

MONITORING OF DOWNSTREAM SALMON AND STEELHEAD AT FEDERAL HYDROELECTRIC FACILITIES - 1997

Annual Report

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Abstract.—All juvenile fish numbers, sample, collection, and index were down almost 50% from the previous year at John Day Dam (JDA). At Bonneville Dam, sample numbers increased while collection and index numbers stayed about the same. River flow in 1997 was very high which resulted in high levels of spill. One possible explanation for the reduction in collection and index numbers at JDA is that spill passes fish at more than a 1:1 ratio, resulting in low estimates. The high levels of spill raised dissolved gas levels up to 129.2% on average for April and May at John Day Dam. From 21 April to 17 June, percent saturation stayed between 135% and 142% at JDA. In spite of the high gas levels, incidence of bubbles was low, only 2.8% at John Day and 6.7% at Bonneville. Descaling at JDA was higher than last year and the historical average for yearling chinook, subyearling chinook, coho, and sockeye, but lower than both for steelhead. Descaling at Bonneville was about the same as last year and the historical average for all species except sockeye, which was more than double last year but still lower than the historical average. Diel passage was similar to previous years at both sites; an increase in passage at dusk, peaking between 2200 hours and midnight and falling off gradually throughout the rest of the night. PIT tag detections were down at John Day but up dramatically at Bonneville. Single airlift operation at JDA and expanded detection in the second powerhouse at Bonneville are the likely causes.

PREFACE

Project 84-014 has been part of the annual integrated and coordinated Columbia River Basin Smolt Monitoring Program since 1984, and currently addresses measure 5.9A.1 of the 1994 Northwest Power Planning Council's (NPPC) Fish and Wildlife Program. The program is coordinated by the Fish Passage Center and funded by the Bonneville Power Administration. This National Marine Fisheries Service (NMFS) project was established to: 1) collect and report daily fish capture, fish condition, dam operations and river flow data to water managers to improve the scientific information on which to base in-season operations of the hydrosystem and 2) analyze the collected data and characterize juvenile fish passage at mainstem federal dams and transfer this information, learning and understanding to the fisheries community through technical reports and publications. In the 1980's this project conducted the smolt monitoring at Lower Granite, Lower Monumental, McNary, John Day and Bonneville dams. Since the early 1990's, the smolt monitoring at the Snake River dams and McNary Dam has been assumed by non-federal entities, mainly the states of Washington and Oregon, and this project has performed the smolt monitoring at John Day, The Dalles (1989 – 1991) and Bonneville dams.

The following report presents results from the 1997 smolt monitoring at John Day and Bonneville dams and represents the fourteenth annual report under this project. The report also contains summaries of data for all years of the program at John Day and Bonneville dams in Appendices C and D.

INTRODUCTION

The seaward migration of juvenile salmonids was monitored by the National Marine Fisheries Service (NMFS) at Bonneville Dam, located at river mile 145, from 17 March to 31 October and at John Day Dam, located at river mile 216, from 7 April to 8 September, 1997 (Figure 1).

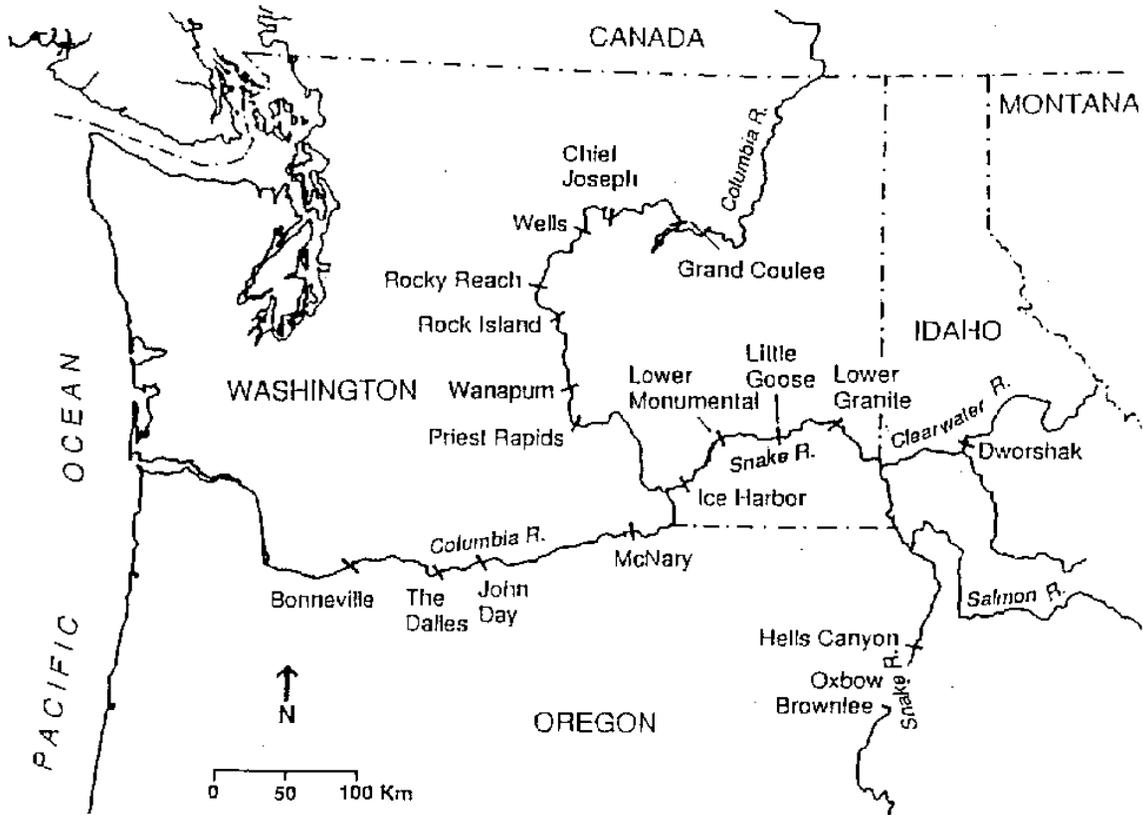


Figure 1. Hydroelectric projects on the Snake and Columbia Rivers, including the two smolt monitoring sites operated by the National Marine Fisheries Service, Bonneville and John Day dams. This figure is reprinted courtesy of NMFS-Northwest Fisheries Science Center-Graphics Department.

The purpose of the SMP is to monitor the migration of the juvenile salmonid stocks in the Columbia basin and make flow and spill recommendations designed to facilitate fish passage. Data are also used for travel time, migration timing and relative run size analysis. The purpose of the NMFS portion of the program is to provide the FPC with species and project specific real time data from John Day and Bonneville dams.

METHODS AND MATERIALS

JOHN DAY DAM

At John Day in 1997, sampling commenced on 7 April and ended on 8 September. Fish were collected with an airlift pump system of the type described by Brege et al. (1990), and shown in Figure 2. Collected fish were examined hourly, or every other hour when numbers were low, each 24 hour sample day (0700 to 0700 hours), seven days per week. Fish were collected in a 1,688 liter (450 gal) tank suspended at water level in the gatewell. Each hour, this collection tank was raised and fish were gravity fed to holding tanks in a fish handling building via a 6-inch PVC pipe (Figure A-1).

Approximately 50 fish at a time were then crowded into a 21-inch square, preanesthetizing chamber (PA). The water level in the PA chamber was lowered to about 5 inches (34 liters) and fish were anesthetized with MS-222 at a concentration of about 44 mg/L. Once anesthetized, fish were net-transferred to the examination trough which contained about 38 mg/L of MS-222 to minimize stress during examination. Fish were routed through a PIT tag detector and then a wobble nose diverter that routed PIT tagged fish to a holding area so condition data could be collected. All sampled fish were held in a recovery tank a minimum of twenty minutes before being returned to the bypass system. All fish holding tanks had a constant exchange of river water. Diagrams showing the location of equipment on the powerhouse deck and the layout of the fish-shack are presented in Figure A-1.

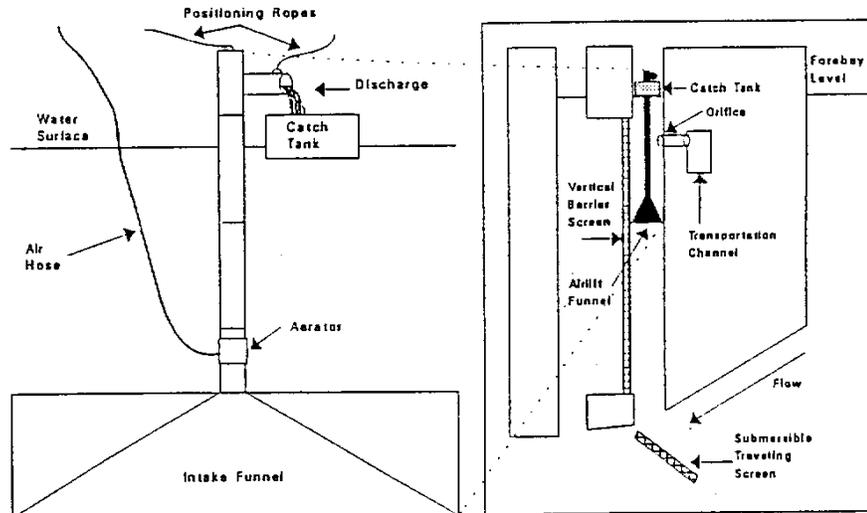


Figure 2. Components of a funnel airlift system and the operating position in the dam.

Diagrams showing the location of equipment on the powerhouse deck and the layout of the fish-shack are presented in Figure A-1.

Subsampling

This year, as in 1996 and 1995, subsampling was utilized to reduce the number of fish handled during peak passage periods. Again in 1997, once the sample rate was set for the day, it remained unchanged. This was done to make data analysis easier and to minimize the discrepancy between hourly and daily indices (see Definitions of Terms section). The methodology consisted of breaking the sample day into two-hour blocks, starting at 0700, and sampling for the first 60, 40 or 30 minutes for 50%, 33%, or 25% sample rates, respectively. Sample collection began when the air was *shut off* at the beginning of each two hour block. The basket was raised, emptied and reset, which took about 10 minutes. The sample was collected for the amount of time left, according to the sample rate. Sample fish were routed to the fish-shack as described earlier. After examination, the number of fish sampled was evenly split between the two hours of that sample block. Fish to be bypassed were first drained into a buffer tank, then drained through a 4 inch flex hose fitted with a PIT tag detector back to the bypass channel.

3C Sampling

No requests were made to operate a second airlift in 1997 for PIT tag detection.

BONNEVILLE DAM

At Bonneville in 1997, sampling began on 17 March and ended on 30 October in powerhouse 1 (PH1), and began on 1 May and ended on 3 October in powerhouse 2 (PH2). Sampling was scheduled to start on 10 March in PH1, but was delayed due to repairs to the inclined floor screen. Fish samples were collected in the bypass channels of the first and second powerhouses using the downstream migrant traps (DSM1 & DSM2) at Bonneville Dam. Gessel (1986) described the DSM trap operation for the first powerhouse and McConnell and Muir (1982) and Krcoma et al. (1984) described trap operation for the second powerhouse.

First Powerhouse

Sampling effort in PH1 remained at 8 hours per day in 1997. Samples were collected hourly, from 1600 to 2400 hours, seven days per week. The sample rate was adjusted on a daily basis depending on smolt numbers, and normally ranged from 6 to 12 minutes per hour (10 - 20%). During periods of high smolt passage, the sample rate was adjusted on an hourly basis, to a minimum of one minute per hour, to avoid overcrowding the trap. Sample time was split into two samples of equal duration per hour, unless the sample rate was set at one minute per hour, in which case a single sample was taken. Samples were collected by lowering a wedge wire screen into the bypass channel at the end of the inclined screen, thus diverting fish into a collection tank suspended in the downwell (Figure 3). Collected fish were drained from the collection tank to the holding tank via a rectangular chute. Fish were then net transferred from the holding tank to the sorting trough, which contained about 42 mg/l of Finquel (MS-222) to anesthetize the fish. After processing,

sampled fish passed through a tunnel PIT tag detector/diverter system before emptying into the recovery tank. PIT tagged fish were diverted to a separate tank so condition data could be collected. A diagram of the PH1 sampling area is presented in Figure B-1.

The flat plate PIT tag detection system was operated again in 1997. The system consisted of two antennae loops, each housed in a watertight case. The cases were fitted in a frame mounted on top of the collection tank and attached with a pivoting arm in each corner. A pneumatic cylinder was used to raise or lower the flatplate system. Between samples, the flat plate was lowered onto the tank and the tank was lowered to sampling position. When the screen was lowered, fish passing over the flatplate were scanned for PIT tags. For sample collection, the flatplate was raised and fish were diverted into the collection tank.

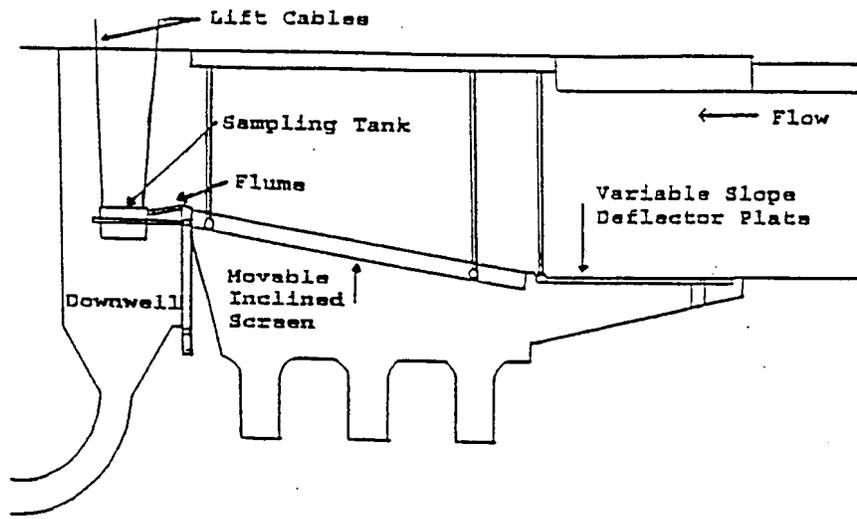


Figure 3. Inclined screen sampling system in the bypass channel of the first powerhouse at Bonneville Dam.

Second Powerhouse

A new fish collection system was installed in the Second Powerhouse in 1997. The system was designed to provide full bypass channel PIT tag interrogation and to collect fish. Both functions were needed for The Dalles Dam spillway survival study conducted by the National Marine Fisheries Service. Unlike the old sampler that sampled a maximum of 10% of the bypass channel, the new system diverts 100% of the fish into the collection system. It was operated as needed to get the target number of research fish, up to 5000 per day. Samples for condition monitoring were obtained from the research fish Monday, Wednesday, and Friday. Fish were routed to and held in raceways until they were examined. A preanesthetizing compartment was also installed this year so fish were anesthetized before being transferred to the sorting trough. After examination, fish were placed in recovery tanks and eventually routed back to the bypass channel. A diagram of the PH2 sampling area is presented in Figure B-2. Detailed diagrams of the new PIT tag system at PH2 are shown in Figures B-3 - 4.

Gas Bubble Disease Subsampling

At John Day and Bonneville, the naked eye examinations for gas bubble disease symptoms were discontinued. This year, the dissecting microscope was used for all examinations. The exams were conducted on up to 200 fish, 100 steelhead and 100 of the most abundant chinook, yearling or subyearling, every other day. Exams were conducted from 8 April through 30 August.

Performance Monitoring

At John Day and Bonneville, as part of our performance monitoring program, coworkers periodically compare results from the same batch of fish, processed independently, and discrepancies are recorded and discussed. Each fish counted as a point, as well as any particular features that fish may have had. For example, if 20 out of the total of 100 fish used in tests for the season were descaled according to the primary data collector, then the total possible points in the descaling category would be 20. If a feature was noted by the secondary data collector, such as an elastomer tag, but not noted by the primary data collector, then it too was counted in the total possible for that category. This approach has several advantages over previously used methods, including: 1) less handling of fish, 2) it does not require a supervisor to administer, 3) increased frequency of tests, 4) promotes teamwork and builds consistency between coworkers.

Data Collected

Items 1-5 were reported to the Fish Passage Center daily; item 6, the PIT tag data, was reported to the PTAGIS data center daily or weekly, depending on the type of PIT tag data, as indicated below:

- 1) Species specific hourly and daily sample totals

- 2) Brands and fin clips
- 3) Descaling and mortality
- 4) Species specific length and condition data (subsampling only)
- 5) River, powerhouse, turbine, and spill flow data
- 6) PIT tag detection (daily) and recapture condition data including: length, weight, and overall condition (weekly)

DEFINITION OF TERMS

Three types of numbers are discussed in the report, defined as follows:

- 1) Total Sample: actual fish counts, number of fish handled.
- 2) Estimated Collection: total sample number divided by sample rate, resulting in an estimated number of fish passing through sample unit.
- 3) Fish Passage Indices: estimated collection counts divided by the proportion of total river flow passing through the sample system resulting in a relative indicator of fish abundance with no adjustment for Fish Guidance Efficiency, horizontal, vertical or temporal fish distribution.

As stated in the Fish Passage Center Annual Reports, Fish Passage Indices (FPI) are used as relative indicators of population abundance, and assumes that fish pass through spill and powerhouse units in numbers proportional to the flow through those passage routes. Indices are not estimates of total daily passage, but rather a relative measure of how the migration is progressing over the season for a given species.

John Day and Bonneville generate hourly and daily indices, defined as follows:

Hourly Resolution FPI divides hourly collection counts by the proportion of river flow through the sampled unit or powerhouse for that hour, then sums hourly subtotals to get the daily total. There is no expansion for 8 hour monitoring at Bonneville.

Daily Resolution FPI divides daily collection counts by the proportion of daily average river flow through the sampled unit (JDA) or powerhouse (BO1) for the day.

RESULTS AND DISCUSSIONS

JOHN DAY DAM

New to this year's report is a program summary table. It includes sample dates, sampling effort, sample, collection, and index numbers for each year of sampling at John Day Dam. The table is located in Appendix C, Table C-21.

The Numbers

Sample Numbers

The total number of fish handled at John Day in 1997 was 46,876, a 43.5% decline from the 1996 total of 70,539, and a 60% decline from 1995 (Table 1). Species specific sample numbers expressed as a percent of 1996 sample numbers are as follows: hatchery steelhead, 122%; wild steelhead, 101%; subyearling chinook, 65.8%; coho, 39.9%; sockeye, 64.3%; and yearling chinook, 31.5%. Only hatchery and wild steelhead increased in sample number, all other species had a significant reduction in sample numbers. See Table 1 for the actual numbers. There are several possible explanations for the reduction in sample numbers, including: conservatively set fixed sample rates for a day to avoid exceeding target sample size, high levels of spill attracting fish to that passage route, and a shorter sampling season, ending 9 September in 1996 and 1997.

Table 1. Summary of 1997 smolt monitoring at John Day and Bonneville dams.

Species	Site	Total Sample	Daily		Hourly	
			Collection ¹	FPI ²	Collection	FPI ³
Yearling	John Day (3B)	4,586	7,646	154,026	7,646	148,993
Chinook	Bonneville PH #1	5,938	56,891	286,666	56,896	279,280
	Bonneville PH#2 ⁴	648	----	----	----	----
Subyearling	John Day (3B)	20,487	24,333	448,328	24,290	422,730
Chinook	Bonneville PH #1	44,024	342,192	1,501,962	342,207	1,509,895
	Bonneville PH #2	7,415	----	----	----	----
Wild Steelhead	John Day (3B)	4,011	7,337	151,061	7,328	145,192
	Bonneville PH #1	3,615	38,829	205,873	38,830	200,764
	Bonneville PH #2	461	----	----	----	----
Hatchery Steelhead	John Day (3B)	13,645	28,547	614,087	28,504	598,959
	Bonneville PH #1	9,285	105,516	575,077	105,517	557,832
	Bonneville PH #2	1,596	----	----	----	----
Coho	John Day (3B)	3,409	6,615	147,267	6,556	143,291
	Bonneville PH #1	12,346	128,031	706,780	128,034	681,513
	Bonneville PH #2	2,169	----	----	----	----
Wild Sockeye	John Day (3B)	500	781	17,388	773	16,827
	Bonneville PH #1	429	4,135	22,788	4,142	21,891
	Bonneville PH #2	388	----	----	----	----
Hatchery Sockeye	John Day (3B)	238	403	9,131	398	8,614
	Bonneville PH #1	160	1,630	8,311	1,632	8,216
	Bonneville PH #2	132	----	----	----	----
SEASON	John Day (3B)	46,876	75,662	1,541,288	75,495	1,484,606
TOTALS	Bonneville PH #1	75,797	677,223	3,307,458	677,258	3,259,391
	Bonneville PH #2	13,472	----	----	----	----

Collection Estimates

The total collection estimate of 75,495 was less than half (46%) the 1996 estimate of 163,698 fish (Hourly method). All

1 Collection numbers = Sample number divided by sample rate.

2 Daily FPI = Daily collection counts divided by proportion of daily average river flow through sample unit.

3 Hourly FPI = Hourly collection counts divided by proportion of hourly river flow through sample unit.

4 PH #2 sampled for fish condition only.

species showed a decline in collection numbers from 1996, ranging from an 80% reduction for yearling chinook to about 22% reduction for hatchery steelhead. Collection estimates for the remaining species, expressed as a percentage of 1996 collection estimates, are as follows: wild steelhead, 61.7%; subyearling chinook, 52.5%; hatchery sockeye, 52.4%; wild sockeye, 29.7%; and coho, 24.3%. The Daily method total collection number was 75,662, very similar to the hourly collection total (Table 1).

