 | 0.0 | 0 | 0.0 | 56 | 87.5 |
| 4/25 | 59 | 47 | 79.7 | 2 | 3.4 | 2 | 3.4 | 0 | 0.0 | 51 | 86.4 |
| 4/26 | 59 | 48 | 81.4 | 2 | 3.4 | 2 | 3.4 | 1 | 1.7 | 53 | 89.8 |
| 4/27 | 60 | 46 | 76.7 | 5 | 8.3 | 2 | 3.3 | 0 | 0.0 | 53 | 88.3 |
| 4/28 | 60 | 44 | 73.3 | 3 | 5.0 | 4 | 6.7 | 0 | 0.0 | 51 | 85.0 |
| 4/29 | 61 | 47 | 77.0 | 4 | 6.6 | 2 | 3.3 | 0 | 0.0 | 53 | 86.9 |
| 4/30 | 60 | 50 | 83.3 | 4 | 6.7 | 3 | 5.0 | 0 | 0.0 | 57 | 95.0 |
| 5/1 | 60 | 29 | 48.3 | 10 | 16.7 | 7 | 11.7 | 1 | 1.7 | 47 | 78.3 |
| 5/2 | 60 | 30 | 50.0 | 10 | 16.7 | 9 | 15.0 | 1 | 1.7 | 50 | 83.3 |
| 5/3 | 60 | 30 | 50.0 | 10 | 16.7 | 4 | 6.7 | 1 | 1.7 | 45 | 75.0 |
| 5/4 | 60 | 29 | 48.3 | 13 | 21.7 | 8 | 13.3 | 3 | 5.0 | 53 | 88.3 |
| 5/5 | 60 | 28 | 46.7 | 9 | 15.0 | 10 | 16.7 | 0 | 0.0 | 47 | 78.3 |
| 5/8 | 62 | 50 | 80.6 | 5 | 8.1 | 4 | 6.5 | 0 | 0.0 | 59 | 95.2 |
| 5/9 | 60 | 32 | 53.3 | 7 | 11.7 | 12 | 20.0 | 0 | 0.0 | 51 | 85.0 |
| 5/10 | 60 | 40 | 66.7 | 2 | 3.3 | 5 | 8.3 | 2 | 3.3 | 49 | 81.7 |
| 5/11 | 61 | 31 | 50.8 | 11 | 18.0 | 12 | 19.7 | 1 | 1.6 | 55 | 90.2 |
| 5/12 | 63 | 30 | 47.6 | 9 | 14.3 | 7 | 11.1 | 1 | 1.6 | 47 | 74.6 |
| 5/15 | 63 | 31 | 49.2 | 8 | 12.7 | 10 | 15.9 | 2 | 3.2 | 51 | 81.0 |
| 5/16 | 61 | 27 | 44.3 | 14 | 23.0 | 4 | 6.6 | 1 | 1.6 | 46 | 75.4 |
| 5/17 | 66 | 30 | 45.5 | 9 | 13.6 | 11 | 16.7 | 1 | 1.5 | 51 | 77.3 |
| 5/18 | 61 | 22 | 36.1 | 16 | 26.2 | 10 | 16.4 | 0 | 0.0 | 48 | 78.7 |
| 5/19 | 59 | 30 | 50.8 | 9 | 15.3 | 4 | 6.8 | 0 | 0.0 | 43 | 72.9 |
| 5/22 | 61 | 26 | 42.6 | 25 | 41.0 | 0 | 0.0 | 0 | 0.0 | 51 | 83.6 |
| 5/24 | 64 | 46 | 71.9 | 6 | 9.4 | 2 | 3.1 | 0 | 0.0 | 54 | 84.4 |
| 5/25 | 61 | 46 | 75.4 | 8 | 13.1 | 2 | 3.3 | 0 | 0.0 | 56 | 91.8 |

Table B-3. Continued.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/26 | 61 | 44 | 72.1 | 4 | 6.6 | 6 | 9.8 | 1 | 1.6 | 55 | 90.2 |
| 5/30 | 39 | 25 | 64.1 | 3 | 7.7 | 4 | 10.3 | 0 | 0.0 | 32 | 82.1 |
| 5/31 | 91 | 70 | 76.9 | 6 | 6.6 | 5 | 5.5 | 0 | 0.0 | 81 | 89.0 |
| Total: | 2244 | 1477 | | 236 | | 165 | | 19 | | 1897 | |

Table B-4. PIT-tagged wild steelhead trout interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Snake River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/31 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 4/1 | 6 | 4 | 66.7 | 1 | 16.7 | 0 | 0.0 | 0 | 0.0 | 5 | 83.3 |
| 4/2 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 100.0 |
| 4/3 | 4 | 1 | 25.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 25.0 |
| 4/4 | 3 | 2 | 66.7 | 1 | 33.3 | 0 | 0.0 | 0 | 0.0 | 3 | 100.0 |
| 4/5 | 3 | 2 | 66.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 66.7 |
| 4/6 | 4 | 1 | 25.0 | 1 | 25.0 | 0 | 0.0 | 0 | 0.0 | 2 | 50.0 |
| 4/7 | 4 | 3 | 75.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 75.0 |
| 4/8 | 2 | 1 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 50.0 |
| 4/9 | 29 | 15 | 51.7 | 7 | 24.1 | 0 | 0.0 | 0 | 0.0 | 22 | 75.9 |
| 4/10,11 | 29 | 19 | 65.5 | 6 | 20.7 | 1 | 3.4 | 0 | 0.0 | 26 | 89.7 |
| 4/12,13 | 25 | 15 | 60.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 15 | 60.0 |
| 4/14 | 18 | 14 | 77.8 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 14 | 77.8 |
| 4/17 | 14 | 11 | 78.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 11 | 78.6 |
| 4/18,20 | 26 | 15 | 57.7 | 1 | 3.8 | 2 | 7.7 | 0 | 0.0 | 18 | 69.2 |
| 4/21 | 21 | 18 | 85.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 18 | 85.7 |
| 4/22,23 | 20 | 14 | 70.0 | 1 | 5.0 | 0 | 0.0 | 0 | 0.0 | 15 | 75.0 |
| 4/24 | 7 | 6 | 85.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 6 | 85.7 |
| 4/25 | 19 | 15 | 78.9 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 15 | 78.9 |
| 4/26 | 27 | 22 | 81.5 | 1 | 3.7 | 1 | 3.7 | 0 | 0.0 | 24 | 88.9 |
| 4/27 | 27 | 19 | 70.4 | 2 | 7.4 | 0 | 0.0 | 0 | 0.0 | 21 | 77.8 |
| 4/28 | 59 | 49 | 83.1 | 5 | 8.5 | 1 | 1.7 | 1 | 1.7 | 56 | 94.9 |
| 4/29 | 54 | 39 | 72.2 | 4 | 7.4 | 1 | 1.9 | 1 | 1.9 | 45 | 83.3 |
| 4/30 | 174 | 132 | 75.9 | 16 | 9.2 | 11 | 6.3 | 2 | 1.1 | 161 | 92.5 |
| 5/1 | 224 | 141 | 62.9 | 39 | 17.4 | 16 | 7.1 | 1 | 0.4 | 197 | 87.9 |
| 5/2 | 139 | 67 | 48.2 | 24 | 17.3 | 21 | 15.1 | 2 | 1.4 | 114 | 82.0 |
| 5/3 | 88 | 51 | 58.0 | 9 | 10.2 | 8 | 9.1 | 1 | 1.1 | 69 | 78.4 |
| 5/4 | 56 | 28 | 50.0 | 12 | 21.4 | 7 | 12.5 | 1 | 1.8 | 48 | 85.7 |
| 5/5 | 86 | 34 | 39.5 | 20 | 23.3 | 13 | 15.1 | 1 | 1.2 | 68 | 79.1 |
| 5/8 | 11 | 9 | 81.8 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 9 | 81.8 |
| 5/9 | 10 | 8 | 80.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 8 | 80.0 |
| 5/10 | 51 | 30 | 58.8 | 4 | 7.8 | 9 | 17.6 | 2 | 3.9 | 45 | 88.2 |
| 5/11 | 55 | 33 | 60.0 | 8 | 14.5 | 8 | 14.5 | 1 | 1.8 | 50 | 90.9 |
| 5/12 | 50 | 27 | 54.0 | 8 | 16.0 | 9 | 18.0 | 0 | 0.0 | 44 | 88.0 |
| 5/15 | 24 | 15 | 62.5 | 3 | 12.5 | 2 | 8.3 | 0 | 0.0 | 20 | 83.3 |
| 5/16 | 25 | 19 | 76.0 | 2 | 8.0 | 1 | 4.0 | 0 | 0.0 | 22 | 88.0 |

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/17 | 30 | 16 | 53.3 | 6 | 20.0 | 4 | 13.3 | 0 | 0.0 | 26 | 86.7 |
| 5/18 | 43 | 17 | 39.5 | 8 | 18.6 | 5 | 11.6 | 0 | 0.0 | 30 | 69.8 |
| 5/19 | 15 | 12 | 80.0 | 1 | 6.7 | 1 | 6.7 | 0 | 0.0 | 14 | 93.3 |
| 5/22 | 12 | 8 | 66.7 | 2 | 16.7 | 1 | 8.3 | 0 | 0.0 | 11 | 91.7 |
| 5/24,25 | 17 | 14 | 82.4 | 3 | 17.6 | 0 | 0.0 | 0 | 0.0 | 17 | 100.0 |
| 5/26 | 10 | 10 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 10 | 100.0 |
| 5/30 | 4 | 4 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 100.0 |
| 5/31 | 9 | 5 | 55.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 5 | 55.6 |

Table B-5. PIT-tagged hatchery chinook salmon interrogations at Lower Granite, Little Goose, Lower Monumental and McNary dams from the Clearwater River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/21 | 42 | 24 | 57.1 | 3 | 7.1 | 1 | 2.4 | 4 | 9.5 | 32 | 76.2 |
| 3/22 | 57 | 27 | 47.4 | 6 | 10.5 | 0 | 0.0 | 0 | 0.0 | 33 | 57.9 |
| 3/23,24 | 47 | 21 | 44.7 | 7 | 14.9 | 3 | 6.4 | 1 | 2.1 | 32 | 68.1 |
| 3/25 | 63 | 23 | 36.5 | 10 | 15.9 | 2 | 3.2 | 6 | 9.5 | 41 | 65.1 |
| 3/26,27,28 | 55 | 23 | 41.8 | 6 | 10.9 | 3 | 5.5 | 3 | 5.5 | 35 | 63.6 |
| 3/29,30,31 -4/1 | 49 | 19 | 38.8 | 8 | 16.3 | 9 | 18.4 | 2 | 4.1 | 38 | 77.6 |
| 4/2,3 | 22 | 10 | 45.5 | 1 | 4.5 | 2 | 9.0 | 1 | 4.5 | 14 | 63.6 |
| 4/4 | 6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 4/5,6,7 | 37 | 12 | 32.4 | 5 | 13.5 | 6 | 16.2 | 1 | 2.7 | 24 | 64.9 |
| 4/8 | 97 | 45 | 46.4 | 17 | 17.5 | 6 | 6.2 | 11 | 11.3 | 79 | 81.4 |
| 4/9 | 101 | 56 | 55.4 | 6 | 5.9 | 6 | 5.9 | 9 | 8.9 | 77 | 76.2 |
| 4/10 | 101 | 48 | 47.5 | 12 | 11.9 | 3 | 3.0 | 8 | 7.9 | 71 | 70.3 |
| 4/11 | 99 | 41 | 41.4 | 12 | 12.1 | 10 | 10.1 | 5 | 5.1 | 68 | 68.7 |
| 4/12 | 101 | 39 | 38.6 | 13 | 12.9 | 7 | 6.9 | 6 | 5.9 | 65 | 64.4 |
| 4/13 | 98 | 47 | 48.0 | 18 | 18.4 | 8 | 8.2 | 2 | 2.0 | 75 | 76.5 |
| 4/17 | 95 | 33 | 34.7 | 23 | 24.2 | 9 | 9.5 | 2 | 2.1 | 67 | 70.5 |
| 4/18 | 97 | 38 | 39.2 | 15 | 15.5 | 14 | 14.4 | 3 | 3.1 | 70 | 72.2 |
| 4/19 | 98 | 35 | 35.7 | 18 | 18.4 | 10 | 10.2 | 5 | 5.1 | 68 | 69.4 |
| 4/20 | 100 | 30 | 30.0 | 20 | 20.0 | 17 | 17.0 | 2 | 2.0 | 69 | 69.0 |
| 4/21 | 99 | 33 | 33.3 | 16 | 16.2 | 14 | 14.1 | 6 | 6.1 | 69 | 69.7 |
| 4/24 | 98 | 40 | 40.8 | 18 | 18.4 | 9 | 9.2 | 2 | 2.0 | 69 | 70.4 |
| 4/25 | 101 | 32 | 31.7 | 24 | 23.8 | 19 | 18.8 | 4 | 4.0 | 79 | 78.2 |
| 4/26 | 99 | 35 | 35.4 | 23 | 23.2 | 15 | 15.2 | 5 | 5.1 | 78 | 78.8 |
| 4/28 | 108 | 37 | 34.3 | 20 | 18.5 | 13 | 12.0 | 6 | 5.6 | 76 | 70.4 |
| 5/1 | 102 | 35 | 34.3 | 14 | 13.7 | 21 | 20.6 | 2 | 2.0 | 72 | 70.6 |
| 5/2,3 | 91 | 21 | 25.9 | 16 | 19.8 | 9 | 11.1 | 4 | 4.9 | 50 | 61.7 |
| 5/15,16 | 44 | 12 | 27.3 | 8 | 18.2 | 10 | 22.7 | 2 | 4.5 | 32 | 72.7 |
| 5/17 | 19 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 5/18 | 129 | 55 | 42.6 | 27 | 20.9 | 15 | 11.6 | 3 | 2.3 | 100 | 77.5 |
| 5/19 | 60 | 14 | 23.3 | 16 | 26.7 | 13 | 21.7 | 3 | 5.0 | 46 | 76.7 |
| 5/25 | 37 | 17 | 45.9 | 9 | 24.3 | 2 | 5.4 | 0 | 0.0 | 28 | 75.7 |
| 5/26 | 48 | 20 | 41.7 | 9 | 18.8 | 3 | 6.2 | 0 | 0.0 | 32 | 66.7 |
| 5/30 | 33 | 9 | 27.3 | 8 | 24.2 | 2 | 6.1 | 1 | 3.0 | 20 | 60.6 |
| 5/30 | 43 | 19 | 44.2 | 6 | 14.0 | 8 | 18.6 | 0 | 0.0 | 33 | 76.7 |
| Total | 2467 | 950 | | 414 | | 269 | | 109 | | 1742 | |