Fish Passage Indices

Collection numbers are divided by the proportion of river flow through the sample unit to get a Fish Passage Index (FPI). The 1997 Daily index total for all species combined was 1,541,288, about 52% of the 1996 Daily FPI of 2,976,409. The Hourly method generated an index total of 1,484,606, only about 49.5% of the 1996 Hourly FPI of 2,995,767. A breakdown by species for sample, collection, and index numbers can be found in Table 1.

Percent composition, using sample numbers, was as follows: subyearling chinook, 44%; hatchery steelhead, 29%; yearling chinook, 10%; wild steelhead, 9 %; coho, 7%; wild sockeye, 1%; hatchery sockeye, 1%.

The large reductions in sample, collection, and index numbers in the last two years is probably the result of the high flows requiring more water to be spilled. The increased spill passage and the conscious effort within the SMP to reduce the number of fish sampled may explain the reduction in sample numbers, and resulting collection numbers. The index numbers are expanded on the assumption that fish passage to flow is a 1 to 1 relationship. If this assumption is false, then the expansion for index numbers will be disproportionately low when more water is spilled, as was the case the last two years.

River Conditions

River Flow

River flows at John Day Dam were even higher in 1997 than the record flows seen in 1996. The 1997 spring (April & May) river flow averaged 414.4 kcfs compared to 352.0 kcfs last year. The spring peak river flow of 539.8 kcfs occurred on 20 May and was more than 100 kcfs greater than last years 31 May peak of 432.8 kcfs. For June and July, river flow averaged 391.8 kcfs compared to 321.5 kcfs last year. Flows fell gradually throughout the summer and flows averaged 171.7 kcfs for August and September (Figure 5), which was still higher than the average (123.5 kcfs) for the same period in 1996.

Spill

The high river flows in 1997 resulted in large volumes of spill, averaging about 23% of river flow for the season, compared to 20% last year and only 2.7% in 1995. Spring spill averaged 27.4% of river flow and peaked at 42.6% on 25 May. In June and July, spill averaged 27% of river flow and peaked at 45.5% on 19 June. These levels of spill produced total dissolved gas in excess of the 120% limit imposed by the Washington and Oregon water quality departments. During April and May, percent saturation in the tailrace at John Day Dam averaged 129.2% and for 44 out of 57 days, from 21 April to 17 June, gas supersaturation in the tailrace stayed between 135% and 142%. After 1 July, gas levels in the tailrace stayed below 120%.

Temperature

Spring water temperature in the fish handling facility ranged from 46⁰F to 57.2⁰F and averaged 52⁰F. During June and July the range was 57⁰F to 68⁰F with an average of 61.2⁰F. In August and September, the range was 68⁰F to 71.8⁰F, the average was 69.6⁰ F, and the peak temperature was 71.8⁰F, recorded on 7 August.

Passage Patterns

Seasonal

The relative run timing (10, 50, and 90% passage dates) and the duration of the middle 80% (in days) for 1997 are compared to the median dates and presented in Figure 4. Median dates were calculated from the Daily indices. Wild and hatchery steelhead dates were only calculated as separate entities from 1990 to 1996 data. Prior to 1990, wild and hatchery stocks were not differentiated. Compared to historical medians, the 10% passage dates were earlier or the same this year. The 90% passage dates were earlier for yearling chinook and wild steelhead, later for coho and sockeye and the same for subyearling chinook and hatchery steelhead. The net effect was that for all species, the middle 80% of the out-migrants took longer to pass John Day Dam (Figure 4). In general, the same can be said when this year's 10% and 90% passage dates are compared to last year's dates (Figure C-2). For the exact dates refer to Table C-1.

Yearling chinook passage was dispersed throughout April and May, but with two distinct peaks, 23 and 30 April (Figure 5). Wild steelhead passage mainly occurred during the last week of April, with one peak later, on 17 May. Hatchery steelhead passage also peaked on 17 May and ranged between 2% and 4% of the total for the rest of their migration. Coho passed John Day Dam in two distinct groups during the first and last weeks of May. Sockeye passage began later than the other spring migrants and lasted longer, with small numbers still present in the samples near the end of August. Sockeye passage peaked on 14 May at just over 6% of the season total. Subyearling chinook passed John Day from mid May through the end of the season. Passage peaks occurred during the first half of June and the first half of July.

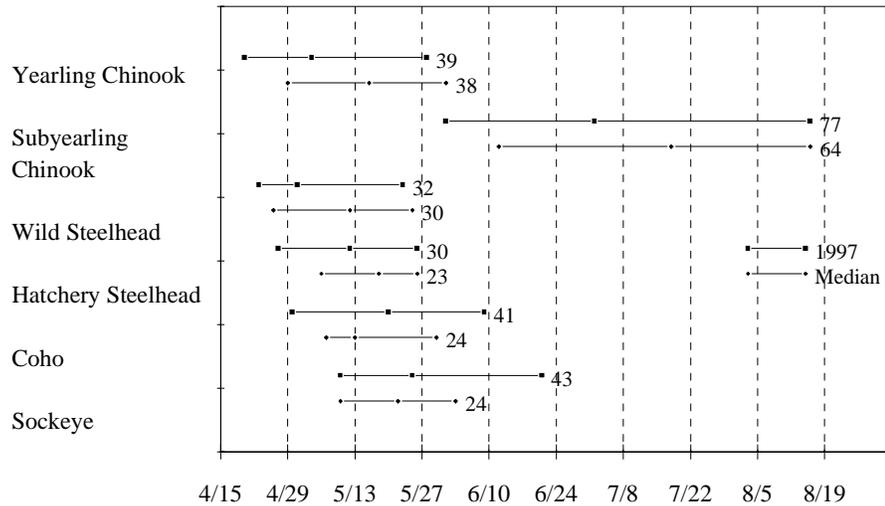


Figure 4. The 10%, 50%, and 90% passage dates and the historical median (n=8 for steelhead, n=13 for salmon species) at John Day Dam, 1997. The duration in days between the 10% and 90% passage dates is indicated for each line.

The average passage pattern for all species and all years of sampling, and the standard deviation for each day, are presented in Figure C-1. Wild steelhead show the most variability around the beginning and end of the migration, while the other stocks showed more variance around the peak of the migration.

Diel

Diel passage patterns are quite consistent over the season and with previous years in that the majority of passage for all species occurs at night, between the hours of 8pm and 6am (2001-0600 Pacific Daylight Time) as shown in Table 2, Figure 6, and Table C-2. Passage for spring species increased after 1900 hours as ambient light decreased, peaked at 2200 to 2300 hours, then dropped off sharply, very similar to the patterns seen in 1996 and 1995. Subyearling chinook had a smaller and later peak at midnight and a more gradual decline the rest of the night, almost identical to last year. About 25% of the coho and 22% of the hatchery steelhead were collected during the 2200-2300 hour sample block. The percent of total daily collection was below 4% per hour from 0800 - 1600 hours for all species except for sockeye, which had an 1100 to 1200 hour peak of about 5% (Figure 6).

Species	% night 1800-0600
Yearling Chinook	62.6
Subyearling Chinook	73.1
Steelhead	
- Wild	67.0
- Hatchery	70.6
Coho	73.7
Sockeye	59.6

When compared to the historical average diel pattern, the 1997 pattern is similar for spring migrants, but with a sharper decline after the 2300 hour spike, more closely matching the pattern seen in 1996 and 1995 than the pattern established using all years. Again in 1997, as in 1996 and 1995, the subyearling chinook diel pattern of decreasing numbers after a spike around midnight is quite different from the historical pattern of increasing numbers up to a spike at 0400 hours (Figure 6 and Figure C-3).

A graphic presentation of the daily variation in the percent of nighttime passage is presented in Figure A-2. There can be considerable variability in the percent of night passage day to day, but the overall diel pattern of increased passage after dusk is consistent over the season and between years (Figure C-4).

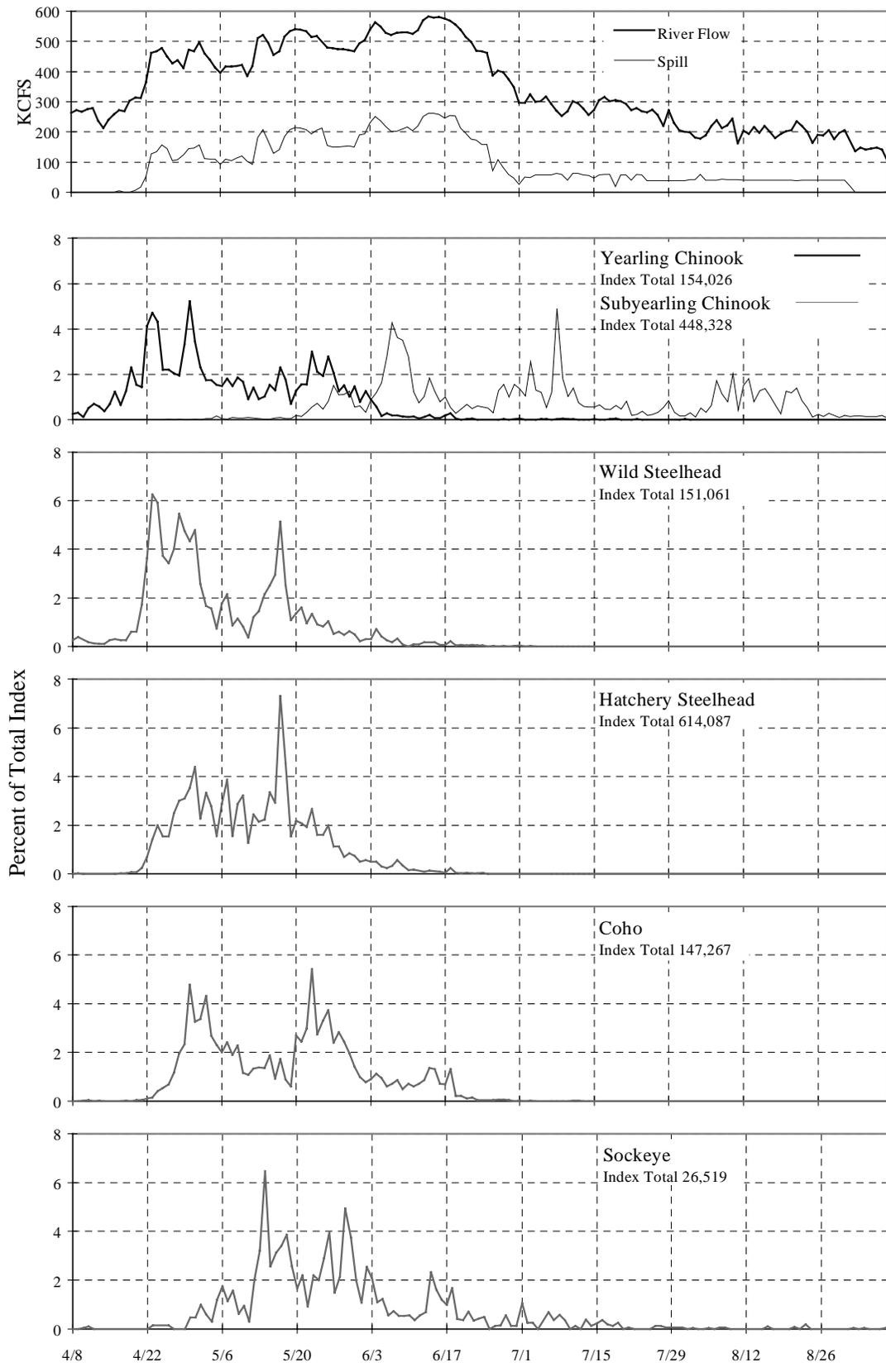


Figure 5. Seasonal passage patterns and daily average flows for John Day Dam, 1997. Based on "daily" indices from 3B.

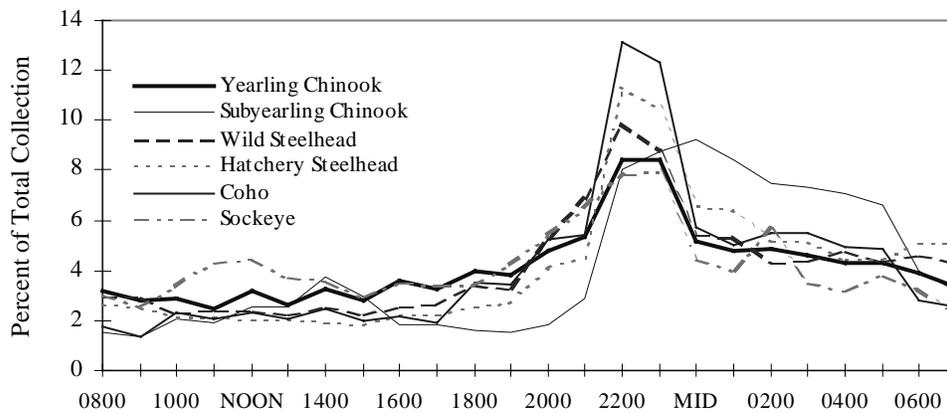


Figure 6. Seasonal diel passage pattern at John Day Dam, 1997.

Fish Condition

Descaling rates in 1997 were higher than in 1996 for all species except steelhead. Record high descaling was recorded for sockeye (20.9%) and yearling chinook (19.1%). Conversely, wild and hatchery steelhead set near record lows at 3.2% and 9.4%, respectively. Each rearing type has had only one year with lower descaling rates, 1986 for wild and 1987 for hatchery (Figure 7, Figure C-5, and Table C-10).

Descaling for yearling chinook peaked in mid May and was variable throughout the rest of its migration. Wild steelhead descaling peaked on 3 May at 9.3% and was well below that the rest of the season. Hatchery steelhead descaling peaked in mid August and was consistently higher than wild steelhead. Subyearling chinook descaling peaked on 17 June at 32.7%. High debris loads discovered in the gatewell during a screen/orifice inspection, conducted on 17 June, were thought to be the cause. Descaling went down to about 11% the next day and averaged 4.0% for the rest of the subyearling run (Figure A-3).

Mortality rates in 1997 were slightly higher than in 1996 for yearling chinook, wild steelhead, coho, and sockeye. Subyearling chinook and hatchery steelhead mortality rates were slightly lower than last year. Mortality for all species except sockeye (up just 0.3%) was lower than the historical average. Yearling chinook had the highest rate at 1.8%, followed by 1.6% for subyearling chinook and sockeye (Figure 8, Figure C-6, and Table C-10).

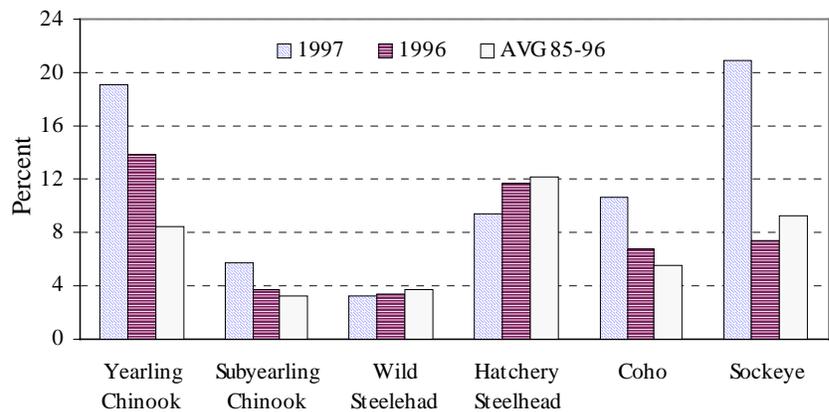


Figure 7. Total descaling for 1997, compared to 1996 and to the 85-96 average at John Day Dam.

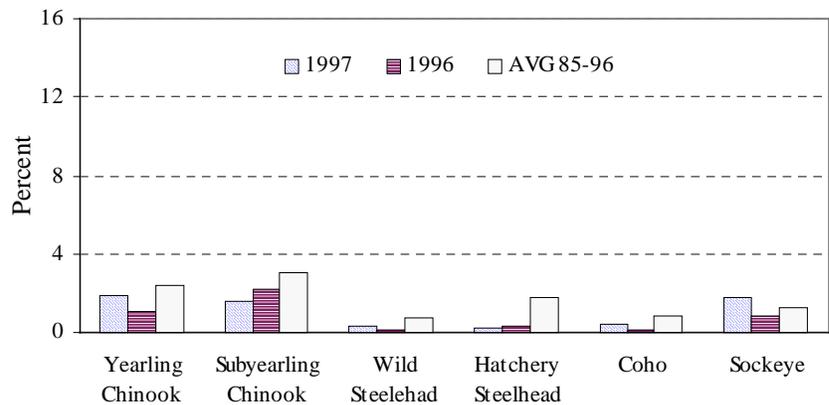


Figure 8. Total mortality for 1997, compared to 1996 and to the 85-96 average at John Day Dam.

Subsampled Fish Condition

In 1997, 11,262 smolts were examined for detailed condition information. See Methods section for a complete list of possible conditions and techniques. Naked eye examinations for gas bubble trauma symptoms were dropped this year in favor of the more detailed dissecting microscope exams. For a summary of those exams, see the next section.

Partial descaling in 1997 was lower for all species than in 1996, ranging from 8.1% for subyearling chinook to 18.9% for hatchery steelhead. Percent reductions ranged from 15% for sockeye to 54% for hatchery steelhead. Sockeye had the highest incidence of operculum damage at 3.2%, which is almost three times the rate of that injury for sockeye last year. Once again, the incidence of attempted bird predation was much higher on hatchery steelhead (7.2%) than any other species (0.3% - 3.0%), but still lower than last year's rate of 9.6%. Hatchery steelhead also had the highest incidence of body injury at 2.8%. The number of parasites on wild steelhead was down again this year, dropping from 3.5% to 2.2%. Columnaris infection in subyearling chinook was down from 4.0% last year to just 0.9% this year. For a historical summary of condition subsampling results, see Tables C-11-16.

Gas Bubble Trauma Monitoring

A total of 5,540 smolts were examined for Gas Bubble Trauma symptoms. Of those, 155 fish (2.8%) showed symptoms of gas bubble trauma, primarily bubbles in the unpaired fins (95.6%) (Table A-4). For discussion purposes, since such a high percentage of bubbles were seen in the unpaired fins, and of those, 82.4% were of rank 1 or 2, all observations were lumped together. Hatchery steelhead had the highest incidence at 6.5% (100 of 1544) and 65% of those observations were made in May. Of the 876 yearling chinook examined, 24 (2.7%) had bubbles. They were found almost exclusively (91.7%) in May. In contrast, of the 5.5% incidence in wild steelhead, 34.5%, 41.4%, and 24.1% were observed in April, May, and June, respectively. Spill at John Day Dam peaked for the season in June, but out of 870 subyearling chinook examined, only 2 had bubbles. By July spill was greatly reduced and no more bubbles were found in the 834 and 879 fish examined in July and August, respectively.

Length Averages

Length averages are presented in Figure 9 to show relative size differences and trends throughout the season. Hatchery steelhead are consistently the largest fish sampled until early June when some of the wild steelhead are larger. Wild steelhead, subyearling chinook, and coho tend to increase in size as the season progresses while yearling chinook decrease in size. Sockeye size varies throughout their migration.

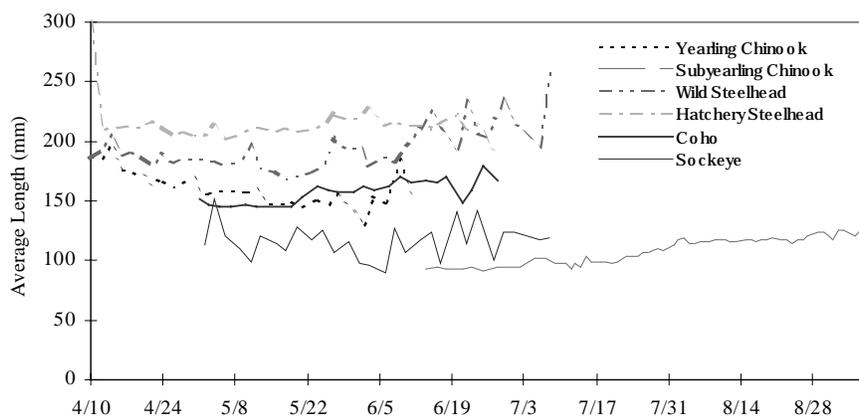


Figure 9. Average length of juvenile salmonids at John Day Dam, 1997.