| | P<br>M | | ıiı<br>Na | | | :e,<br>95 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Numb<br>tagg | t<br>o<br>a | | ıt. a<br>ittl<br>;oose | | ve1<br>en | | ıt.<br>cN | | | |
| 3/21 | 35 | 17 | 48.6 | 2 | 5.7 | 2 | 5.7 | 1 | 2.9 | 22 | 62.9 |
| 3/22 | 62 | 33 | 53.2 | 5 | 8.1 | 4 | 6.5 | 3 | 4.8 | 45 | 72.6 |
| 3/23,24,25 | 66 | 25 | 37.9 | 11 | 16.7 | 3 | 4.5 | 3 | 4.5 | 42 | 63.6 |
| 3/26,27,28 | 51 | 25 | 49.0 | 5 | 9.8 | 5 | 9.8 | 2 | 3.9 | 37 | 72.5 |
| 3/29 | 8 | 4 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 50.0 |
| 3/30 | 4 | 2 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 50.0 |
| 3/31 | 10 | 4 | 40.0 | 3 | 30.0 | 0 | 0.0 | 0 | 0.0 | 7 | 70.0 |
| 4/1 | 7 | 3 | 42.9 | 1 | 14.3 | 1 | 14.3 | 1 | 14.3 | 6 | 85.7 |
| 4/2 | 9 | 4 | 44.4 | 2 | 22.2 | 0 | 0.0 | 0 | 0.0 | 6 | 66.7 |
| 4/3 | 10 | 4 | 40.0 | 2 | 20.0 | 0 | 0.0 | 0 | 0.0 | 6 | 60.0 |
| 4/4 | 3 | 2 | 66.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 66.7 |
| 4/5 | 2 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 | 0 | 0.0 | 2 | 100.0 |
| 4/6 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/7 | 18 | 9 | 50.0 | 1 | 5.6 | 0 | 0.0 | 0 | 0.0 | 10 | 55.6 |
| 4/8 | 76 | 41 | 53.9 | 9 | 11.8 | 9 | 11.8 | 2 | 2.6 | 61 | 80.3 |
| 4/9 | 74 | 31 | 41.9 | 12 | 16.2 | 6 | 8.1 | 6 | 8.1 | 55 | 74.3 |
| 4/10 | 75 | 34 | 45.3 | 13 | 17.3 | 4 | 5.3 | 2 | 2.7 | 53 | 70.7 |
| 4/11 | 75 | 35 | 46.7 | 11 | 14.7 | 4 | 5.3 | 4 | 5.3 | 54 | 72.0 |
| 4/12 | 72 | 30 | 41.7 | 11 | 15.3 | 6 | 8.3 | 7 | 9.7 | 54 | 75.0 |
| 4/13 | 47 | 19 | 40.4 | 9 | 19.1 | 5 | 10.6 | 1 | 2.1 | 34 | 72.3 |
| 4/17,18 | 48 | 16 | 33.3 | 10 | 20.8 | 7 | 14.6 | 3 | 6.3 | 36 | 75.0 |
| 4/19,20 | 44 | 18 | 40.9 | 14 | 31.8 | 5 | 11.4 | 0 | 0.0 | 37 | 84.1 |
| 4/21 | 8 | 1 | 12.5 | 2 | 25.0 | 2 | 25.0 | 0 | 0.0 | 5 | 62.5 |
| 4/24 | 7 | 2 | 28.6 | 1 | 14.3 | 1 | 14.3 | 0 | 0.0 | 4 | 57.1 |
| 4/25 | 6 | 2 | 33.3 | 2 | 33.3 | 0 | 0.0 | 0 | 0.0 | 4 | 66.7 |
| 4/26 | 10 | 6 | 60.0 | 1 | 10.0 | 2 | 20.0 | 0 | 0.0 | 9 | 90.0 |
| 4/28 | 3 | 2 | 66.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 66.7 |
| 5/1,2,3,15 | 52 | 20 | 38.5 | 11 | 21.2 | 7 | 13.5 | 0 | 0.0 | 38 | 73.1 |
| 5/16 | 5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 5/17 | 8 | 2 | 25.0 | 3 | 37.5 | 2 | 25.0 | 0 | 0.0 | 7 | 87.5 |
| 5/18 | 97 | 48 | 49.5 | 21 | 21.6 | 7 | 7.2 | 2 | 2.1 | 78 | 80.4 |
| 5/19 | 15 | 6 | 40.0 | 2 | 13.3 | 1 | 6.7 | 0 | 0.0 | 9 | 60.0 |
| 5/25 | 9 | 2 | 22.2 | 3 | 33.3 | 3 | 33.3 | 0 | 0.0 | 8 | 88.9 |
| 5/26 | 9 | 4 | 44.4 | 1 | 11.1 | 1 | 11.1 | 0 | 0.0 | 6 | 66.7 |
| 5/30 | 13 | 6 | 46.2 | 1 | 7.7 | 1 | 7.7 | 0 | 0.0 | 8 | 61.5 |
| 5/30 | 12 | 5 | 41.7 | 3 | 25.0 | 0 | 0.0 | 0 | 0.0 | 8 | 66.7 |
| Total | 1051 | 464 | | 173 | | 88 | | 37 | | 762 | |

Table B-7. PIT-tagged hatchery steelhead interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Clearwater River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/8 | 7 | 3 | 42.9 | 1 | 14.3 | 0 | 0.0 | 0 | 0.0 | 4 | 57.1 |
| 4/9 | 8 | 6 | 75.0 | 2 | 25.0 | 0 | 0.0 | 0 | 0.0 | 8 | 100.0 |
| 4/10 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 100.0 |
| 4/18 | 10 | 6 | 60.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 6 | 60.0 |
| 4/19 | 91 | 74 | 81.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 74 | 81.3 |
| 4/20 | 90 | 74 | 82.2 | 1 | 1.1 | 6 | 6.7 | 0 | 0.0 | 81 | 90.0 |
| 4/21 | 89 | 64 | 71.9 | 9 | 10.1 | 3 | 3.4 | 1 | 1.1 | 77 | 86.5 |
| 4/24 | 60 | 43 | 71.7 | 5 | 8.3 | 2 | 3.3 | 2 | 3.3 | 52 | 86.7 |
| 4/25 | 59 | 44 | 74.6 | 6 | 10.2 | 0 | 0.0 | 0 | 0.0 | 50 | 84.7 |
| 4/26 | 60 | 50 | 83.3 | 1 | 1.7 | 2 | 3.3 | 0 | 0.0 | 53 | 88.3 |
| 4/28 | 91 | 73 | 80.2 | 4 | 4.4 | 7 | 7.7 | 0 | 0.0 | 84 | 92.3 |
| 5/1 | 60 | 35 | 58.3 | 7 | 11.7 | 11 | 18.3 | 0 | 0.0 | 53 | 88.3 |
| 5/2 | 34 | 19 | 55.9 | 3 | 8.8 | 5 | 14.7 | 0 | 0.0 | 27 | 79.4 |
| 5/3,15,16 | 77 | 43 | 55.8 | 14 | 18.2 | 7 | 9.1 | 0 | 0.0 | 64 | 83.1 |
| 5/17 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 5/18 | 85 | 36 | 42.4 | 11 | 12.9 | 12 | 14.1 | 0 | 0.0 | 59 | 69.4 |
| 5/19 | 8 | 6 | 75.0 | 2 | 25.0 | 0 | 0.0 | 0 | 0.0 | 8 | 100.0 |
| 5/25 | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 100.0 |
| 5/26 | 23 | 12 | 52.2 | 3 | 13.0 | 1 | 4.3 | 0 | 0.0 | 16 | 69.6 |
| 5/19,25,26 | 34 | 21 | 61.7 | 5 | 14.7 | 1 | 2.9 | 0 | 0.0 | 27 | 79.4 |
| 5/30 | 9 | 9 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 9 | 100.0 |
| Total: | 867 | 602 | | 69 | | 56 | | 3 | | 730 | |

| | P M | | d am | it om | ite he | oga ea | is er | G: ap | :e 95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Numb tagg | t o a | | it. a ittle oose | | Ir I on | ver en | | it. cN | | ota nt | |
| 3/22 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 3/25 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 3/26 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 3/30 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 3/31 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/1 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 4/2 | 2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 4/5 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 4/6 | 5 | 4 | 80.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 80.0 |
| 4/7 | 5 | 2 | 40.0 | 3 | 60.0 | 0 | 0.0 | 0 | 0.0 | 5 | 100.0 |
| 4/8 | 20 | 10 | 50.0 | 4 | 20.0 | 2 | 10.0 | 0 | 0.0 | 16 | 80.0 |
| 4/6,7,8 | 30 | 16 | 53.3 | 7 | 23.3 | 2 | 6.7 | 0 | 0.0 | 25 | 83.3 |
| 4/9 | 86 | 47 | 54.7 | 19 | 22.1 | 7 | 8.1 | 1 | 1.2 | 74 | 86.0 |
| 4/10 | 23 | 15 | 65.2 | 1 | 4.3 | 1 | 4.3 | 0 | 0.0 | 17 | 73.9 |
| 4/11,12,13 | 24 | 14 | 58.3 | 4 | 16.7 | 2 | 8.3 | 0 | 0.0 | 21 | 87.5 |
| 4/18,19,20 | 16 | 11 | 68.8 | 1 | 6.3 | 1 | 6.3 | 0 | 0.0 | 13 | 81.3 |
| 4/21 | 4 | 2 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 50.0 |
| 4/24 | 16 | 14 | 87.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 14 | 87.5 |
| 4/21,24 | 20 | 16 | 80.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 16 | 80.0 |
| 4/25,26,28 | 15 | 11 | 73.3 | 1 | 6.7 | 0 | 0.0 | 0 | 0.0 | 80.0 | |
| 5/1 | 12 | 7 | 58.3 | 1 | 8.3 | 0 | 0.0 | 0 | 0.0 | 8 | 66.7 |
| 5/2 | 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 5/3 | 4 | 2 | 50.0 | 1 | 25.0 | 1 | 25.0 | 0 | 0.0 | 4 | 100.0 |
| 5/15 | 3 | 1 | 33.3 | 1 | 33.3 | 1 | 33.3 | 0 | 0.0 | 3 | 100.0 |
| 5/18,26 | 19 | 12 | 63.2 | 4 | 21.1 | 1 | 5.3 | 0 | 0.0 | 17 | 89.5 |
| 5/19 | 5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 5/30 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| Total: | 268 | 57 | | 40 | | 16 | | 1 | | 214 | |