PIT Tags and External Marks

PIT Tags

Total PIT tag detections went from 3,784 in 1996 to 928 in 1997. This is partially due to not operating a second airlift. A summary of the PIT tags detected, including species and travel time estimates can be found in Table A-1. Detections were split almost evenly between the detector on the bypass hose (52%) and the detector in the sample building (48%). About 91% of the PIT tags detected were in hatchery fish. Yearling chinook and steelhead accounted for 20% and 78%, respectively, of all PIT tag detections (Table A-2). Last year, the majority of tags were found in chinook (60.5%) and only 38.8% were found in steelhead (Table C-17).

Again this year, a PIT tag recapture station was used to record condition data from PIT tagged fish that were part of the general sample. Of the 445 detections in the sample building, 371 were processed for additional condition data collection, for an efficiency estimate of 83.4% (Table A-2). The discrepancy is due to fish not being diverted or an inability to read the PIT tag with the "paddle" detector at the recapture station. Numerous problems with the recapture station equipment contributed to this lower efficiency estimate, which is down from 92.2% in 1996.

The number of PIT tagged fish detected at John Day in 1997 (928) is about 24.5% of the number detected in 1996

(3,784), and 32% of the number detected in 1995 (2,897) (Table C-17). Operating only one airlift and high levels of spill likely contributed to this decline.

Brands

In 1995, there were over 1,000 brands recorded at John Day, but this year, only 16 brands were recorded. This is a clear indication that freeze brand marking has been replaced with PIT tags and other mark types. This trend is obvious in Table C-18, a summary of brands per year, by species. See Table A-3 for a detailed summary of brand data recorded this year.

Elastomer Tags

One of the tags replacing brands is the elastomer tag. They are small pieces of colored plastic injected into the tissue behind the eye. A total of 336 elastomer tags were recorded this year. Table A-3 contains release and travel time details for these marks.

Photonic Tags

One other type of tag, used primarily in the Umatilla River, is the photonic tag. It is a dye or paint injected into the tissue of the anal fin. A total of 78 photonic tags were recorded this season. Again, for a complete summary of photonic tags recovered at John Day in 1997, see Table A-3.

Performance Monitoring

Personnel

Numerous tests were conducted this year to evaluate employee performance in the areas of species identification, brand/tag recognition, descaling and fin clip observance. Tests were conducted by co-workers, one being the primary data collector, the other being the secondary data collector. Overall, the secondary data agreed with the primary data 97.3% of the time. Identifying fish to species was slightly better at 98.3%. Spotting fin clips was done consistently 98.7% of the time. The secondary person finding clips that the primary person missed generated the differences in this category. This was one of the problems with this test method; the primary person's data, which was assumed to be correct, was not always correct. Deciding if a fish was descaled or not was done consistently 96.6% of the time this year. Spotting elastomer tags, freeze brands, and PIT tag scars was the most problematic area, with the primary and secondary data agreeing 71.5% of the time. For a full explanation of the test protocol see the methods section.

Table 3. Results of the quality control tests.

Category	ID	Clip	Descaled	Mark	Total
Errors	25	13	49	4	91
Possible	1446	1024	1446	14	3930
% Correct	98.3	98.7	96.6	71.5	97.7

Equipment

Lost or biased sample time totaled 49 hours, representing 1.3% of the 1997 sampling season. Lost sample time was due to sample unit outage for screen inspection or maintenance. No time was lost due to airlift sampling equipment malfunction. The subsampling routine (see Methods section) provided opportunities for minor repairs, funnel checks, etc., without interrupting sampling. See Table A-5 for details on biased sample days.

Fry Incidence

The number of summer/fall chinook fry ($\leq 60\text{mm}$) collected this season was 2,342. This is about eleven times the 217 collected in 1996 and about two times the 1305 sampled in 1995. In 1997, 80% of the fry were collected in May.

Adult Catch

Due to the installation of adult excluder bars on the top of the sample collection tank, no adult fallbacks were sampled in 1997. For a summary of the fallbacks recorded in previous years, see Table C-19.

Incidental Catch

A summary of the incidental catch by species and year is presented in Table C-20. Figure C-7 presents a graphical look at juvenile shad and lamprey collection estimates for all years of sampling.

American shad (*Alosa sapidissima*) was by far the most common incidental species captured at John Day Dam this season. The catch of juvenile shad for 1997 (97,829) was 173% of the 1996 total of 56,245. Shad passage peaked on 26 August but was still going strong at the end of sampling on 8 September (Figure A-4).

The total number of juvenile Pacific Lamprey (*Lampetra tridentata*) captured in gateway 3B was 486, about the same as last year (481). There were several lamprey passage spikes but the peak occurred on 26 May (Figure A-4).

BONNEVILLE DAM

New to this year's report are program summary tables. See Table D-23 (PH1) and Table D-24 (PH2) for a summary of all years of sampling including sample dates, sampling effort, sample, collection, and index numbers.

River Conditions

River Flow

Spring river flow, up to 31 May, averaged 386.5 kcfs, compared to 333.6 kcfs in 1996. The peak flow for this period was 515.0 kcfs on 21 May. For June and July, river flow averaged 378.7 kcfs, considerably higher than the 315.4 kcfs for the same period in 1996. The highest flow for the season occurred during this period, reaching 556.7 kcfs on 16 June. Flows for the late summer/fall period, August through October, were also higher than in 1996, averaging 175.5 kcfs versus 151.0 kcfs last year.

Spill for the 13 March release of 7.2 million tule fall chinook from Spring Creek National Fish Hatchery (SCNFH) averaged about 118.7 kcfs (36.9% of river flow) for the period 14 March through 24 March (Table 4). Spill averaged 194.0 kcfs (46.5% of river flow) between 19 and 29 April to facilitate passage of the 18 April SCNFH release of 3.9 million tule fall chinook. For the third SCNFH release of 3.4 million fish on 15 May, spill averaged 280.7 kcfs or 56.9% of river flow for the 10 days following the release.

Table 4. 1997 Spring Creek National Fish Hatchery releases.

Release Date	Number (millions)	Peak PH1 Passage	Avg. River Flow	Spill as % of River
March 13	7.2	NA	322.7	36.9
April 18	3.9	19 April	407.5	46.5
May 15	3.5	15 May	492.4	56.9

Due to problems with the inclined screen in the first powerhouse, sampling did not start until 17 March, after the majority of the fish from the 13 March release had passed the project. High river flow throughout the spring prevented the preferred second powerhouse (PH2) operating protocol of "last on first off" and shifting of flow from PH2 to spill after a Spring Creek release for the second and third releases. Shifting of flow from PH2 to spill following a Spring Creek release is thought to increase the number of those fish passing the project via the spillway and improve survival.

The Numbers

Sample Numbers

The total number of fish sampled at the first powerhouse at Bonneville Dam in 1997 was 75,797, a 23% increase over last year's 58,128. The SMP goal of reducing the number of fish handled was not met. The increases occurred in the steelhead and subyearling chinook numbers. Species specific sample numbers expressed as a percent of 1996 sample numbers are as follows: hatchery steelhead, 182.7%; wild steelhead, 191.8%; subyearling chinook, 149%; coho, 94.4%; wild sockeye, 85.1%; hatchery sockeye, 80.4%; and yearling chinook, 75.9%. Subyearling chinook constituted 58% of the sample numbers, followed by coho (16%), hatchery steelhead (12%), yearling chinook (8%), wild steelhead (5%), and sockeye (1%) (Table 1).

Collection Estimates

The total hourly collection estimate of 677,258 is 99.8% of the 1996 estimate of 678,605 fish. Increases in steelhead collection estimates offset reductions in yearling chinook, coho and sockeye estimates to keep the total nearly the same as in 1996. The Daily method total collection number was 677,253, almost identical to the Hourly collection total (Table 1).

Fish Passage Indices

Collection numbers are divided by the proportion of river flow through powerhouse 1 to get a Fish Passage Index (FPI) for the entire project. The Hourly method generated an index total of 3,259,391, about 87.4% of the 1996 Hourly FPI of 3,730,103. The 1997 Daily index total for all species combined was 3,307,458, about 110% of the 1996 Daily FPI of 3,014,255. In 1997, the two methods differed by about 1%. Index numbers, expressed as a percent of the 1996 numbers, range from 58.4% for yearling chinook to 177.2% for hatchery steelhead. A breakdown by species for sample, collection, and index numbers can be found in Table 1.

At the **Second Powerhouse**, a total of 13,472 smolts were sampled for fish condition (Table 1). The condition data are used as an indicator of the condition of the bypass system. Species composition was very similar to that seen in the first powerhouse samples: subyearling chinook, 55%; coho, 16%; hatchery steelhead, 12%; yearling chinook, 5%; wild steelhead, 3%; and sockeye, 4%.

Passage Patterns

Seasonal

The run timing and duration at Bonneville this year was very similar to the historical median for all species except sockeye. The sockeye run reached the 10% mark about a week earlier and lasted about 2 weeks longer than the historical median. The middle 80% took 26 days longer to pass Bonneville than the historical median (Figure 10). For the exact dates, refer to Table D-1.

Yearling chinook and wild steelhead passage peaked at the end of April. Wild steelhead had another nearly equal peak in the middle of May that coincided with the hatchery steelhead and wild sockeye peak. Coho daily passage was quite variable with several nearly equal peaks throughout May. The spring passage pattern (before June 1) for subyearling chinook mainly represents large releases of tule stock into the Bonneville pool from Spring Creek National Fish Hatchery (Table 4). No passage dates are calculated for these fish. The summer passage pattern for subyearlings (after June 1) is composed mainly of upriver bright stock, which peaked at the end of May and first of June (Figure 11). Passage timelines for all years and species are shown in Figure D-2. The historical median passage graph for each species is shown in Figure D-1 and includes a line representing standard deviation on each day throughout the passage season.

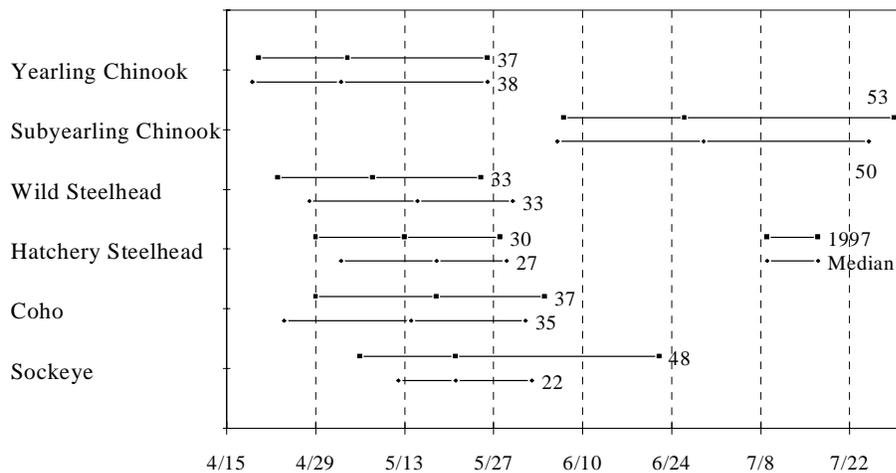


Figure 10. The 10%, 50%, and 90% passage dates and the historical median (n=7 for steelhead, n=10 for salmon species) at Bonneville Dam, PH 1, 1997. The duration in days between the 10% and 90% passage dates is indicated for each line.

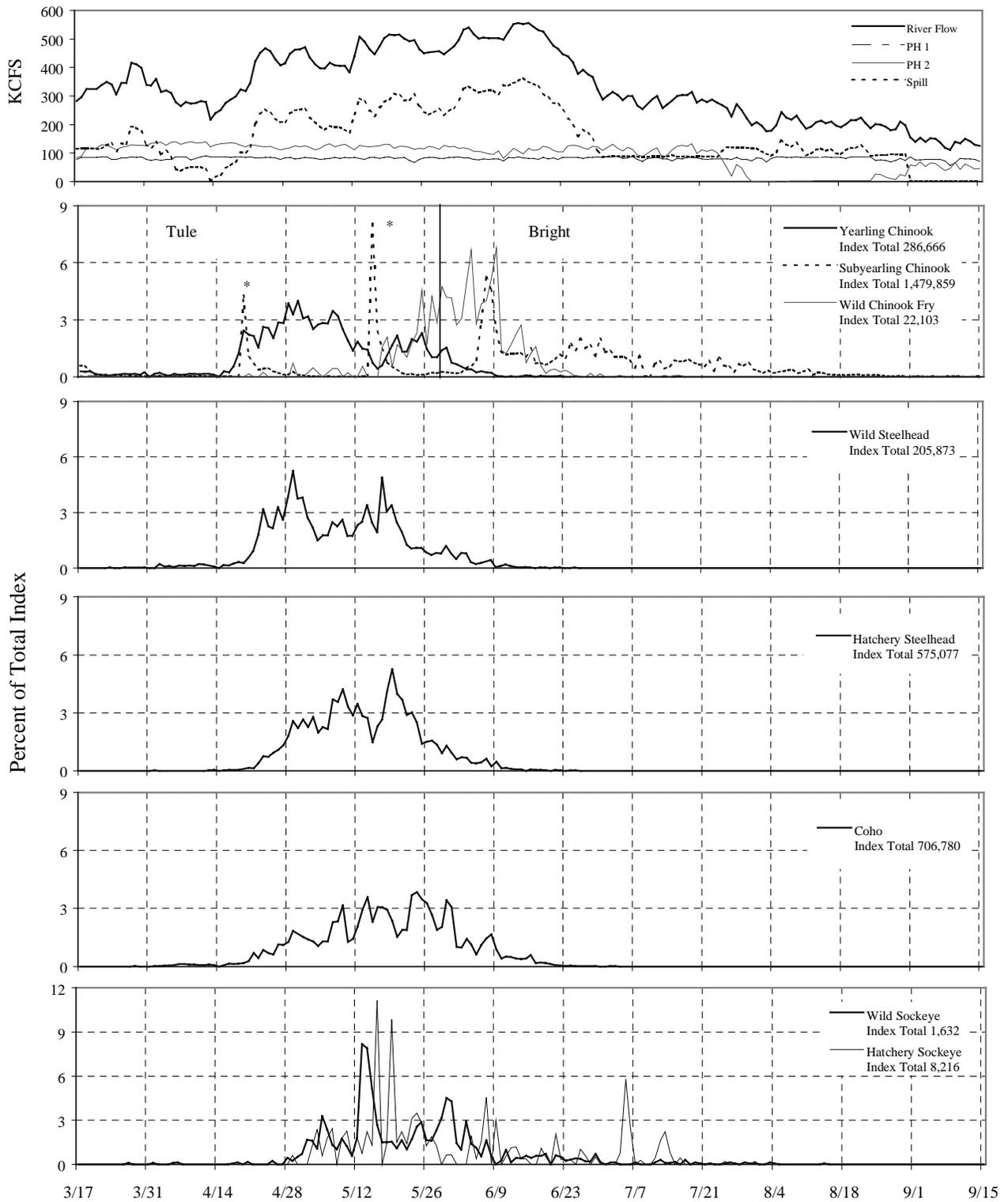


Figure 11. Seasonal passage patterns and daily average flows at Bonneville Dam, 1997. Based on "daily" indices. Spring Creek Fish Hatchery releases of tule fall chinook.

Diel Passage Patterns

In 1997, sampling in the first powerhouse at Bonneville Dam remained at 8 hours per day, from 1600 to 2400 hours. Passage for all species increased at dusk, about 2000 hours, peaked at 2200 hours and then gradually declined (Figure 12). This pattern is consistent with the pattern established during the 4 years of 24-hour monitoring (92-95) (Figure D-3).

The 8-hour passage patterns of tulle and bright stocks of subyearling chinook are similar to last year's patterns and the spring migrants. The upriver bright stock pattern (after 1 June) is very similar to the spring migrant pattern with a sharp increase between 2100 and 2200 hours and dropping off sharply thereafter. Tulle passage started increasing at 1800 hours and increased steadily until peaking at 2200 hours (Figure 13).

**Fish Condition
Powerhouse 1**

In general, descaling was about the same as the 1996 and historical levels (Figure 14, Table D-10, and Figure D-5). The big exception was sockeye, which had 14.3% descaling for the year, more than double last year's (6.2%) but still lower than the historical average of 20.9% (Table D-3). Daily descaling rates for yearling chinook were highest near the end of their outmigration, around the end of May. Hatchery steelhead descaling varied widely all season but peaked at almost 16% on 19 May. Wild steelhead descaling was consistently lower than hatchery steelhead and peaked on the same day at about 5%. Subyearling chinook descaling was below 5% until the end of August when it peaked at around 9%. Coho had some higher descaling early, up to about 11% in mid April. For the rest of the coho outmigration, descaling varied considerably but averaged only 2.9% for the season (Figure B-5). Overall mortality rates were less than 0.5% for all species (Figure 15, Figure D-6, and Table D-10).

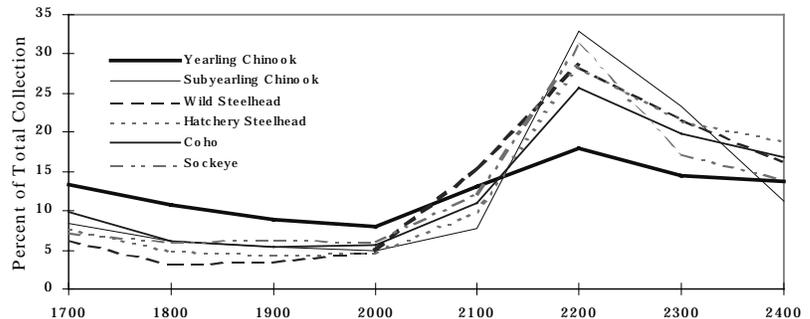


Figure 12. Eight hour passage patterns from PH1 at Bonneville Dam, 1997.

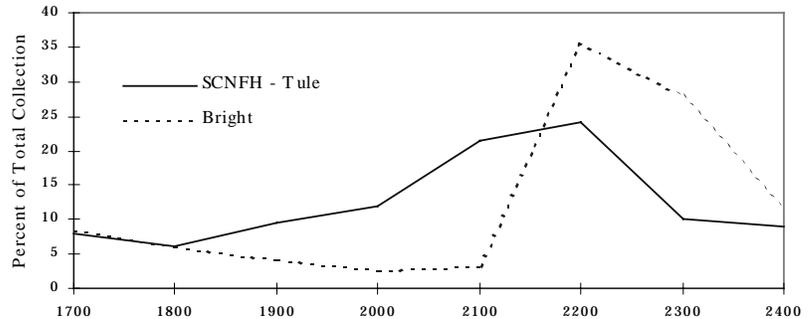


Figure 13. Eight hour passage patterns of subyearling chinook stocks from PH1 at Bonneville Dam, 1997.

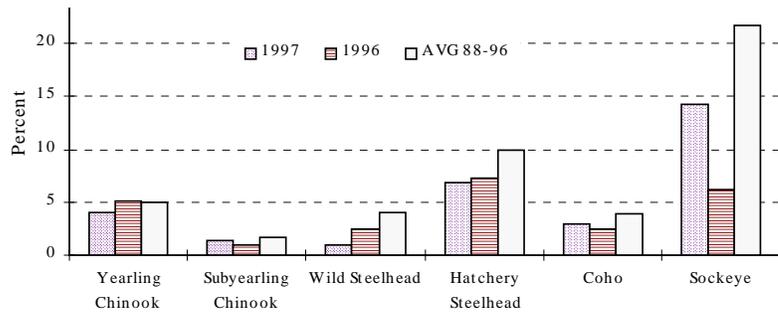


Figure 14. Total descaling for 1997, compared to 1996 and the 88-96 average at Bonneville Dam, PH1.

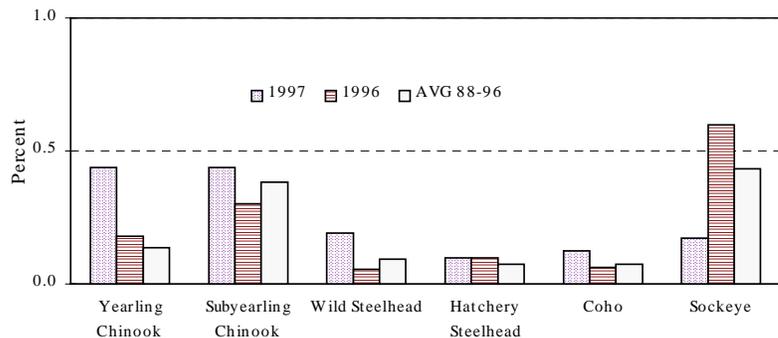


Figure 15. Total mortality for 1997, compared to 1996 and the 88-96 average at Bonneville Dam, PH1.

Powerhouse 2

Descaling and mortality rates for the fish sampled at PH2 are presented in Figures 16 and 17. In general, fish sampled in PH2 were in worse condition than fish sampled in PH1. Coho was the only species with higher descaling in PH1 than PH2, but only by 0.4%, (2.9% in PH1 versus 2.5% in PH2). The biggest difference in descaling rates was for sockeye, with 14.3% at PH1 and 23.0% in PH2.

1997 descaling rates were lower than the historical average for all species except subyearling chinook, which was 0.3% higher than the historical average (1.9% versus 1.6%, respectively). For a summary of all years' descaling and mortality rates in PH2, see Table D-11.