Table B-9 PIT-tagged hatchery chinook salmon interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Salmon River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16 | 2 | 1 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 50.0 |
| 3/17 | 150 | 58 | 38.7 | 16 | 10.7 | 13 | 8.7 | 8 | 5.3 | 95 | 63.3 |
| 3/18 | 200 | 67 | 33.5 | 19 | 9.5 | 12 | 6.0 | 8 | 4.0 | 106 | 53.0 |
| 3/19 | 150 | 56 | 37.3 | 12 | 8.0 | 12 | 8.0 | 5 | 3.3 | 85 | 56.7 |
| 3/20 | 100 | 31 | 31.0 | 9 | 9.0 | 4 | 4.0 | 6 | 6.0 | 50 | 50.0 |
| 3/21 | 100 | 32 | 32.0 | 13 | 13.0 | 9 | 9.0 | 1 | 1.0 | 55 | 55.0 |
| 3/22 | 100 | 30 | 30.0 | 16 | 16.0 | 8 | 8.0 | 3 | 3.0 | 57 | 57.0 |
| 3/23 | 100 | 43 | 43.0 | 7 | 7.0 | 4 | 4.0 | 5 | 5.0 | 59 | 59.0 |
| 3/24 | 99 | 36 | 36.4 | 5 | 5.1 | 5 | 5.1 | 6 | 6.1 | 52 | 52.5 |
| 3/27 | 102 | 33 | 32.4 | 8 | 7.8 | 11 | 10.8 | 5 | 4.9 | 57 | 55.9 |
| 3/28 | 100 | 31 | 31.0 | 14 | 14.0 | 12 | 12.0 | 1 | 1.0 | 58 | 58.0 |
| 3/29 | 100 | 30 | 30.0 | 12 | 12.0 | 7 | 7.0 | 2 | 2.0 | 51 | 51.0 |
| 3/30 | 100 | 46 | 46.0 | 11 | 11.0 | 4 | 4.0 | 0 | 0.0 | 61 | 61.0 |
| 3/31 | 100 | 38 | 38.0 | 8 | 8.0 | 10 | 10.0 | 6 | 6.0 | 62 | 62.0 |
| 4/3 | 101 | 32 | 31.7 | 9 | 8.9 | 13 | 12.9 | 8 | 7.9 | 62 | 61.4 |
| 4/4 | 100 | 33 | 33.0 | 16 | 16.0 | 10 | 10.0 | 4 | 4.0 | 63 | 63.0 |
| 4/5 | 100 | 45 | 45.0 | 18 | 18.0 | 9 | 9.0 | 2 | 2.0 | 74 | 74.0 |
| 4/6 | 100 | 49 | 49.0 | 12 | 12.0 | 10 | 10.0 | 3 | 3.0 | 74 | 74.0 |
| 4/7 | 100 | 43 | 43.0 | 9 | 9.0 | 13 | 13.0 | 6 | 6.0 | 71 | 71.0 |
| 4/10 | 100 | 38 | 38.0 | 10 | 10.0 | 8 | 8.0 | 1 | 1.0 | 57 | 57.0 |
| 4/11 | 100 | 46 | 46.0 | 10 | 10.0 | 12 | 12.0 | 2 | 2.0 | 70 | 70.0 |
| 4/12 | 102 | 41 | 40.2 | 17 | 16.7 | 4 | 3.9 | 4 | 3.9 | 66 | 64.7 |
| 4/13 | 100 | 45 | 45.0 | 16 | 16.0 | 6 | 6.0 | 3 | 3.0 | 70 | 70.0 |
| 4/14 | 100 | 37 | 37.0 | 16 | 16.0 | 9 | 9.0 | 4 | 4.0 | 66 | 66.0 |
| 4/17 | 98 | 31 | 31.6 | 12 | 12.2 | 6 | 6.1 | 5 | 5.1 | 54 | 55.1 |
| 4/18 | 100 | 24 | 24.0 | 22 | 22.0 | 19 | 19.0 | 5 | 5.0 | 70 | 70.0 |
| 4/19 | 99 | 35 | 35.4 | 11 | 11.1 | 11 | 11.1 | 5 | 5.1 | 62 | 62.6 |
| 4/20 | 100 | 25 | 25.0 | 21 | 21.0 | 10 | 10.0 | 2 | 2.0 | 58 | 58.0 |
| 4/21 | 100 | 29 | 29.0 | 19 | 19.0 | 6 | 6.0 | 4 | 4.0 | 58 | 58.0 |
| 4/24 | 98 | 26 | 26.5 | 20 | 20.4 | 15 | 15.3 | 4 | 4.1 | 65 | 66.3 |
| 4/25 | 99 | 25 | 25.3 | 24 | 24.2 | 12 | 12.1 | 5 | 5.1 | 66 | 66.7 |
| 4/26 | 96 | 24 | 25.0 | 13 | 13.5 | 16 | 16.7 | 6 | 6.2 | 59 | 61.5 |
| 4/27 | 98 | 29 | 29.6 | 12 | 12.2 | 17 | 17.3 | 5 | 5.1 | 63 | 64.3 |
| 4/28 | 100 | 34 | 34.0 | 12 | 12.0 | 14 | 14.0 | 6 | 6.0 | 66 | 66.0 |
| 4/29 | 100 | 27 | 27.0 | 23 | 23.0 | 16 | 16.0 | 1 | 1.0 | 67 | 67.0 |
| 4/30 | 101 | 38 | 37.6 | 17 | 16.8 | 11 | 10.9 | 4 | 4.0 | 70 | 69.3 |
| 5/1 | 100 | 37 | 37.0 | 19 | 19.0 | 14 | 14.0 | 5 | 5.0 | 75 | 75.0 |
| 5/2 | 100 | 24 | 24.0 | 24 | 24.0 | 15 | 15.0 | 3 | 3.0 | 66 | 66.0 |
| 5/3 | 99 | 27 | 27.3 | 11 | 11.1 | 18 | 18.2 | 4 | 4.0 | 60 | 60.6 |
| 5/4 | 100 | 29 | 29.0 | 21 | 21.0 | 14 | 14.0 | 4 | 4.0 | 68 | 68.0 |

Table B-9. Continued.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 100 | 29 | 29.0 | 20 | 20.0 | 17 | 17.0 | 2 | 2.0 | 68 | 68.0 |
| 5/6 | 100 | 27 | 27.0 | 21 | 21.0 | 12 | 12.0 | 4 | 4.0 | 64 | 64.0 |
| 5/7 | 98 | 36 | 36.7 | 21 | 21.4 | 16 | 16.3 | 2 | 2.0 | 75 | 76.5 |
| 5/9 | 100 | 39 | 39.0 | 20 | 20.0 | 12 | 12.0 | 0 | 0.0 | 71 | 71.0 |
| 5/10 | 69 | 22 | 31.9 | 15 | 21.7 | 7 | 10.1 | 0 | 0.0 | 44 | 63.8 |
| 5/11,12 | 76 | 25 | 32.9 | 12 | 15.8 | 9 | 11.8 | 6 | 7.9 | 52 | 68.4 |
| 5/13,14 | 103 | 37 | 35.9 | 19 | 18.4 | 8 | 7.8 | 5 | 4.8 | 69 | 66.9 |
| 5/15 | 43 | 21 | 48.8 | 8 | 18.6 | 3 | 7.0 | 1 | 2.3 | 33 | 76.7 |
| 5/16,17 | 51 | 20 | 39.2 | 11 | 21.6 | 3 | 5.9 | 3 | 5.9 | 37 | 72.5 |
| 5/18,19 | 67 | 26 | 38.8 | 13 | 19.4 | 12 | 17.9 | 1 | 1.5 | 52 | 77.6 |
| 5/20 | 85 | 42 | 49.4 | 20 | 23.5 | 6 | 7.1 | 1 | 1.2 | 69 | 81.2 |
| 5/21 | 47 | 25 | 53.2 | 5 | 10.6 | 4 | 8.5 | 0 | 0.0 | 34 | 72.3 |
| 5/22,23 | 41 | 23 | 56.1 | 8 | 19.5 | 3 | 7.3 | 0 | 0.0 | 24 | 58.5 |
| Total: | 5074 | 1777 | | 757 | | 531 | | 186 | | 3251 | |

Table B-10. PIT-tagged wild chinook salmon interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Salmon River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16 | 74 | 33 | 44.6 | 10 | 13.5 | 6 | 8.1 | 5 | 6.8 | 54 | 73.0 |
| 3/17 | 149 | 70 | 47.0 | 13 | 8.7 | 11 | 7.4 | 6 | 4.0 | 100 | 67.1 |
| 3/18 | 75 | 37 | 49.3 | 9 | 12.0 | 1 | 1.3 | 4 | 5.3 | 51 | 68.0 |
| 3/19 | 75 | 30 | 40.0 | 7 | 9.3 | 4 | 5.3 | 8 | 10.7 | 49 | 65.3 |
| 3/20 | 75 | 36 | 48.0 | 6 | 8.0 | 7 | 9.3 | 2 | 2.7 | 51 | 68.0 |
| 3/21 | 74 | 37 | 50.0 | 15 | 20.3 | 3 | 4.1 | 1 | 1.4 | 56 | 75.7 |
| 3/22 | 75 | 45 | 60.0 | 6 | 8.0 | 2 | 2.7 | 5 | 6.7 | 58 | 77.3 |
| 3/23 | 75 | 36 | 48.0 | 12 | 16.0 | 6 | 8.0 | 2 | 2.7 | 56 | 74.7 |
| 3/24 | 77 | 37 | 48.1 | 9 | 11.7 | 5 | 6.5 | 2 | 2.6 | 53 | 68.8 |
| 3/27 | 75 | 28 | 37.3 | 15 | 20.0 | 7 | 9.3 | 3 | 4.0 | 53 | 70.7 |
| 3/28 | 75 | 31 | 41.3 | 8 | 10.7 | 8 | 10.7 | 6 | 8.0 | 53 | 70.7 |
| 3/29 | 8 | 4 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 50.0 |
| 3/30 | 69 | 35 | 50.7 | 10 | 14.5 | 3 | 4.3 | 4 | 5.8 | 52 | 75.4 |
| 3/31 | 92 | 44 | 47.8 | 19 | 20.7 | 9 | 9.8 | 1 | 1.1 | 73 | 79.3 |
| 4/1 | 54 | 21 | 38.9 | 11 | 20.4 | 5 | 9.3 | 1 | 1.9 | 38 | 70.4 |
| 4/2 | 90 | 46 | 51.1 | 17 | 18.9 | 7 | 7.8 | 4 | 4.4 | 74 | 82.2 |
| 4/3 | 74 | 43 | 58.1 | 6 | 8.1 | 3 | 4.1 | 1 | 1.4 | 53 | 71.6 |
| 4/4 | 75 | 43 | 57.3 | 8 | 10.7 | 6 | 8.0 | 2 | 2.7 | 59 | 78.7 |
| 4/5 | 74 | 44 | 59.5 | 8 | 10.8 | 3 | 4.1 | 3 | 4.1 | 58 | 78.4 |
| 4/6 | 75 | 43 | 57.3 | 6 | 8.0 | 3 | 4.0 | 3 | 4.0 | 55 | 73.3 |
| 4/7 | 76 | 46 | 60.5 | 11 | 14.5 | 5 | 6.6 | 2 | 2.6 | 64 | 84.2 |
| 4/10 | 77 | 36 | 46.8 | 13 | 16.9 | 5 | 6.5 | 2 | 2.6 | 56 | 72.7 |
| 4/11 | 73 | 31 | 42.5 | 14 | 19.2 | 9 | 12.3 | 2 | 2.7 | 56 | 76.7 |
| 4/12 | 75 | 32 | 42.7 | 11 | 14.7 | 4 | 5.3 | 4 | 5.3 | 51 | 68.0 |
| 4/13 | 75 | 34 | 45.3 | 16 | 21.3 | 6 | 8.0 | 2 | 2.7 | 58 | 77.3 |
| 4/14 | 74 | 29 | 39.2 | 19 | 25.7 | 6 | 8.1 | 3 | 4.1 | 57 | 77.0 |
| 4/17 | 59 | 28 | 47.5 | 9 | 15.3 | 6 | 10.2 | 2 | 3.4 | 45 | 76.3 |
| 4/18 | 90 | 37 | 41.1 | 20 | 22.2 | 11 | 12.2 | 2 | 2.2 | 70 | 77.8 |
| 4/19 | 75 | 42 | 56.0 | 11 | 14.7 | 5 | 6.7 | 2 | 2.7 | 60 | 80.0 |
| 4/20 | 75 | 31 | 41.3 | 24 | 32.0 | 9 | 12.0 | 3 | 4.0 | 67 | 89.3 |
| 4/21 | 75 | 39 | 52.0 | 15 | 20.0 | 5 | 6.7 | 2 | 2.7 | 61 | 81.3 |
| 4/24 | 74 | 35 | 47.3 | 15 | 20.3 | 9 | 12.2 | 1 | 1.4 | 60 | 81.1 |
| 4/25 | 75 | 29 | 38.7 | 17 | 22.7 | 12 | 16.0 | 1 | 1.3 | 59 | 78.7 |
| 4/26 | 75 | 30 | 40.0 | 17 | 22.7 | 9 | 12.0 | 2 | 2.7 | 58 | 77.3 |
| 4/27 | 75 | 37 | 49.3 | 16 | 21.3 | 6 | 8.0 | 1 | 1.3 | 60 | 80.0 |
| 4/28 | 75 | 26 | 34.7 | 14 | 18.7 | 15 | 20.0 | 2 | 2.7 | 57 | 76.0 |
| 4/29 | 75 | 36 | 48.0 | 15 | 20.0 | 8 | 10.7 | 2 | 2.7 | 61 | 81.3 |
| 4/30 | 75 | 33 | 44.0 | 13 | 17.3 | 7 | 9.3 | 2 | 2.7 | 55 | 73.3 |
| 5/1 | 75 | 26 | 34.7 | 15 | 20.0 | 14 | 18.7 | 5 | 6.7 | 60 | 80.0 |
| 5/2 | 75 | 26 | 34.7 | 18 | 24.0 | 15 | 20.0 | 2 | 2.7 | 61 | 81.3 |