Overall, mortality rates were slightly higher in PH2, but very low in both powerhouses. The highest mortality rate in samples from PH2 this year was for sockeye at 1.2%. All other species were below 1.0% (Figure 17, Table D-11).

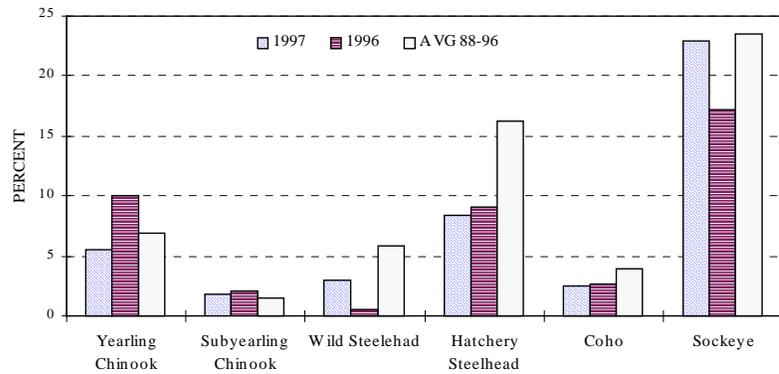


Figure 16. Total descaling for 1997, compared to 1996 and the 88-96 average at Bonneville Dam PH2.

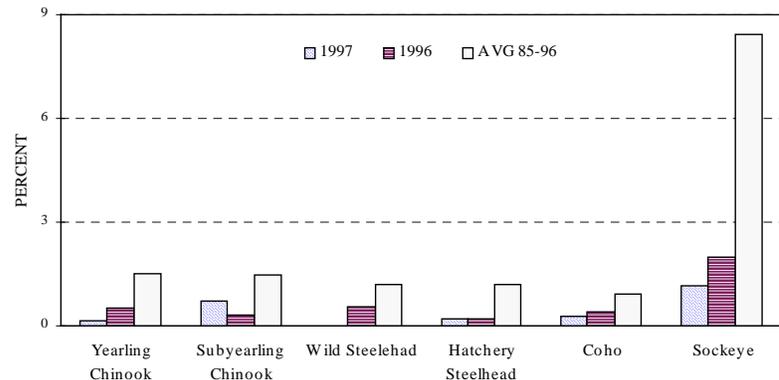


Figure 17. Total mortality for 1997, compared to 1996 and the 88-96 average at Bonneville Dam PH2.

Subsampled Fish Condition

A total of 12,330 smolts from PH1 samples were examined for detailed condition subsampling in 1997 (Tables D-12 - 17). As in previous years, partial descaling was the most prevalent condition and sockeye had the highest incidence at 25.6%, followed by hatchery steelhead at 25.3%, yearling chinook at 10%, coho at 8%, wild steelhead at 6.9%, and subyearling chinook at 5.9%. Attempted bird predation on hatchery steelhead was down from 10.0% last year to 6.8% this year. About 2% of the wild steelhead showed signs of attempted bird predation. The incidence of external parasites on wild steelhead continued its downward trend, from 19.3% in 1995, 8.1% in 1996, to 4.6% this year.

Gas Bubble Trauma Examinations

A total of 8,169 fish were examined for gas bubbles this year. Of those, 547, or 6.7%, showed some sign of gas bubble trauma. As in the John Day section, all of the observations, regardless of where they were seen (e.g. fins, eyes, lateral line) were lumped together. Steelhead had the highest incidence of bubbles at 16.2%, followed by yearling chinook at 5.3%. About 61% of the symptoms recorded for steelhead and chinook were seen in May. Almost 4 times as many steelhead had bubbles as yearling chinook, 405 versus 105, respectively. Steelhead accounted for 74% of all symptoms seen. Of the 3,689 subyearling chinook examined, only 37 fish had bubbles, for an incidence rate of 1.0%.

Length Averages

Individual fish lengths were obtained in conjunction with the fish condition subsampling described above. The results are presented in Figure 18.

PIT tags and External Marks

PIT Tags

A total of 25,507 PIT tags were detected at Bonneville this year (Table B-1). The increase is due to a Corps of Engineers funded research project, conducted by the National Marine Fisheries Service, to evaluate survival through The Dalles Dam spillway. A breakdown by month, species and detection site can be found in Table B-1. The PIT tag tunnel/diverter system was used again this year. This device diverts PIT tagged fish in the sample to a separate holding tank so condition data can be collected. Estimates of diversion efficiency by species are listed in Table B-2. For the condition data, please see the PTAGIS database administered by the Pacific States Marine Fisheries Commission. Table

D-18 summarizes PIT tag records by year for all years of interrogation at Bonneville Dam, PH1.

Freeze Brands

At PH1, 30 freeze brands were recorded this year, down from 196 last year. All of the brands were on hatchery steelhead. Table B-3 provides details on release sites and recapture timing by species. Table D-12 lists the number of brands for each species for all years of monitoring. At PH2, two brands were recorded this year, down from 52 last year. Both were on hatchery steelhead. See Table B-4 for a complete listing of brands and marks recorded from samples in the second powerhouse.

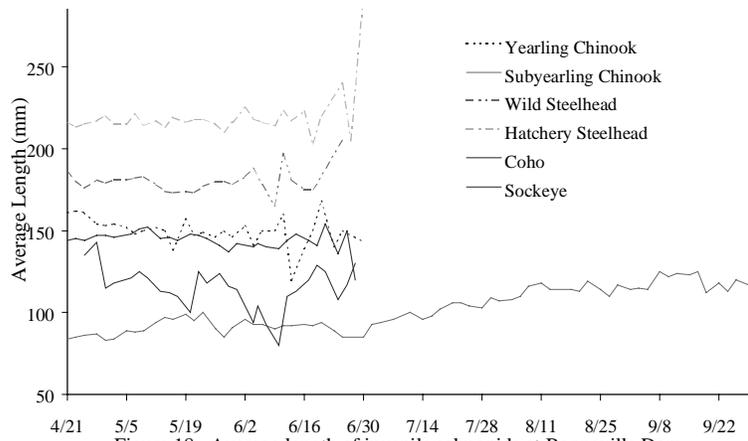


Figure 18. Average length of juvenile salmonids at Bonneville Dam, 1997.

Elastomer Tags

At PH1, 352 elastomer tags were recorded this year, up from 153 last year. The origin of the majority of this mark type, according to recoveries, can be attributed to two release sites, Lyons Ferry Hatchery (121) and Turtle Rock Hatchery (128). See Table B-3 for more details on elastomer tag release sites and recovery timing. At PH2, 59 elastomer tags were recorded. Again, Lyons Ferry and Turtle Rock hatcheries were the main points of origin with 31 and 10, respectively (Table B-4).

Photonic Tags

At PH1, 51 photonic tags were recorded this year and 5 were recorded from samples taken in the second powerhouse. All photonic tags were from the Umatilla River. See Table B-3 for details on recaptures in the first powerhouse and Table B-4 for details from the second powerhouse.

Fry Incidence

This year, 459 chinook fry and 13 coho fry (fork length ≤ 60mm) were captured. When expanded by sample rate, these numbers generate a collection estimate of 3,761 chinook fry and 105 coho fry. The number of chinook fry is up considerably from last year when only 79 were sampled, but coho numbers are up only slightly, from 9 last year to 13 this year. Fry counts for both species are still way down from the numbers recorded during the four years of 24 hour monitoring, 1992 - 1995. See Table D-22 for a summary of sample and collection numbers for fry by species per year.

Adult Incidence

The sample collection equipment at both powerhouses is designed to pass adult fish. Consequently, very few adults are collected in our samples. However, periodically throughout the season, adult fish do end up in the samples. This year, 2 adults, one steelhead and one sockeye were captured at PH1 and five chinook mini jacks were captured at the second powerhouse. For a summary of fallbacks by year for PH1, see Table D-20.

Incidental Catch

American Shad (*Alosa sapidissima*) juveniles were present in the samples from mid August through the end of the season and passage peaked on 8 October (Figure B-6). The total number sampled was 87,542, which, when expanded by sample rate, was 437,715. **Pacific Lamprey** (*Lampetra tridentata*) juveniles were most abundant during the last half of May and passage peaked on 25 May (Figure B-6). The total number of lamprey sampled was 105; all of these were smolted. Sample numbers expanded by sample rate generated a collection estimate of 945. A summary of incidental catch for the years 1988 - 1997 is presented in Table D-21. A graphical comparison of juvenile shad and lamprey abundance by year is presented in Figure D-7.

Performance Monitoring

Personnel

Numerous tests were conducted this year to evaluate employee performance in the areas of species identification, brand/tag and clip recognition, descaling, and count. Co-workers conducted tests, one being the primary data collector, the other being the secondary collector. Overall, the secondary data agreed with the primary data 98.0% of the time (Table 5). Identifying fish to species was slightly better at 99.4%. Spotting fin clips, brands, and marks was the most

problematic task, with the primary and secondary data agreeing 96.4% of the time. Deciding if a fish was descaled or not was done consistently 98.6% of the time. For a full explanation of the test protocol see the Methods section.

Table 5. Results of the quality control tests.

<u>Category</u>	<u>ID</u>	<u>Clip</u>	<u>Descaled</u>	<u>Mark</u>	<u>Total</u>
Errors	8	21	16	36	81
Possible	1150	581	1150	1150	4031
% Correct	99.4	96.4	98.6	96.9	98.0

Equipment

At PH1, a total of 23 hours of sampling were missed, about 1.0% of the season. See Table B-5 for more details on lost sample time.

At PH2, no samples were lost or biased due to equipment problems. The PH2 sampler was taken out of service during the large releases of Tule fall chinook from the Spring Creek National Fish Hatchery (SCNFH).

ACKNOWLEDGMENTS

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Johnsen, R. C., Lynette A. Hawkes, W. W. Smith, G. L. Fredricks. 1988. Monitoring of downstream salmon and steelhead at federal hydroelectric facilities - 1988. U.S. Dept. of Comm. , NOAA, NMFS, ETSD, Portland, OR. 1988 Annual Report (DOE/BP-20733-4) to BPA, Project 84-014, Contract DE-AI79-85BP20733. 14p. plus Appendices.

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1986

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APPENDIX A
JOHN DAY DAM - 1997

<u>FIGURES</u>	<u>TITLES</u>	<u>PAGE #</u>
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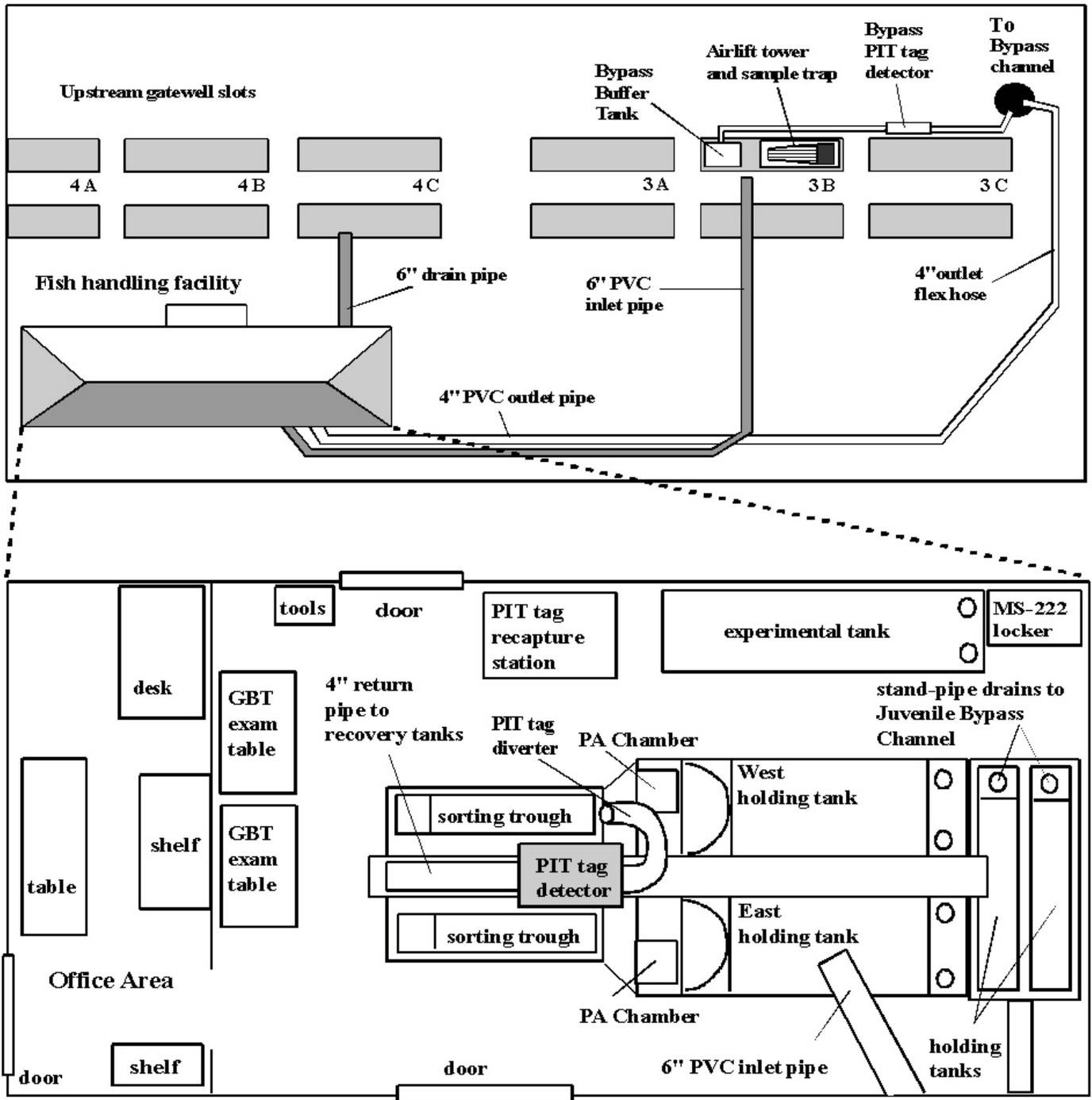


Figure A-1. Smolt monitoring system showing positioning on deck and detail of fish handling facility interior at John Day Dam, 1997.

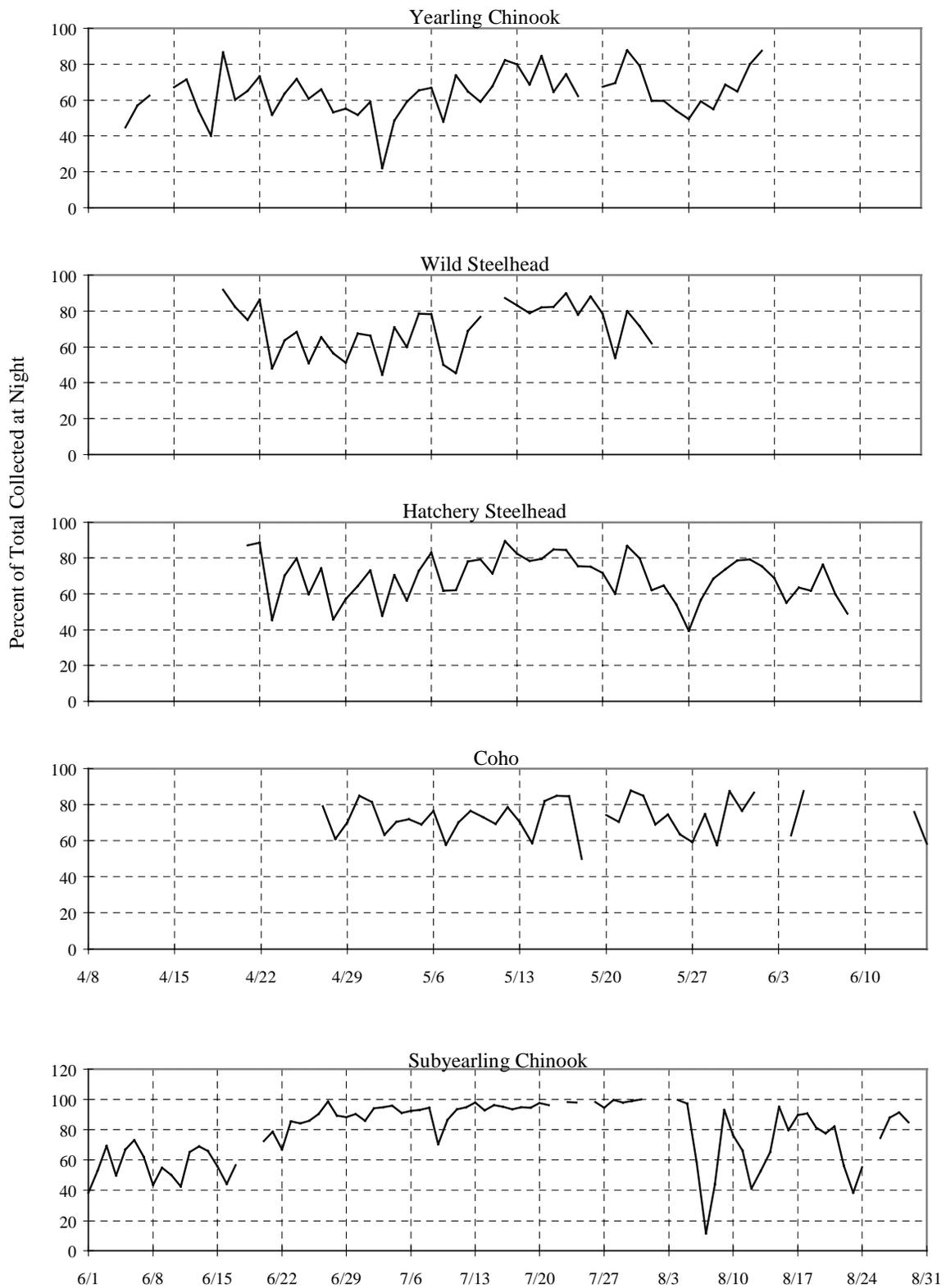


Figure A-2. Percent of daily total collection at night, 1800 to 0600 hours, (P.D.T.) at John Day Dam. Days with collection numbers < 50 were excluded. Wild sockeye had a total collection of 50 on May 29 (not shown).

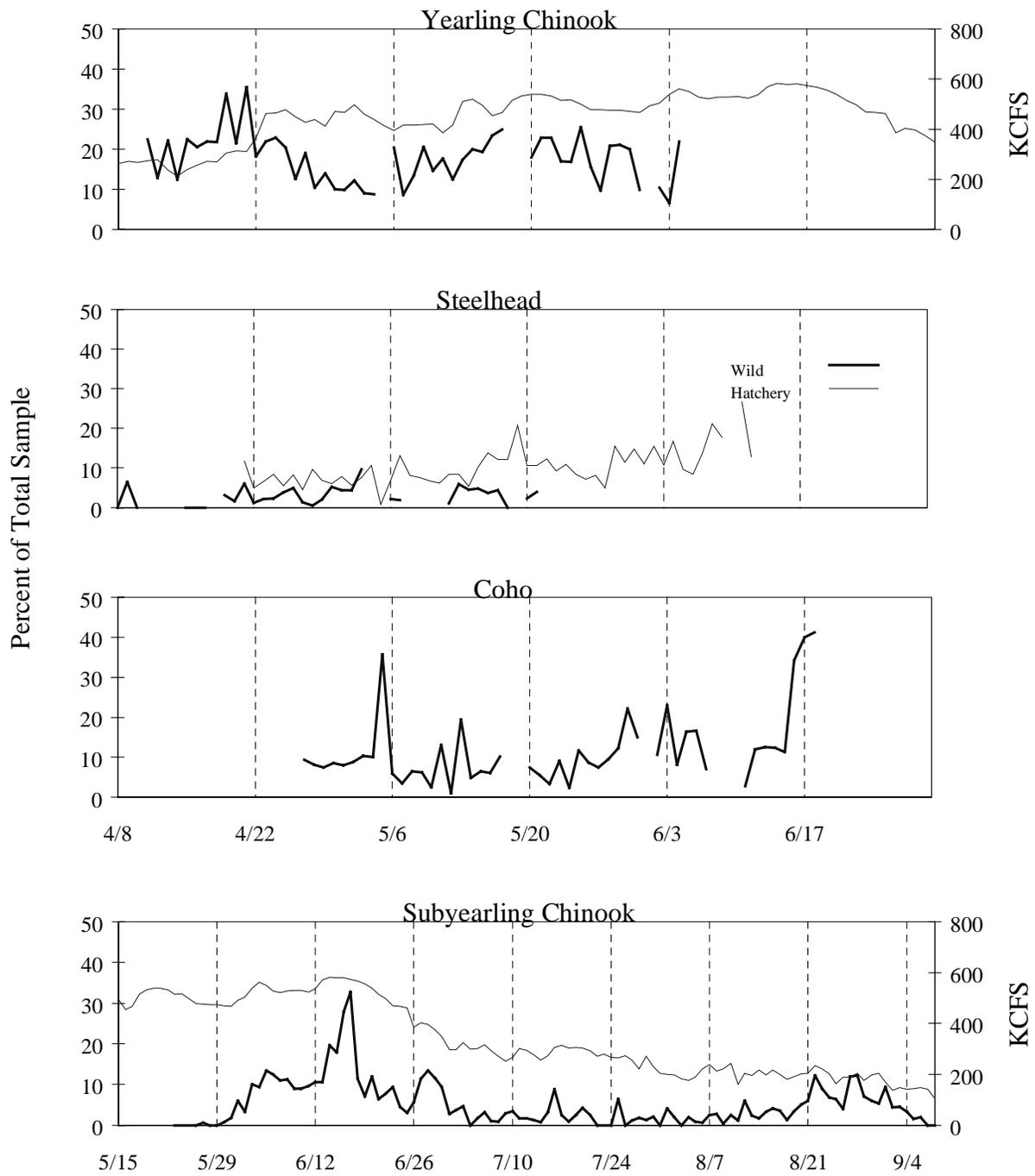


Figure A-3. Daily percent descaling and river flow at John Day Dam, 1997. Days with sample size less than 30 excluded.

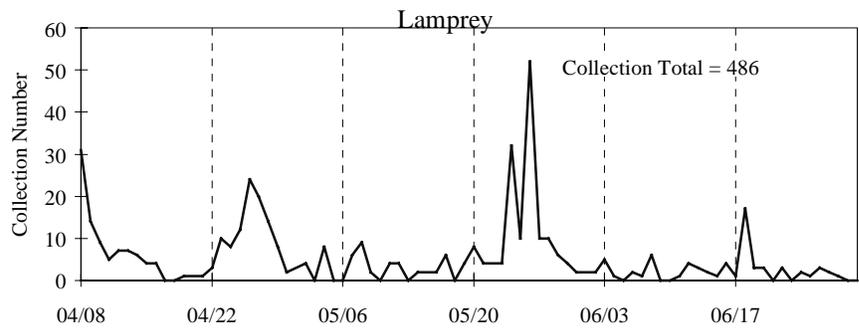
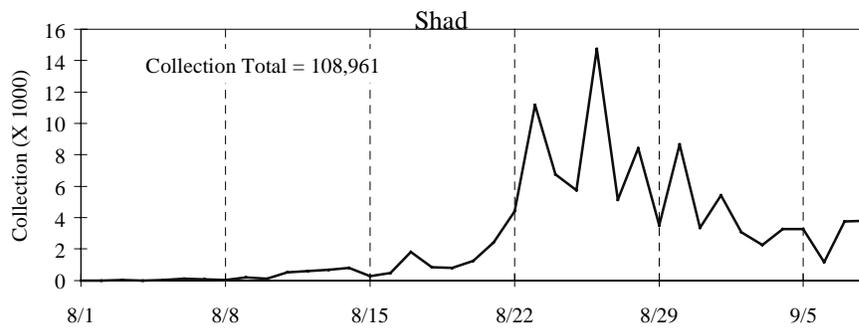


Figure A-4. Seasonal juvenile shad and lamprey counts at John Day Dam, 1997.

Table A-1. PIT tag observations at John Day Dam, 1997.

RELEASE SITE	SPECIES	RUN	REAR	N=	TRAVEL TIME (DAYS)			RIVER KM UPSTREAM OF JDA	AVERAGE SPEED (KM/DAY)
					MEAN	MIN	MAX		
Big Canyon Facility	Steelhead	Summer	Hatchery	10	27.5	15.9	52.5	596	21.7
Crooked Fork Creek Trap	Steelhead	Summer	Wild	8	177.2	9.9	258.7	672	3.8
Clear Creek	Steelhead	Summer	Hatchery	6	11.1	6.9	13.6	523	47.1
Clearwater River	Steelhead	Summer	Hatchery	3	9.7	7.9	12.2	514	53.0
Clearwater River (Big Canyon Creek)	Chinook	Fall	Hatchery	16	49.2	18.8	78.4	456	9.3
Clearwater River, South Fork (+ 31 km)	Steelhead	Summer	Hatchery	7	10.3	6.6	16.6	550	53.4
Crooked River (+ 9 km)	Steelhead	Summer	Hatchery	3	24.0	13.8	29.6	622	25.9
Curl Lake Rearing Pond (+8 km)	Steelhead	Summer	Hatchery	3	19.5	10.4	27.6	362	18.6
Dayton Pond	Steelhead	Summer	Hatchery	5	34.8	30.8	37.0	266	7.6
Dworshak Hatchery	Chinook	Spring	Hatchery	5	41.7	32.1	51.6	464	11.1
	Steelhead	Summer	Hatchery	21	13.9	7.8	25.4	464	33.4
Fish Creek	Steelhead	Summer	Wild	5	335.6	238.9	601.7	595	1.8
Fish Creek Trap	Steelhead	Summer	Wild	25	218.5	184.2	267.4	697	3.2
Grande Ronde River	Steelhead	Summer	Hatchery	7	11.3	6.6	24.9	446	39.5
Herd Creek	Steelhead	Summer	Hatchery	4	15.5	11.9	18.5	1044	67.4
Imnaha River Weir	Chinook	Spring	Hatchery	5	39.4	28.6	48.1	557	14.1
Imnaha Trap	Steelhead	Summer	Hatchery	21	12.3	7.6	26.4	490	39.8
	Steelhead	Summer	Wild	5	11.6	8.7	16.7	490	42.2
John Day Dam	Coho	Spring	Hatchery	3	0.2	0.1	0.2	N / A	N / A
Knox Bridge	Chinook	Summer	Hatchery	31	60.0	37.9	86.6	805	13.4
Lower Granite Tailrace	Steelhead	Summer	Hatchery	134	9.9	5.7	29.8	348	35.2
Little Goose Dam	Steelhead	Summer	Hatchery	350	8.8	3.6	33.1	288	32.7
Looking Glass Hatchery	Chinook	Spring	Hatchery	22	32.1	21.5	49.1	586	18.3
Looking Glass Creek	Chinook	Spring	Hatchery	5	180.0	71.7	289.5	583	3.2
Lyons Ferry Hatchery	Chinook	Fall	Hatchery	3	135.0	12.5	377.8	270	2.0
Minam River	Chinook	Spring	Wild	3	227.6	225.7	231.2	593	2.6
Pahsimeroi Pond	Chinook	Summer	Hatchery	24	42.8	15.1	59.8	978	22.9
Pahsimeroi River	Steelhead	Summer	Wild	4	13.7	11.6	18.6	967	70.6
Pahsimeroi Weir	Steelhead	Summer	Hatchery	4	25.9	24.4	28.3	969	37.4
Rapid River Hatchery	Chinook	Spring	Hatchery	24	49.9	29.2	77.6	631	12.6
Red River	Steelhead	Summer	Hatchery	11	26.4	18.8	38.5	620	23.5
Rock Island Dam	Steelhead	Summer	Hatchery	22	9.3	4.4	33.4	383	41.2
	Steelhead	Summer	Wild	3	5.8	4.6	7.5	383	66.0
	Chinook	Unknown	Hatchery	9	9.1	5.7	19.4	383	42.1
	Chinook	Unknown	Unknown	5	28.0	10.3	39.3	383	13.7
Salmon River	Steelhead	Summer	Hatchery	4	31.0	27.5	35.5	478	15.4
Salmon River, North Fork	Steelhead	Summer	Hatchery	3	26.2	23.2	30.9	859	32.8
Salmon Trap	Steelhead	Summer	Hatchery	11	14.1	8.0	22.5	563	39.9
Sawtooth Hatchery	Steelhead	Summer	Hatchery	7	23.6	13.6	36.1	1095	46.6
Snake River(near Clearwater R.S.F.)	Chinook	Fall	Hatchery	18	129.1	10.3	310.2	519	27.2
Snake River Trap	Steelhead	Summer	Hatchery	11	10.5	6.6	15.9	400	38.1
Tucannon River	Steelhead	Summer	Wild	3	5.2	4.9	5.5	278	53.5
Wallowa Hatchery	Steelhead	Summer	Hatchery	6	33.4	21.1	51.9	641	19.2
Yakima River (Prosser Trap, rkm 617)	Coho	Fall	Hatchery	8	5.5	3.3	7.2	270	49.1
				Total =	887				

Note: Release sites with N < 3 observations were excluded from this table.

Table A-2. Summary of PIT tag observations at John Day Dam, 1997.

Species	Run	Rearing Type	Total # Observed	3B Bypass	Sample Detector	Recapture Station	Recapture Efficiency %
Chinook	Spring	Hatchery	66	26	40	35	87.5
		Wild	8	3	5	4	80.0
	Summer	Hatchery	57	28	29	27	93.1
		Wild	4	2	2	2	100.0
	Fall	Hatchery	38	14	24	17	70.8
		Wild	2	0	2	1	50.0
	Unknown	Hatchery	9	3	6	5	83.3
		Wild	1	0	1	0	0.0
Unknown		5	1	4	4	100.0	
Chinook Total			190	77	113	95	84.1
Coho	Fall	Hatchery	9	1	8	8	100.0
	Spring	Hatchery	3	1	2	2	100.0
Coho Total			12	2	10	10	100.0
Steelhead	Summer	Hatchery	663	372	291	246	84.5
		Wild	61	31	30	19	63.3
		Unknown	0	0	0	0	N/A
Steelhead Total			724	403	321	265	82.6
Sockeye	Unknown	Hatchery	1	0	1	1	100.0
		Wild	1	1	0	0	N/A
Sockeye Total			2	1	1	1	100.0
Total, all species			928	483	445	371	83.4

Table A-3. Tag and brand release dates and numbers, John Day Dam, 1997.

Freeze Brands									
Species	Tag Type	Brand/ Location/ Orientation	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
SU ST	Brand	R/RA/4	Dworshak Hatchery	10,000	30-Apr	30-Apr	1	9-May	9-May
SU ST	Brand	R/LA/1	Dworshak Hatchery	10,000	2-May	2-May	1	24-May	24-May
SU ST	Brand	IC/LA/1	Dayton Acclim. Pond	30,341	24-Mar	30-Apr	6	25-Apr	12-May
SU ST	Brand	IC/LA/3	Dayton Acclim. Pond	31,064	25-Mar	30-Apr	1	20-May	20-May
SU ST	Brand	S/RA/1	Lyons Ferry Hatchery	19,975	28-Apr	29-Apr	1	9-May	9-May
SU ST	Brand	S/RA/2	Lyons Ferry Hatchery	20,769	28-Apr	29-Apr	2	17-May	1-Jun
SU ST	Brand	S/LA/2	Lyons Ferry Hatchery	20,223	28-Apr	29-Apr	1	17-May	17-May
SU ST	Brand	IL/RA/3	Cottonwood Acclim. Pd	39,634	1-Apr	30-Apr	3	3-May	19-May
Total =							16		
Elastomer Tags									
Species	Tag Type	Brand/ Location/ Orientation	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
SU CH1	Elastomer	R/RE/NC	S.F. Salmon River	63,375	19-Mar	21-Mar	5	12-May	15-Jun
FA CH1	Elastomer	L/RE/AD	Lyons Ferry Hatchery	456,776	4-Apr	26-Apr	155	26-Apr	31-May
FA CH1	Elastomer	R/GR/AD	Pittsburg Landing	148,000	14-Apr	17-Apr	5	2-May	26-May
FA CH1	Elastomer	L/GR/AD	Clearwater Hatchery	148,000	14-Apr	17-Apr	23	30-Apr	3-Jun
SP CH1	Elastomer	L/BL/AD	Tucannon Hatchery	4,948	25-Mar	25-Mar	2	16-May	14-Jun
SP CH1	Elastomer	R/RE/AD	Tucannon Hatchery	42,200	7-Mar	18-Apr	11	6-May	28-May
SU ST	Elastomer	L/RE/AD	Turtle Rock Hatchery *	186,900	14-Apr	17-Apr	104	24-Apr	8-Jun
SU ST	Elastomer	R/RE/AD	Wenatchee	162,695	21-Apr	22-Apr	31	29-Apr	4-Jun
Total =							336		
Photonic Tags									
Species	Tag Type	Color Code	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
COHO	Photonic	YE	Umitilla River	7,962	2-Apr	4-May	3	12-Apr	8-Jun
SU ST	Photonic	RE	Bonifer Acclim. Pond	1,507	15-May	15-May	1	1-Jun	1-Jun
SU ST	Photonic	MY	Bonifer Acclim. Pond	4,992	15-May	15-May	2	24-May	26-May
SP CH1	Photonic	DG	Imeques Acclim. Pond	3,724	26-Mar	26-Mar	12	10-Apr	11-May
FA CH1	Photonic	OR	Imeques Acclim. Pond	4,796	25-Mar	25-Mar	27	11-Apr	10-Jun
FA CH1	Photonic	RE	Thornhollow Acc. Pond	4,180	25-Mar	25-Mar	18	9-Apr	24-Apr
FA CH0	Photonic	PI	Umitilla River	8,469	29-May	30-May	7	6-Jun	16-Jun
FA CH0	Photonic	BL	Umitilla River	8,094	29-May	30-May	4	7-Jun	14-Jun
FA CH0	Photonic	DO	Umitilla River	9,000	29-May	30-May	4	17-Apr	9-Jun
Total =							78		
Floy Tags									
Species	Tag Type	Color	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
SU ST	Floy	Orange	Cheney, WA	?			7	21-May	24-Jun
Total =							7		

* These fish were all reared at Turtle Rock and released at four different sites.

Table A-4. Gas Bubble Trauma (GBT) examination summary for John Day Dam, 1997.

			Incidence of Gas Bubble Trauma symptoms					# of smolt affected	Monthly % of season totals
Month	Species	Sample Size	% of monthly sample*						
			lateral line	eves	unpaired fins ranks 1 and 2	unpaired fins ranks 3 and 4			
April	Spring Chinook	506	0.2%		0.4%		2	7.7%	
	Wild Steelhead	305	0.3%		3.3%		10	34.5%	
	Hatchery Steelhead	323			5.0%		16	16.0%	
Monthly Total		1134	0.2%	0.0%	2.4%	0.0%	28	18.1%	
May	Spring Chinook	362			4.7%	1.4%	22	84.6%	
	Wild Steelhead	200		0.5%	4.5%	1.0%	12	41.4%	
	Hatchery Steelhead	1098		0.1%	4.9%	0.9%	65	65.0%	
Monthly Total		1660	0.0%	0.1%	4.8%	1.0%	99	63.9%	
June	Spring Chinook	8						0.0%	
	Fall Chinook	870			0.2%		2	7.7%	
	Wild Steelhead	23		8.7%	26.1%	8.7%	7	24.1%	
	Hatchery Steelhead	123	0.8%		13.0%	2.4%	19	19.0%	
Monthly Total		1024	0.1%	0.2%	2.3%	0.4%	28	18.1%	
July	Fall Chinook	834							
	Monthly Total		834	0.0%	0.0%	0.0%	0.0%	0	0.0%
August	Fall Chinook	879							
	Monthly Total		879	0.0%	0.0%	0.0%	0.0%	0	0.0%
Season Totals		5531	1.9%	2.5%	82.4%	13.2%	155		

Total Seasonal Incidence of Gas Bubble Trauma 2.8%

NOTE: GBT symptoms were ranked as follows: 0 = 0% coverage, 1 = 1-5% coverage, 2 = 6-25% coverage, 3 = 26-50% coverage, and 4 = greater than 50% coverage

* some fish exhibited multiple symptoms

Table A-5. Interruptions in the sampling season (154 days or 3696 hours) due to Unit 3 shutdowns and the number of hours affected at John Day Dam, 1997.

End Date	Batch Number	Reason for Outage	Hours Missed
25-Apr	97018	Funnel and STS/VBS Inspection	8
3-Jun	97057	Unit 3 Off-line	2
18-Jun	97072	Funnel and STS/VBS Inspection	11
26-Jun	97080	Unit 3 Off-line for amplidine repairs	1
27-Jun	97081	Unit 3 Off-line	5
1-Aug	97116	Funnel and STS/VBS Inspection	8
13-Aug	97128	Unit 3 Off-line	8
14-Aug	97129	Unit 3 Off-line	2
25-Aug	97140	Unit 3 Off-line	1
26-Aug	97141	Unit 3 Off-line	3
Total hours missed			49

APPENDIX B
BONNEVILLE DAM - 1997

<u>FIGURES</u>	<u>TITLES</u>	<u>PAGE #</u>
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Figure B-1. Smolt monitoring system at Bonneville Dam, PH1, 1997. 1 inch = 4 feet

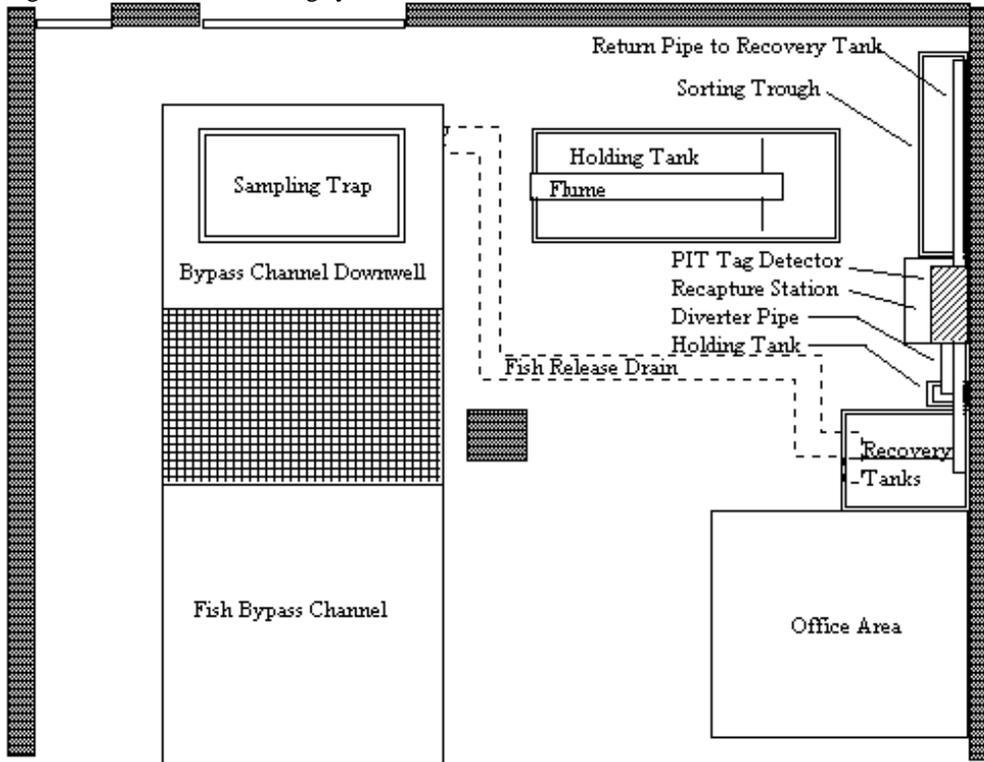
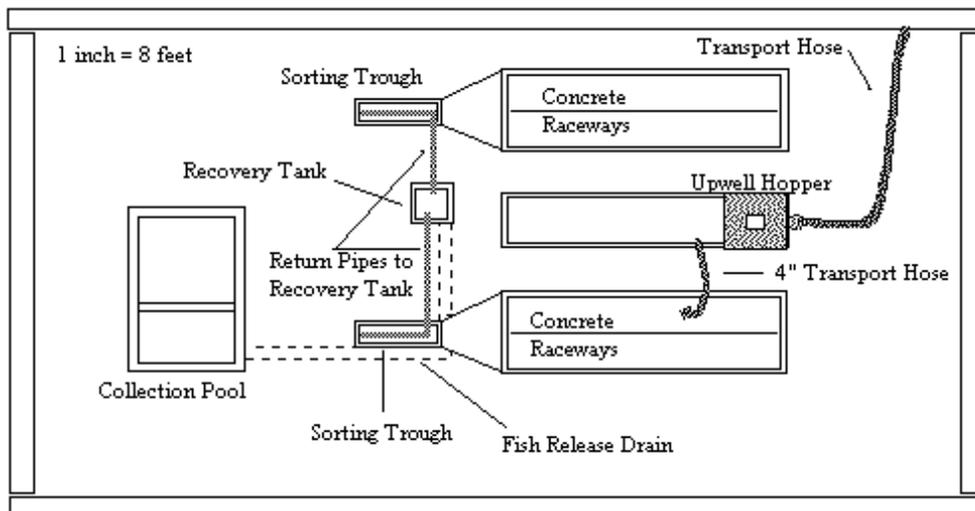


Figure B-2. Smolt monitoring system at Bonneville Dam, PH2, 1997.