Table B-10. Continued.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/3 | 74 | 26 | 35.1 | 15 | 20.3 | 11 | 14.9 | 2 | 2.7 | 54 | 73.0 |
| 5/4 | 74 | 29 | 39.2 | 20 | 27.0 | 11 | 14.9 | 2 | 2.7 | 62 | 83.8 |
| 5/5 | 74 | 28 | 37.8 | 10 | 13.5 | 9 | 12.2 | 4 | 5.4 | 51 | 68.9 |
| 5/6 | 75 | 27 | 36.0 | 13 | 17.3 | 13 | 17.3 | 1 | 1.3 | 54 | 72.0 |
| 5/7 | 74 | 27 | 36.5 | 19 | 25.7 | 6 | 8.1 | 1 | 1.4 | 53 | 71.6 |
| 5/9 | 74 | 37 | 50.0 | 13 | 17.6 | 6 | 8.1 | 1 | 1.4 | 57 | 77.0 |
| 5/10 | 35 | 17 | 48.6 | 5 | 14.3 | 2 | 5.7 | 0 | 0.0 | 24 | 68.6 |
| 5/11,12 | 53 | 18 | 34.0 | 16 | 30.2 | 5 | 9.4 | 1 | 1.9 | 40 | 75.5 |
| 5/13 | 50 | 22 | 44.0 | 5 | 10.0 | 5 | 10.0 | 0 | 0.0 | 32 | 64.0 |
| 4/14,15 | 60 | 20 | 33.3 | 16 | 26.7 | 5 | 8.3 | 2 | 3.3 | 43 | 71.7 |
| 5/16,17 | 81 | 42 | 51.9 | 12 | 14.8 | 11 | 13.6 | 1 | 1.2 | 66 | 81.5 |
| 5/18,19 | 79 | 35 | 44.3 | 20 | 25.3 | 9 | 11.4 | 0 | 0.0 | 64 | 81.0 |
| 5/20 | 55 | 27 | 49.1 | 10 | 18.2 | 4 | 7.3 | 0 | 0.0 | 41 | 74.5 |
| 5/21 | 37 | 13 | 35.1 | 11 | 29.7 | 3 | 8.1 | 0 | 0.0 | 27 | 73.0 |
| 5/22 | 17 | 9 | 52.9 | 2 | 11.8 | 0 | 0.0 | 0 | 0.0 | 11 | 64.7 |
| 5/23 | 17 | 7 | 41.2 | 4 | 23.5 | 1 | 5.9 | 0 | 0.0 | 12 | 70.6 |
| 5/21,22,23 | 71 | 29 | 40.8 | 17 | 23.9 | 4 | 5.6 | 0 | 0.0 | 50 | 70.4 |
| Total: | 3937 | 1790 | | 689 | | 366 | | 122 | | 2967 | |