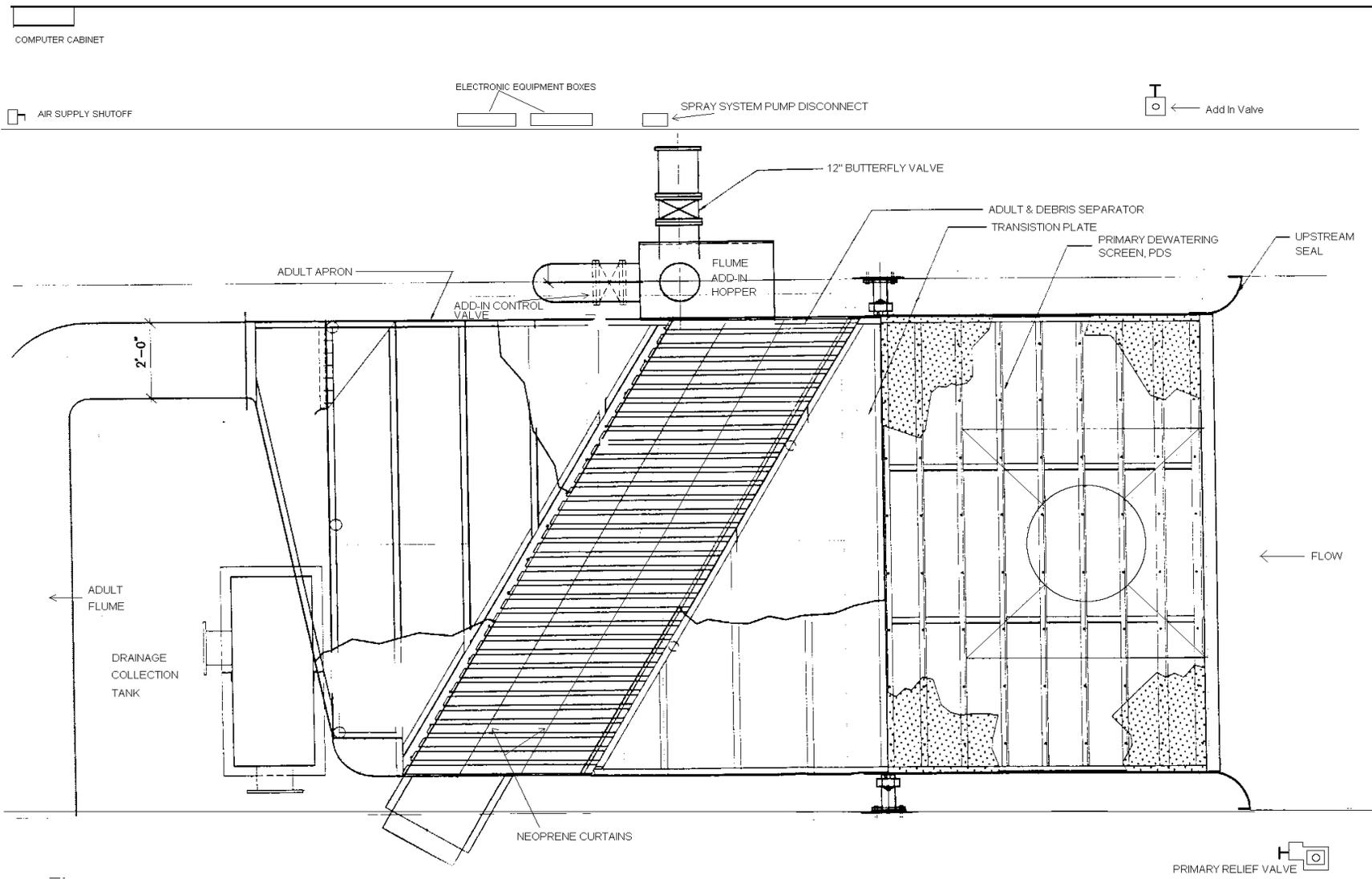


Figure B-3. Top view of PIT tag system, PH2, Bonneville Dam, 1997.

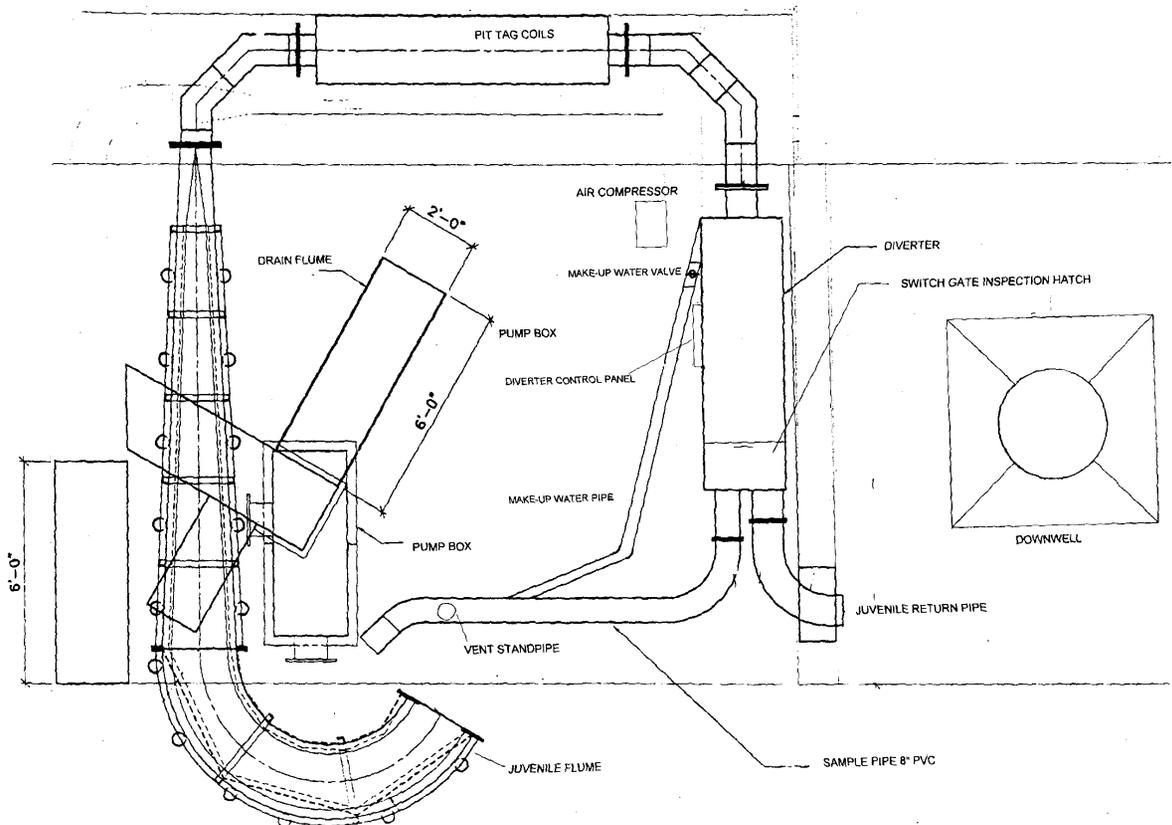


Figure B-4. Lower level or "Sump" area of PIT tag system, PH2, Bonneville Dam, 1997.

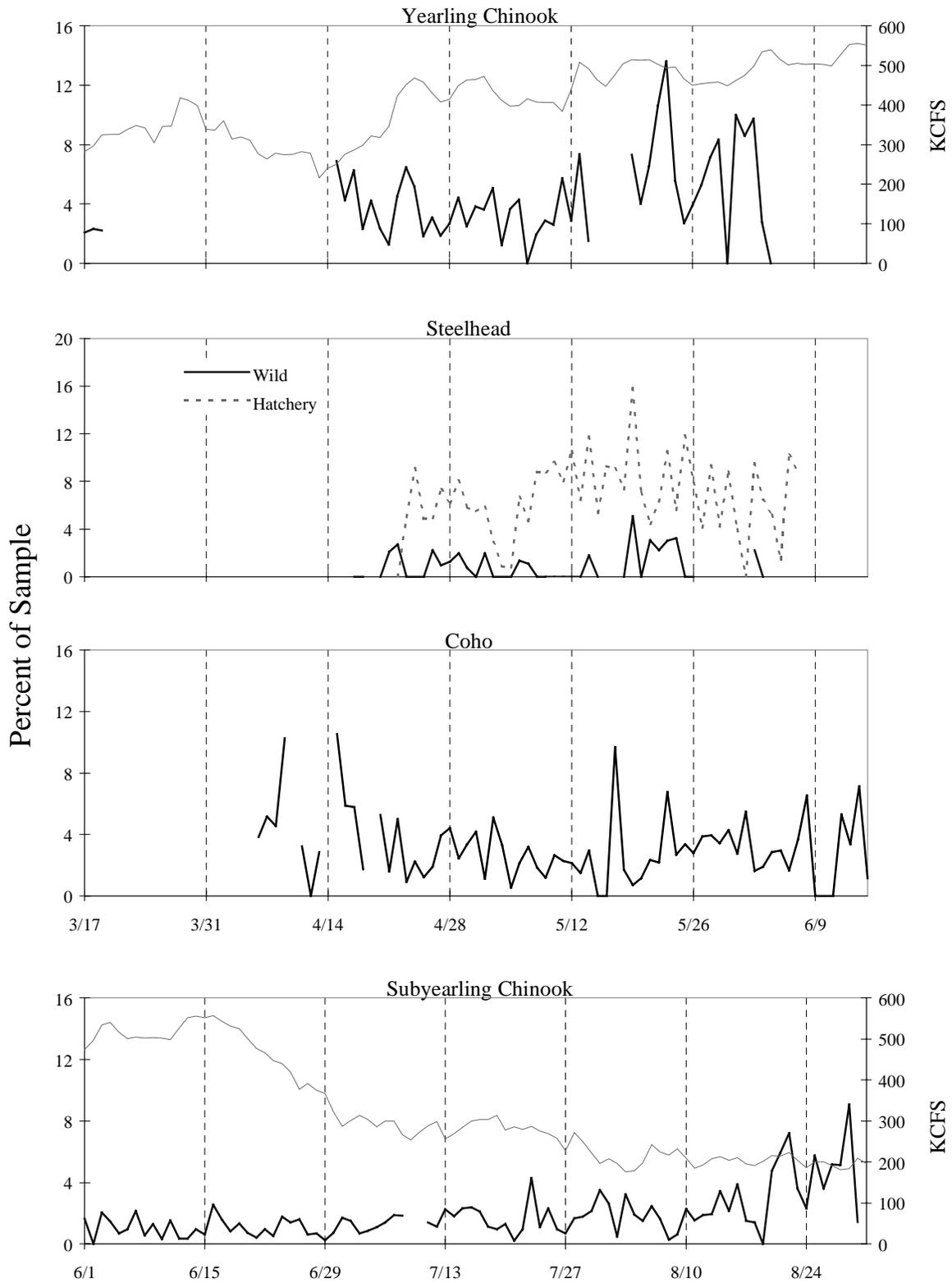


Figure B-5. Daily percent descaling and river flow at Bonneville Dam, PH1, 1997. Days with sample size less than 30 were excluded.

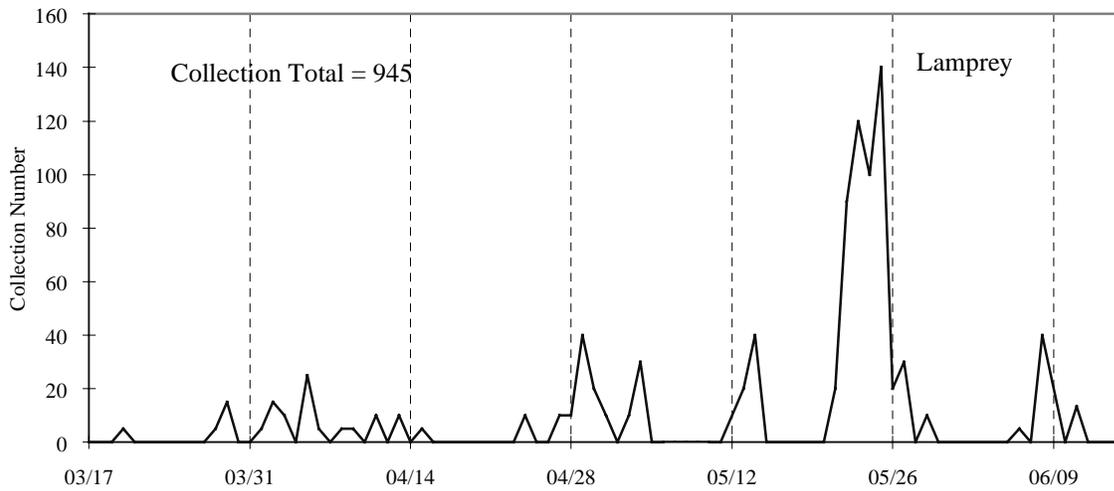
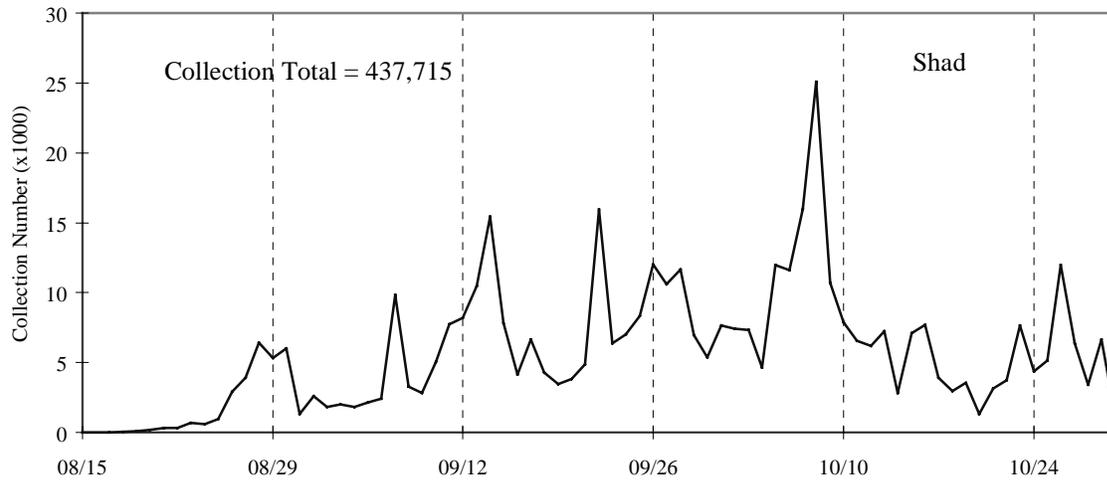


Figure B-6. Seasonal juvenile shad and lamprey counts at Bonneville Dam, PH1, 1997.

Table B-1. Summary of PIT tag observations by month for 1997 at Bonneville Dam.

April					August				
Species	Detector			Total	Species	Detector			Total
	BVJ	BVX	B2J			BVJ	BVX	B2J	
Chinook	14	380	103	497	Chinook	8	296	2	306
Steelhead	41	862	76	979	Steelhead		1		1
Coho	2	79	18	99	Coho				0
Sockeye				-	Sockeye				0
Total	57	1,321	197	1,575	Total	8	297	2	307
May					September				
Species	Detector			Total	Species	Detector			Total
	BVJ	BVX	B2J			BVJ	BVX	B2J	
Chinook	73	2,514	1,118	3,705	Chinook	1	14	24	39
Steelhead	163	5,380	722	6,265	Steelhead				0
Coho	62	2,547	2,127	4,736	Coho				0
Sockeye	1	23	15	39	Sockeye				0
Total	299	10,464	3,982	14,745	Total	1	14	24	39
June					October				
Species	Detector			Total	Species	Detector			Total
	BVJ	BVX	B2J			BVJ	BVX	B2J	
Chinook	26	584	764	1,374	Chinook	1			1
Steelhead	18	301	106	425	Steelhead				0
Coho	4	91	37	132	Coho				0
Sockeye		9	1	10	Sockeye				0
Total	48	985	908	1,941	Total	1	0	0	1
July					Total				
Species	Detector			Total	Species	Detector			Total
	BVJ	BVX	B2J			BVJ	BVX	B2J	
Chinook	80	1,511	5,304	6,895	Chinook	203	5,299	7,315	12,817
Steelhead		1	2	3	Steelhead	222	6,545	906	7,673
Coho				-	Coho	68	2,717	2,182	4,967
Sockeye			1	1	Sockeye	1	32	17	50
Total	80	1,512	5,307	6,899	Total	494	14,593	10,420	25,507

BVJ= Bonneville Dam DSM1 Subsample

BVX= Bonneville Dam DSM1 Flatplate

B2J= Bonneville Dam DSM2

Table B-2. Summary of PIT tag recapture data at Bonneville Dam, PH1, 1997.

Species	Run	Rearing Type	Diverter Coil	Recapture Station	Recapture Efficiency (%)
Chinook	Spring	Hatchery	51	38	74.5
		Wild	5	3	60.0
	Summer	Hatchery	20	15	75.0
		Wild	4	2	50.0
	Fall	Hatchery	37	29	78.4
		Wild	2	1	50.0
		Unknown	71	58	81.7
	Unknown	Hatchery	5	1	20.0
Wild		1	0	0.0	
Unknown		7	5	71.4	
Chinook Total			203	152	74.9
Coho	Fall	Hatchery	4	1	25.0
	Spring	Hatchery	2	1	50.0
	Unknown	Unknown	62	48	77.4
Coho Total			68	50	73.5
Steelhead	Summer	Hatchery	203	149	73.4
		Wild	19	12	63.2
Steelhead Total			222	161	72.5
Sockeye	Unknown	Wild	1	1	100.0
Sockeye Total			1	1	100.0
TOTAL, all species			494	364	73.7

Table B-3. Tag and brand release dates and numbers from Bonneville Dam, PH1, 1997.

Freeze Brands									
Species	Tag Type	Brand/ Location/ Orientation	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
SU ST	Brand	IL/RA/3	Cottonwood Acclim. Pd	39,634	1-Apr	30-Apr	4	1-May	10-May
SU ST	Brand	IC/RA/3	Curl Lake	27,978	25-Mar	20-May	2	10-May	24-May
SU ST	Brand	IC/LA/1	Dayton Acclim. Pd	30,341	25-Mar	30-Apr	6	27-Apr	21-May
SU ST	Brand	IC/LA/3	Dayton Acclim. Pd	31,064	25-Mar	5-Mar	6	28-May	9-May
SU ST	Brand	R/RA/4	Dworshak H	10,000	30-Apr	30-Apr	1	10-May	10-May
SU ST	Brand	R/LA/1	Dworshak H	10,000	2-May	2-May	1	12-May	12-May
SU ST	Brand	S/RA/1	Lyons Ferry H	19,975	28-Apr	29-Apr	3	21-May	25-May
SU ST	Brand	S/RA/2	Lyons Ferry H	20,769	28-Apr	29-Apr	3	22-May	26-May
SU ST	Brand	S/LA/2	Lyons Ferry H	20,223	28-Apr	29-Apr	1	27-May	27-May
SU ST	Brand	IC/RA/I	Tucannon R	29,966	22-Apr	22-Apr	3	24-May	31-May
Total							30		
Elastomer Tags									
Species	Tag Type	Location/ Color/ Clip	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
FA CH1	Elastomer	L/RE/AD	Lyons Ferry	456776	4-Apr	26-Apr	121	24-Apr	6-Jun
FA CH1	Elastomer	R/GR/AD	Pittsburg Ldg	148000	14-Apr	17-Apr	15	1-May	30-May
FA CH1	Elastomer	L/GR/AD	Clearwater	148000	14-Apr	17-Apr	19	5-May	30-May
SP CH1	Elastomer	L/BL/AD	Tucannon H	4948	25-Mar	25-Mar	10	2-May	18-Jun
SU CH1	Elastomer	R/RE/AD	Tucannon H	42200	3-Mar	18-Apr	17	12-May	4-Jun
SU CH1	Elastomer	R/RE/NC	SF Salmon R	63375	19-Mar	21-Mar	1	22-May	22-May
SU ST	Elastomer	L/RE/AD	Turtle Rock H*	186,900	14-Apr	17-Apr	128	27-Apr	2-Jun
SU ST	Elastomer	R/RE/AD	Wenatchee	162,695	21-Apr	22-Apr	41	27-Apr	5-Jun
Total							352		
Photonic Tags									
Species	Tag Type	Color Code	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	
								First	Last
COHO	Photonic	YE	Umatilla R	7962	2-Apr	5-Apr	4	7-May	26-May
FA CH0	Photonic	DO	Umatilla R	9000	29-May	30-May	3	6-Jun	13-Jun
FA CH0	Photonic	PI	Umatilla R	8469	29-May	30-May	13	7-Jun	25-Jun
FA CH0	Photonic	BL	Umatilla R	8094	29-May	30-May	5	7-Jun	15-Jun
FA CH1	Photonic	RE	Thornhollow Acclim. Pd	4180	25-Mar	25-Mar	4	3-Apr	3-May
FA CH1	Photonic	OR	Imeques Acclim. Pd	4796	25-Mar	25-Mar	8	18-Apr	31-May
FA CH1	Photonic	DG	Imeques Acclim. Pd	3724	26-Mar	26-Mar	9	9-Apr	8-May
SU ST	Photonic	MY	Bonifer Acclim. Pd	4992	15-May	15-May	2	23-May	6-Jun
SU ST	Photonic	RE	Bonifer Acclim. Pd	1507	15-May	15-May	1	28-May	28-May
SU ST	Photonic	OR	Bonifer Acclim. Pd	2136	15-May	16-May	1	3-Jun	3-Jun
SU ST	Photonic	DG	?				1	8-May	8-May
Total							51		

* These fish were all reared at Turtle Rock and released at four different sites.

? Mark that was mistaken or of unknown origin

Table B-4. Summary of external mark recaptures at Bonneville Dam, PH 2, 1997.

Freeze Brands									
Species	Tag Type	Brand/ Location/ Orientation	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	First
SU ST	Brand	S/RA/I	Lyons Ferry H	19,975	28-Apr	29-Apr	2	21-May	25-May
Total							2		
Elastomer Tags									
Species	Tag Type	Location/ Color/ Clip	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	First
FA CH1	Elastomer	L/RE/AD	Lyons Ferry	456,776	4-Apr	26-Apr	31	5-May	6-Jun
FA CH1	Elastomer	L/GR/AD	Clearwater	148,000	14-Apr	17-Apr	6	5-May	22-May
FA CH1	Elastomer	R/GR/AD	Pittsburg Ldg	148,000	14-Apr	17-Apr	6	5-May	28-May
SP CH1	Elastomer	L/BL/AD	Tucannon H	4,948	25-Mar	25-Mar	1	31-May	31-May
SU CH1	Elastomer	R/RE/AD	Tucannon H	42,200	3-Mar	18-Apr	3	1-May	21-May
SU ST	Elastomer	L/RE/AD	Turtle Rock H*	186,900	14-Apr	17-Apr	10	1-May	31-May
SU ST	Elastomer	R/RE/AD	Wenatchee	162,695	21-Apr	22-Apr	2	1-May	15-May
Total							59		
Photonic Tags									
Species	Tag Type	Color Code	Release Site	Number Released	Release Timing		Recovery Data		
					Start	End	Number Recovered	Recovery Timing	First
COHO	Photonic	YE	Umatilla R	7,962	2-Apr	5-Apr	1	15-May	15-May
FA CH0	Photonic	PI	Umatilla R	8,469	29-May	30-May	1	8-Jun	8-Jun
FA CH1	Photonic	OR	Imeques Acclim. Pd	4,796	25-Mar	25-Mar	2	1-May	31-May
SU ST	Photonic	MY	Bonifer Acclim. Pd	4,992	15-May	15-May	1	6-Jun	6-Jun
Total							5		

* These fish were all reared at Turtle Rock and released at four different sites.

Table B-5. Interruptions in the sampling season at Bonneville Dam, 1997.

Powerhouse 1				
Date	Batch Number	Reason for Outage	Hours Missed	
17-Mar	97001	Working on flat plate	1	
27-Mar	97011	Working on flat plate	1	
31-Mar	97015	Channel maintenance	8	
14-Apr	97029	Channel maintenance	8	
16-May	97061	Repair sweep and flat plate	3	
23-Jun	97099	Trap repairs	2	
9-11 July	97115 - 97117	ERG shaft repairs	18	
2-Oct	97200	Trap down	1	
26-Oct	97224	Trap could not be lowered	2	
30-Oct	97228	Build up of debris	6	
Total hours missed			50	
Powerhouse 2				
Date	Batch Number	Reason for Outage	Samples Missed	
9-Jun - 29-Jun	NA	Installation of PA system	9	
30-Jul - 25-Aug	NA	Repairs to AWS	11	
Total samples missed			20	

PA= Pre-anesthitizing

AWS= Auxilliary Water Supply

APPENDIX C
HISTORICAL DATA
JOHN DAY DAM

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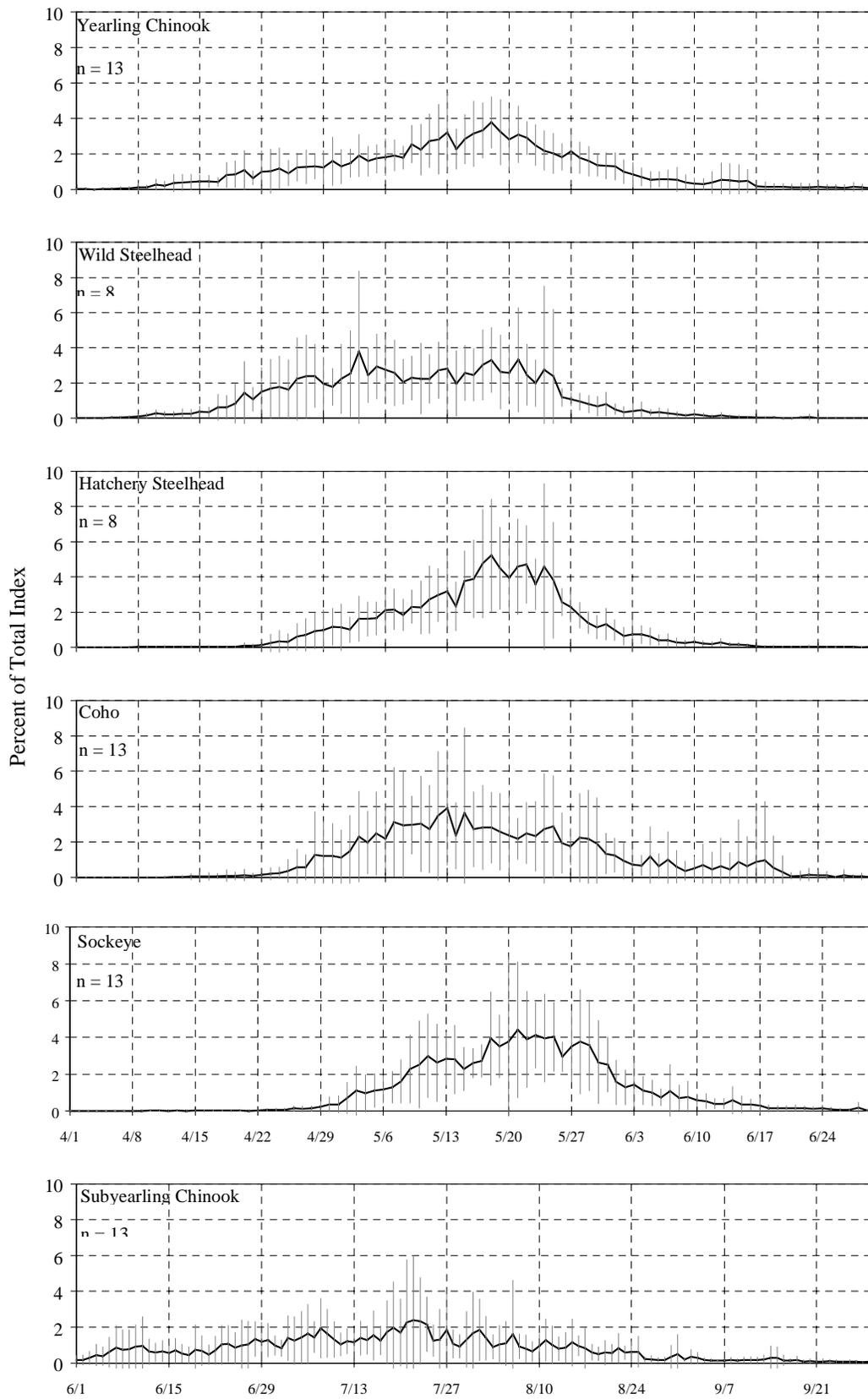


Figure C-1. Historical average passage pattern with standard deviation, John Day Dam, 1985-1997.

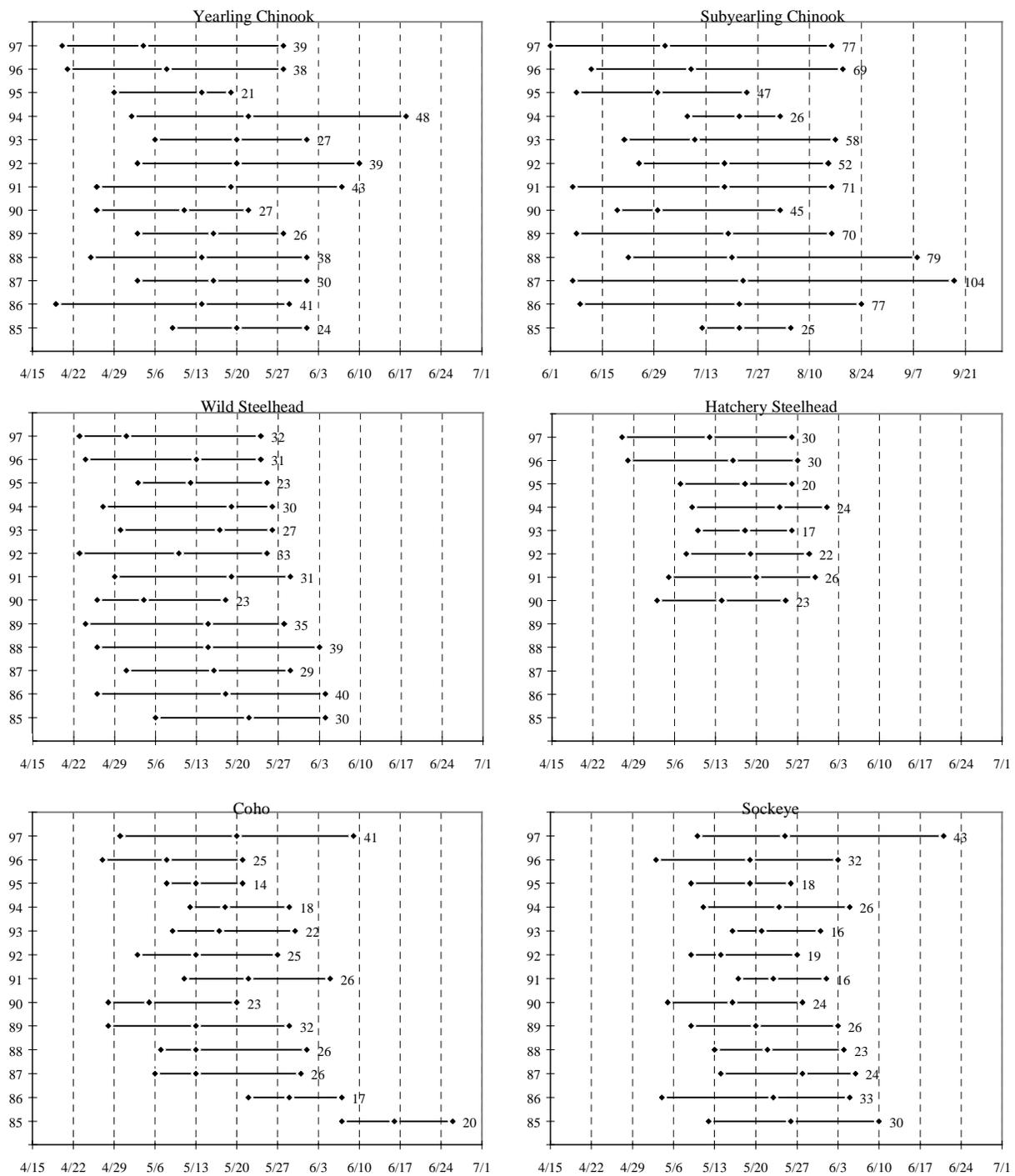


Figure C-2. 10%, 50%, and 90% passage dates for each season at John Day Dam, by species, 1985-1997. The duration between 10-90% dates (in days) is indicated for each line. Hatchery and wild steelhead were not differentiated before 1990.

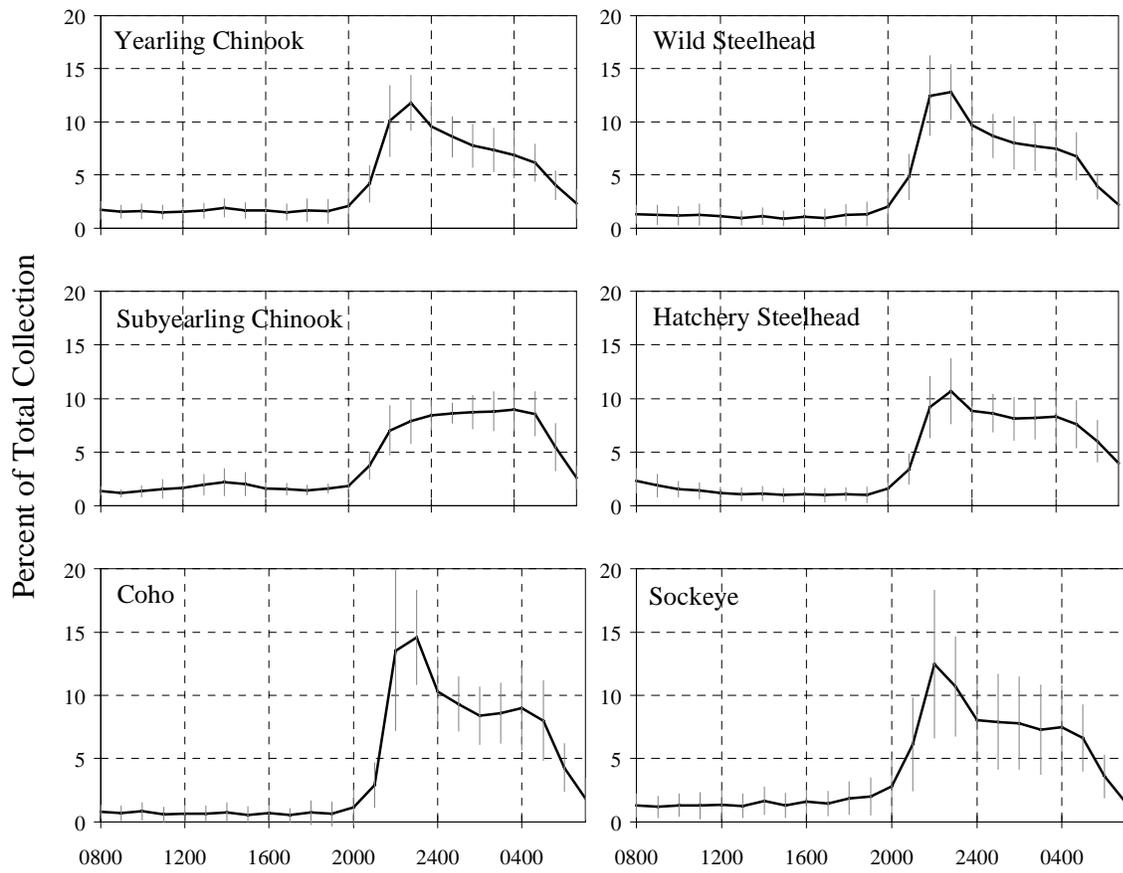


Figure C-3. Historical average diel passage with standard deviation, John Day Dam, 1985 - 1997.

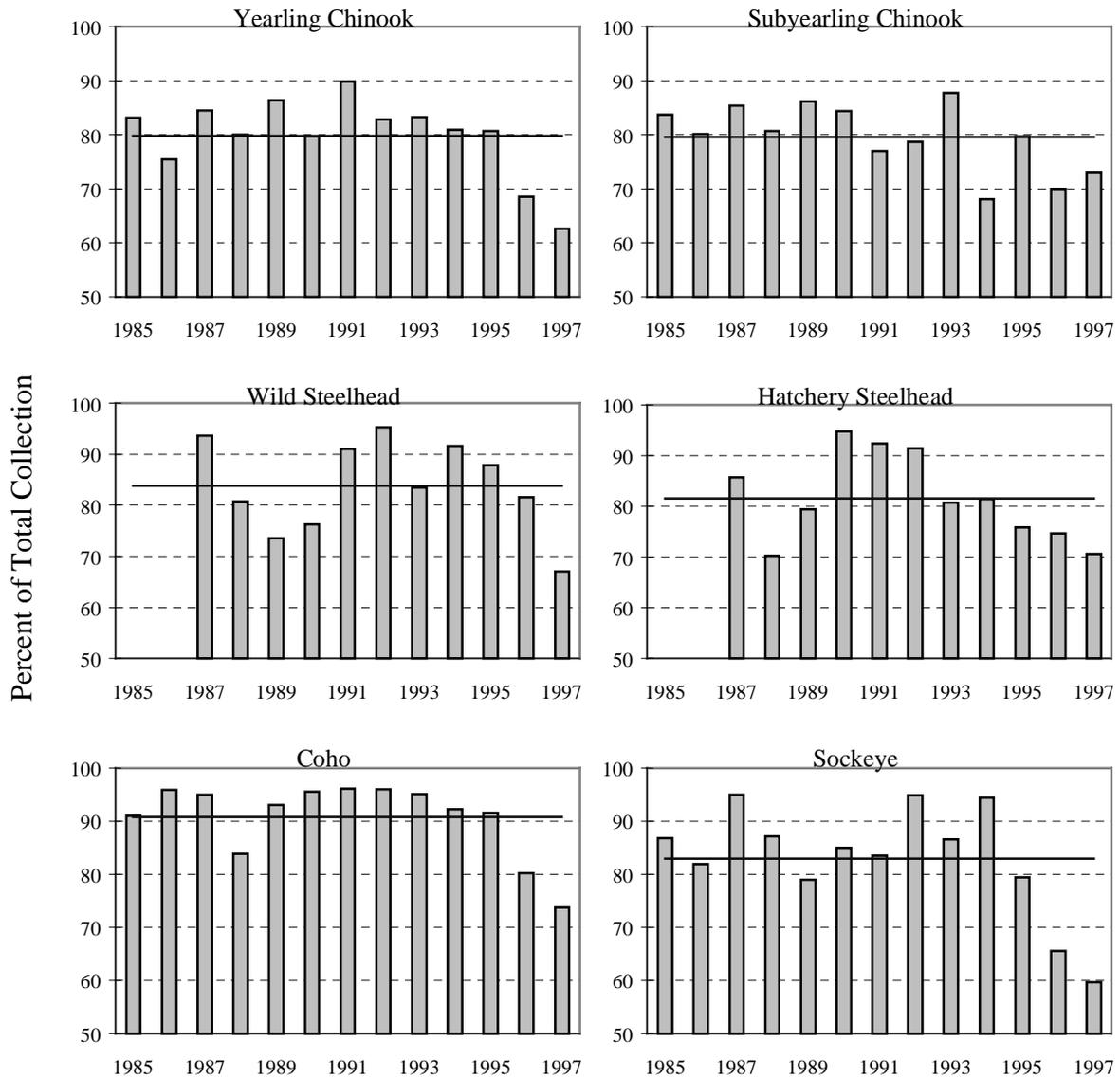


Figure C-4. Percent night passage (1800-0600) for each season at John Day Dam, by species, including the average for all years, 1985-1997.

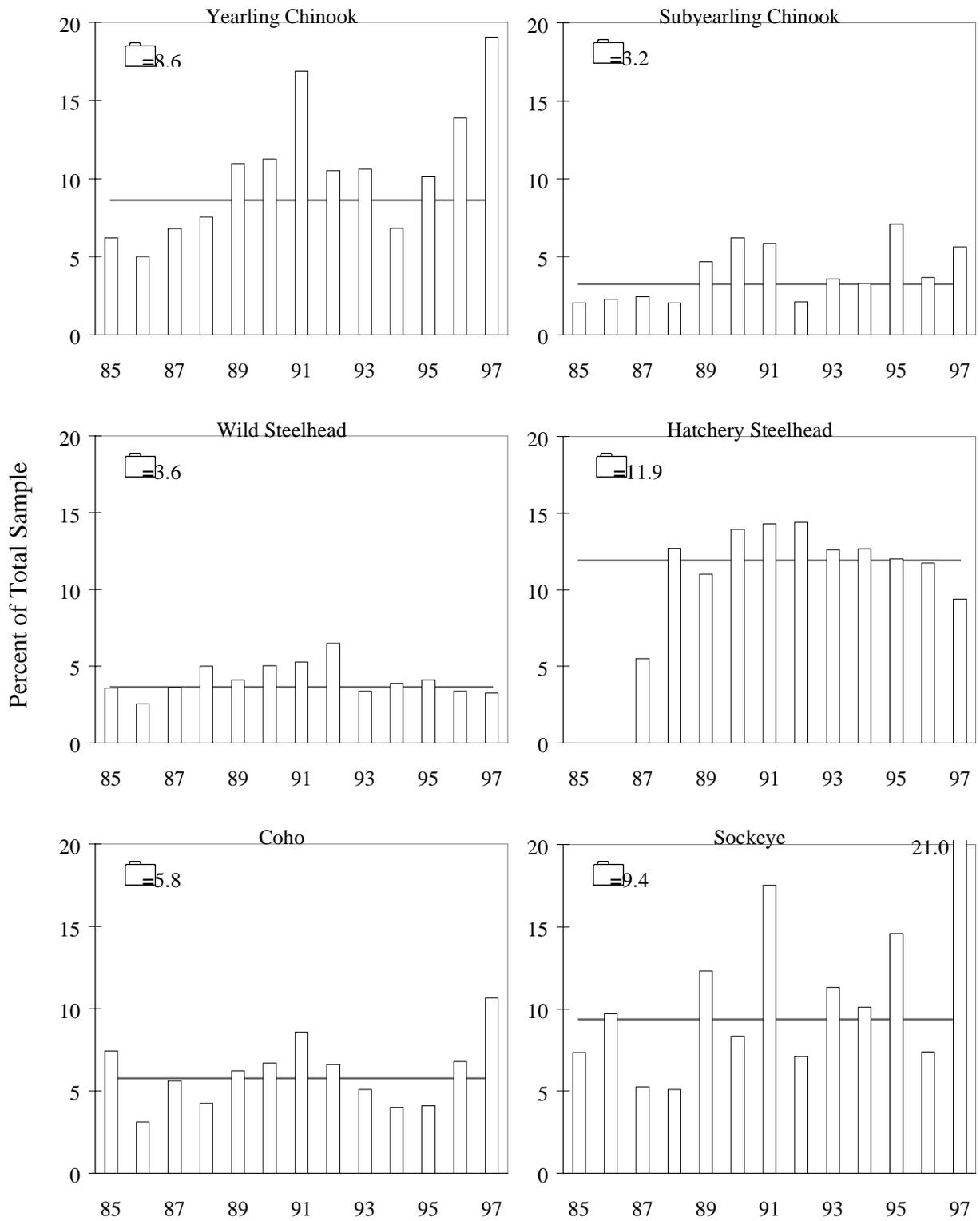


Figure C-5. Historical descaling percentages, John Day Dam, 1985-1997. Hatchery and wild steelhead not differentiated before 1987.