Table B-11. PIT-tagged hatchery steelhead trout interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Salmon River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/10,11 | 27 | 16 | 59.3 | 2 | 7.4 | 0 | 0.0 | 0 | 0.0 | 18 | 66.7 |
| 4/12 | 20 | 11 | 55.0 | 3 | 15.0 | 0 | 0.0 | 0 | 0.0 | 14 | 70.0 |
| 4/13 | 18 | 12 | 66.7 | 1 | 5.6 | 0 | 0.0 | 0 | 0.0 | 13 | 72.2 |
| 4/14 | 61 | 41 | 67.2 | 4 | 6.6 | 2 | 3.3 | 0 | 0.0 | 47 | 77.0 |
| 4/17 | 60 | 46 | 76.7 | 2 | 3.3 | 1 | 1.7 | 1 | 1.7 | 50 | 83.3 |
| 4/18 | 60 | 37 | 61.7 | 4 | 6.7 | 3 | 5.0 | 1 | 1.7 | 45 | 75.0 |
| 4/19 | 60 | 45 | 75.0 | 2 | 3.3 | 2 | 3.3 | 1 | 1.7 | 50 | 83.3 |
| 4/20 | 60 | 38 | 63.3 | 6 | 10.0 | 3 | 5.0 | 0 | 0.0 | 47 | 78.3 |
| 4/21 | 60 | 39 | 65.0 | 8 | 13.3 | 2 | 3.3 | 0 | 0.0 | 49 | 81.7 |
| 4/24 | 60 | 43 | 71.7 | 2 | 3.3 | 3 | 5.0 | 1 | 1.7 | 49 | 81.7 |
| 4/25 | 60 | 37 | 61.7 | 10 | 16.7 | 2 | 3.3 | 1 | 1.7 | 50 | 83.3 |
| 4/26 | 59 | 37 | 62.7 | 4 | 6.8 | 4 | 6.8 | 1 | 1.7 | 46 | 78.0 |
| 4/27 | 60 | 38 | 63.3 | 3 | 5.0 | 6 | 10.0 | 3 | 5.0 | 50 | 83.3 |
| 4/28 | 60 | 47 | 78.3 | 2 | 3.3 | 5 | 8.3 | 0 | 0.0 | 54 | 90.0 |
| 4/29 | 60 | 33 | 55.0 | 9 | 15.0 | 4 | 6.7 | 1 | 1.7 | 47 | 78.3 |
| 4/30 | 60 | 33 | 55.0 | 7 | 11.7 | 10 | 16.7 | 0 | 0.0 | 50 | 83.3 |
| 5/1 | 62 | 30 | 48.4 | 14 | 22.6 | 7 | 11.3 | 1 | 1.6 | 52 | 83.9 |
| 5/2 | 60 | 31 | 51.7 | 12 | 20.0 | 5 | 8.3 | 0 | 0.0 | 48 | 80.0 |
| 5/3 | 60 | 26 | 43.3 | 8 | 13.3 | 9 | 15.0 | 0 | 0.0 | 43 | 71.7 |
| 5/4 | 60 | 34 | 56.7 | 8 | 13.3 | 7 | 11.7 | 0 | 0.0 | 49 | 81.7 |
| 5/5 | 60 | 31 | 51.7 | 12 | 20.0 | 9 | 15.0 | 1 | 1.7 | 53 | 88.3 |
| 5/6 | 60 | 32 | 53.3 | 11 | 18.3 | 9 | 15.0 | 0 | 0.0 | 52 | 86.7 |
| 5/7 | 62 | 42 | 67.7 | 6 | 9.7 | 3 | 4.8 | 0 | 0.0 | 51 | 82.3 |
| 5/9 | 60 | 37 | 61.7 | 6 | 10.0 | 7 | 11.7 | 2 | 3.3 | 52 | 86.7 |
| 5/10,11 | 38 | 24 | 63.2 | 7 | 18.4 | 0 | 0.0 | 0 | 0.0 | 31 | 81.6 |
| 5/12,13 | 32 | 15 | 46.9 | 6 | 18.8 | 4 | 12.5 | 0 | 0.0 | 25 | 78.1 |
| 5/14,15 | 35 | 19 | 54.3 | 7 | 20.0 | 4 | 11.4 | 0 | 0.0 | 30 | 85.7 |
| 5/16 | 27 | 12 | 44.4 | 5 | 18.5 | 5 | 18.5 | 0 | 0.0 | 22 | 81.5 |
| 5/17,18 | 33 | 16 | 48.5 | 10 | 30.3 | 1 | 3.0 | 0 | 0.0 | 27 | 81.8 |
| 5/19,20 | 33 | 18 | 54.5 | 4 | 12.1 | 1 | 3.0 | 0 | 0.0 | 23 | 69.7 |
| 5/21 | 15 | 10 | 66.7 | 1 | 6.7 | 0 | 0.0 | 0 | 0.0 | 11 | 73.3 |
| 5/22 | 8 | 4 | 50.0 | 4 | 50.0 | 0 | 0.0 | 0 | 0.0 | 8 | 100.0 |
| 5/23 | 6 | 3 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 50.0 |
| Total: | 1556 | 937 | | 190 | | 118 | | 14 | | 1259 | |

Table B-12. PIT-tagged wild steelhead trout interrogations at Lower Granite, Little Goose, Lower Monumental, and McNary dams from the Salmon River trap, 1995.

| Date | Number tagged | Int. at Lower Granite | % | Int. at Little Goose | % | Int. at Lower Monumental | % | Int. at McNary | % | Total int. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/17 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 3/18 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/5 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 4/7 | 4 | 3 | 75.0 | 1 | 25.0 | 0 | 0.0 | 0 | 0.0 | 4 | 100.0 |
| 4/10 | 9 | 7 | 77.8 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 7 | 77.8 |
| 4/5,7,10,11 | 33 | 25 | 75.8 | 4 | 12.1 | 0 | 0.0 | 0 | 0.0 | 29 | 87.9 |
| 4/12,13,14 | 34 | 24 | 70.6 | 3 | 8.8 | 0 | 0.0 | 0 | 0.0 | 27 | 79.4 |
| 4/17,18,19 20,21 | 32 | 26 | 81.2 | 1 | 3.1 | 0 | 0.0 | 0 | 0.0 | 27 | 84.4 |
| 4/28 | 12 | 9 | 75.0 | 1 | 8.3 | 0 | 0.0 | 0 | 0.0 | 10 | 83.3 |
| 4/24,25 26,27 | 47 | 25 | 53.1 | 4 | 8.5 | 5 | 10.6 | 1 | 2.1 | 35 | 74.5 |
| 4/29 | 14 | 8 | 57.1 | 4 | 28.6 | 1 | 7.1 | 0 | 0.0 | 13 | 92.9 |
| 4/30 | 16 | 9 | 56.2 | 1 | 6.2 | 2 | 12.5 | 0 | 0.0 | 12 | 75.0 |
| 5/1 | 40 | 18 | 45.0 | 5 | 12.5 | 5 | 12.5 | 0 | 0.0 | 28 | 70.0 |
| 5/2 | 29 | 12 | 41.4 | 4 | 13.8 | 5 | 17.2 | 0 | 0.0 | 21 | 72.4 |
| 5/3,4 | 38 | 15 | 39.5 | 10 | 26.3 | 3 | 7.9 | 0 | 0.0 | 28 | 73.7 |
| 5/5 | 25 | 12 | 48.0 | 8 | 32.0 | 3 | 12.0 | 0 | 0.0 | 23 | 92.0 |
| 5/6 | 33 | 15 | 45.5 | 9 | 27.3 | 3 | 9.1 | 0 | 0.0 | 27 | 81.8 |
| 5/7 | 30 | 20 | 66.7 | 2 | 6.7 | 3 | 10.0 | 0 | 0.0 | 25 | 83.3 |
| 5/9 | 15 | 9 | 60.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 9 | 60.0 |
| 5/11 | 4 | 2 | 50.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 50.0 |
| 5/12 | 6 | 3 | 50.0 | 1 | 16.7 | 1 | 16.7 | 0 | 0.0 | 5 | 83.3 |
| 5/13 | 6 | 4 | 66.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 66.7 |
| 5/14 | 3 | 2 | 66.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 66.7 |
| 5/18 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| 5/19 | 5 | 2 | 40.0 | 1 | 20.0 | 1 | 20.0 | 0 | 0.0 | 4 | 80.0 |
| 5/20 | 5 | 5 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 5 | 100.0 |
| 5/21 | 4 | 2 | 50.0 | 1 | 25.0 | 0 | 0.0 | 0 | 0.0 | 3 | 75.0 |
| 5/23 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 |
| Total: | 435 | 251 | | 59 | | 32 | | 1 | | 343 | |

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