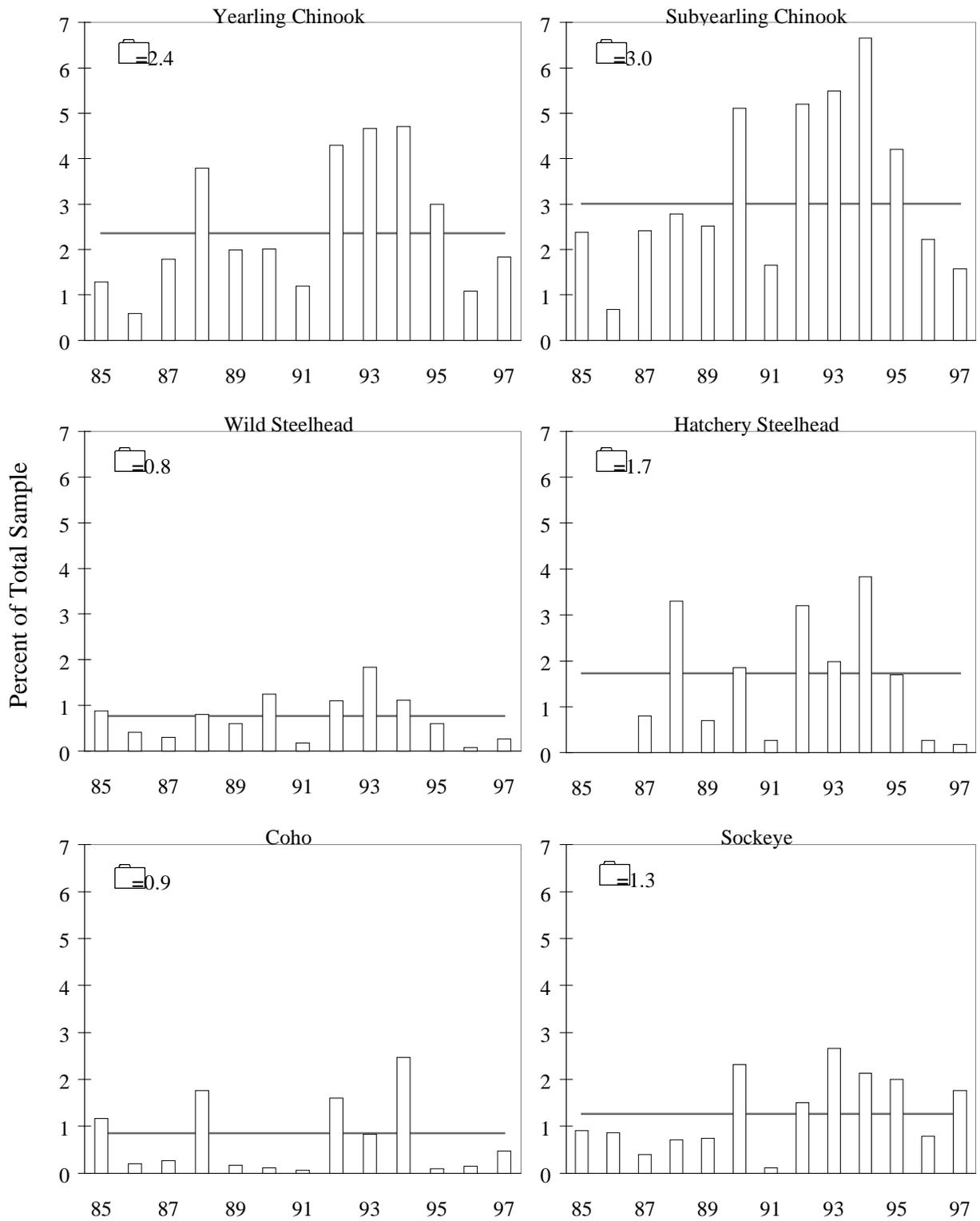


Figure C-6. Historical mortality percentages, John Day Dam, 1985-1997. Hatchery and wild steelhead not differentiated before 1987.

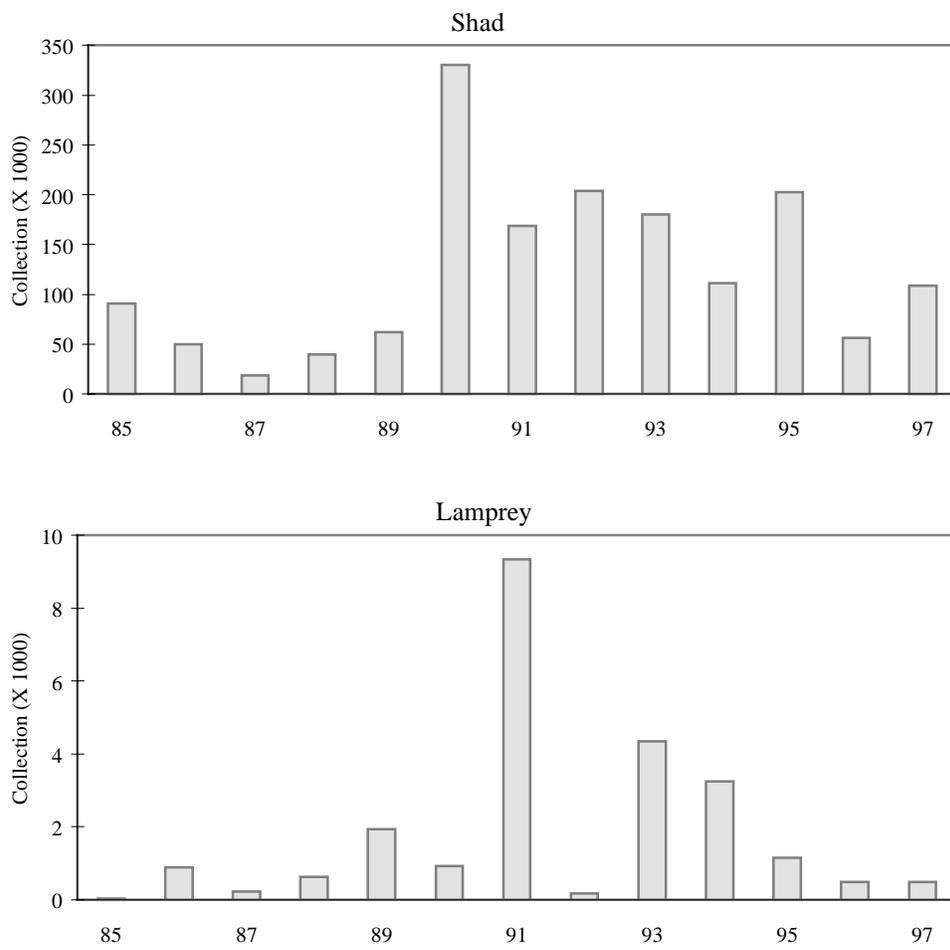


Figure C-7. Historical juvenile shad and lamprey counts at John Day Dam, 1985-1997.

Table C-1. 10, 50, and 90 percent passage dates at John Day Dam based on the "daily" index.

Yearling Chinook				
	10 %	50%	90 %	# of Days
1997	20-Apr	4-May	28-May	39
1996	21-Apr	8-May	28-May	38
1995	29-Apr	14-May	19-May	21
1994	2-May	22-May	18-Jun	48
1993	6-May	20-May	1-Jun	27
1992	3-May	20-May	10-Jun	39
1991	26-Apr	19-May	7-Jun	43
1990 ^	26-Apr	11-May	22-May	27
1989	3-May	16-May	28-May	26
1988	25-Apr	14-May	1-Jun	38
1987	3-May	16-May	1-Jun	30
1986	19-Apr	14-May	29-May	41
1985 ^	9-May	20-May	1-Jun	24
MEDIAN	29-Apr	16-May	1-Jun	38
MIN	19-Apr	4-May	19-May	31
MAX	9-May	22-May	18-Jun	41

Subyearling Chinook				
	10 %	50%	90 %	# of Days
1997	1-Jun	2-Jul	16-Aug	77
1996	12-Jun	9-Jul	19-Aug	69
1995	8-Jun	30-Jun	24-Jul	47
1994	8-Jul	22-Jul	2-Aug	26
1993	21-Jun	10-Jul	17-Aug	58
1992	25-Jun	18-Jul	15-Aug	52
1991	7-Jun	18-Jul	16-Aug	71
1990 ^	19-Jun	30-Jun	2-Aug	45
1989	8-Jun	19-Jul	16-Aug	70
1988	22-Jun	20-Jul	8-Sep	79
1987	7-Jun	23-Jul	18-Sep	104
1986	9-Jun	22-Jul	24-Aug	77
1985 ^	12-Jul	22-Jul	5-Aug	25
MEDIAN	12-Jun	18-Jul	16-Aug	64
MIN	1-Jun	30-Jun	24-Jul	54
MAX	12-Jul	23-Jul	18-Sep	69

Wild Steelhead				
	10 %	50%	90 %	# of Days
1997	23-Apr	1-May	24-May	32
1996	24-Apr	13-May	24-May	31
1995	3-May	12-May	25-May	23
1994	27-Apr	19-May	26-May	30
1993	30-Apr	17-May	26-May	27
1992	23-Apr	10-May	25-May	33
1991	29-Apr	19-May	29-May	31
1990 ^	26-Apr	4-May	18-May	23
1989*	24-Apr	15-May	28-May	35
1988*	26-Apr	15-May	3-Jun	39
1987*	1-May	16-May	29-May	29
1986*	26-Apr	18-May	4-Jun	40
1985*^	6-May	22-May	4-Jun	30
MEDIAN	26-Apr	12-May	25-May	30
MIN	23-Apr	1-May	18-May	26
MAX	3-May	19-May	29-May	27

WILD FISH ONLY, N = 8

Hatchery Steelhead				
	10 %	50%	90 %	# of Days
1997	27-Apr	12-May	26-May	30
1996	28-Apr	16-May	27-May	30
1995	7-May	18-May	26-May	20
1994	9-May	24-May	1-Jun	24
1993	10-May	18-May	26-May	17
1992	8-May	19-May	29-May	22
1991	5-May	20-May	30-May	26
1990 ^	3-May	14-May	25-May	23
1989*	ALL STEELHEAD IN WILD			
1988*	ALL STEELHEAD IN WILD			
1987*	ALL STEELHEAD IN WILD			
1986*	ALL STEELHEAD IN WILD			
1985*^	ALL STEELHEAD IN WILD			
MEDIAN	6-May	18-May	26-May	23
MIN	27-Apr	12-May	25-May	29
MAX	10-May	24-May	1-Jun	23

HATCHERY FISH ONLY, N = 8

Coho				
	10 %	50%	90 %	# of Days
1997	30-Apr	20-May	9-Jun	41
1996	27-Apr	8-May	21-May	25
1995	8-May	13-May	21-May	14
1994	12-May	18-May	29-May	18
1993	9-May	17-May	30-May	22
1992	3-May	13-May	27-May	25
1991	11-May	22-May	5-Jun	26
1990 ^	28-Apr	5-May	20-May	23
1989	28-Apr	13-May	29-May	32
1988	7-May	13-May	1-Jun	26
1987	6-May	13-May	31-May	26
1986	22-May	29-May	7-Jun	17
1985 ^	7-Jun	16-Jun	26-Jun	20
MEDIAN	7-May	13-May	30-May	24
MIN	27-Apr	5-May	20-May	14
MAX	7-Jun	16-Jun	26-Jun	32

Sockeye (Wild + Hatchery)				
	10 %	50%	90 %	# of Days
1997	10-May	25-May	21-Jun	43
1996	3-May	19-May	3-Jun	32
1995	9-May	19-May	26-May	18
1994	11-May	24-May	5-Jun	26
1993	16-May	21-May	31-May	16
1992	9-May	14-May	27-May	19
1991	17-May	23-May	1-Jun	16
1990 ^	5-May	16-May	28-May	24
1989	9-May	20-May	3-Jun	26
1988	13-May	22-May	4-Jun	23
1987	14-May	28-May	6-Jun	24
1986	4-May	23-May	5-Jun	33
1985 ^	12-May	26-May	10-Jun	30
MEDIAN	10-May	22-May	3-Jun	24
MIN	3-May	14-May	26-May	16
MAX	17-May	28-May	21-Jun	33

* Years in which no differentiation was made between wild and hatchery steelhead for index purposes.

^ Years in which the sample unit was out of service (1990: May 30 - June 9, and 1985: April 2 to April 26).

Table C-2. Percent night passage (1800-0600) for each season at John Day Dam, 1985-1997.

YEAR	Yearling Chinook	Subyearling Chinook	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye	All Species Combined
1997	62.6	73.1	67.0	70.6	73.7	59.6	70.3
1996	68.6	70.0	81.6	74.7	80.2	65.6	73.1
1995	80.7	79.7	87.9	75.8	91.5	79.5	80.4
1994	80.9	68.1	91.6	81.4	92.2	94.5	74.6
1993	83.3	87.8	83.4	80.7	95.1	86.5	85.0
1992	82.8	78.7	95.3	91.5	96.0	94.9	82.9
1991	89.9	77.0	91.0	92.3	96.2	83.6	84.2
1990	79.7	84.4	76.3	94.8	95.6	85.0	83.8
1989	86.4	86.2	73.6	79.4	93.0	79.0	85.3
1988	80.0	80.7	80.8	70.3	83.9	87.1	80.3
1987	84.5	85.4	93.6	85.6	95.0	94.9	86.6
1986	75.5	80.1	N/A	N/A	95.9	81.9	79.5
1985	83.2	83.7	N/A	N/A	91.0	86.8	84.4
AVERAGE	79.8	79.6	83.8	81.5	90.7	83.0	80.8
MIN	62.6	68.1	67.0	70.3	73.7	59.6	70.3
MAX	89.9	87.8	95.3	94.8	96.2	94.9	86.6

Table C-3. Percent of total passage per hour at John Day Dam for **yearling chinook**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	0.9	1.1	1.3	1.5	1.1	1.6	1.8	1.7	1.5	1.6	1.6	1.3	1.6	4.9	11.3	11.6	10.8	10.1	8.4	7.5	7.1	6.0	2.5	1.0
1986	1.3	1.6	1.9	1.9	1.9	2.0	2.4	2.3	2.7	2.5	2.5	2.4	3.6	8.4	15.3	13.1	7.5	6.0	4.9	4.3	3.5	3.6	2.6	1.4
1987	1.3	1.0	1.0	0.8	0.8	1.8	1.7	1.6	1.1	0.9	1.1	0.9	1.1	2.4	5.5	11.5	11.0	10.3	9.9	8.9	9.5	8.1	5.5	2.4
1988	2.7	2.1	2.4	0.9	0.9	1.0	1.2	1.1	1.2	1.2	1.0	1.2	1.5	4.2	7.2	9.7	7.8	7.5	8.3	9.2	8.1	8.1	7.2	4.2
1989	2.2	1.1	0.8	0.7	0.8	0.7	0.8	0.7	0.9	0.6	0.8	0.7	0.9	2.8	9.1	12.1	10.6	10.2	9.4	9.5	8.9	6.9	5.5	3.6
1990	1.0	1.7	2.0	1.7	2.0	1.9	2.9	1.5	2.2	1.2	1.4	0.8	1.2	4.3	8.6	10.9	9.7	8.6	8.2	7.9	8.2	7.6	3.6	0.7
1991	0.6	0.5	0.8	0.8	0.9	1.0	1.0	1.0	1.0	0.9	0.8	0.9	1.0	3.2	14.9	17.4	13.9	10.2	7.8	6.6	6.1	4.9	2.9	0.7
1992	1.1	1.3	1.3	2.1	1.9	2.1	1.8	1.5	1.2	1.4	0.7	0.6	0.7	2.4	6.0	11.6	11.7	10.8	10.4	9.5	8.8	6.7	3.5	1.0
1993	2.6	1.7	1.4	1.1	1.0	0.9	0.8	0.8	0.8	1.0	1.1	1.1	1.5	2.8	14.8	16.2	10.3	7.8	7.2	6.1	6.1	5.5	3.9	3.4
1994	1.2	1.3	1.2	1.7	1.5	2.1	2.3	1.9	1.8	1.4	1.3	1.1	1.0	4.1	7.9	8.8	8.9	8.7	9.4	9.3	9.4	8.3	4.0	1.4
1995	1.5	2.1	1.2	1.1	1.0	0.9	1.6	1.6	1.2	1.2	1.8	1.9	2.5	3.3	10.6	10.5	9.8	9.6	7.5	7.5	6.5	6.4	4.5	4.2
1996	2.4	2.2	2.4	2.4	2.7	2.6	3.0	2.9	2.2	2.2	3.6	3.7	5.5	5.9	11.1	11.2	6.9	6.8	4.2	4.0	3.2	3.2	2.9	2.7
1997	3.2	2.8	2.9	2.5	3.2	2.6	3.3	2.8	3.6	3.3	4.0	3.8	4.8	5.3	8.4	8.5	5.2	4.7	4.8	4.6	4.3	4.3	3.9	3.3
AVG	1.6	1.5	1.5	1.4	1.3	1.6	1.8	1.7	1.6	1.5	1.7	1.6	2.1	4.4	10.5	11.9	9.6	8.7	7.7	7.2	6.8	6.1	4.0	2.4
MIN	0.6	0.5	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.6	0.7	0.6	0.7	2.4	5.5	8.5	5.2	4.7	4.2	4.0	3.2	3.2	2.5	0.7
MAX	3.2	2.8	2.9	2.5	3.2	2.6	3.3	2.9	3.6	3.3	4.0	3.8	5.5	8.4	15.3	17.4	13.9	10.8	10.4	9.5	9.5	8.3	7.2	4.2

Table C-4. Percent of total passage per hour at John Day Dam for **subyearling chinook**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	0.8	1.0	1.3	3.1	1.8	1.3	1.6	1.0	0.9	1.1	1.1	1.0	1.2	5.0	12.1	8.1	8.5	8.7	10.1	7.9	8.9	8.0	4.2	1.2
1986	1.9	1.4	1.3	1.4	1.5	2.5	1.6	1.4	1.2	1.3	1.3	1.4	1.4	4.0	5.4	7.9	8.3	8.8	8.6	8.7	9.4	9.2	7.1	3.1
1987	2.0	0.8	0.9	0.7	0.8	0.8	1.0	1.0	1.1	1.1	1.2	2.0	2.1	4.5	6.7	6.5	7.3	8.7	8.3	9.9	10.0	10.8	8.6	3.1
1988	1.7	1.2	1.1	1.1	1.2	1.8	1.8	1.7	1.4	1.5	1.4	2.1	2.2	5.7	7.6	6.5	6.6	7.4	7.9	8.5	9.5	9.3	7.4	3.3
1989	1.8	1.1	1.1	0.7	0.7	0.6	0.7	0.7	0.9	0.8	0.9	1.0	0.9	2.3	3.3	4.4	6.6	8.5	11.6	12.4	12.9	12.8	9.4	3.8
1990	0.9	0.8	0.8	1.2	1.3	1.7	1.8	1.9	1.8	1.2	1.2	1.2	1.4	2.9	7.3	12.1	11.4	10.1	10.0	9.2	8.1	7.2	3.4	1.1
1991	1.0	0.7	0.8	1.0	1.1	3.3	4.7	4.0	1.9	1.7	1.4	1.5	1.6	3.6	7.5	10.0	8.7	8.2	8.0	8.0	8.3	7.9	3.8	1.4
1992	1.1	1.2	1.3	1.6	1.6	2.9	2.4	2.2	2.2	1.9	1.9	2.2	2.7	5.7	6.2	7.0	7.8	7.9	8.6	9.0	10.1	8.5	3.1	1.1
1993	1.1	0.9	0.9	0.7	0.9	0.8	0.7	0.8	0.8	0.7	0.8	1.0	1.1	2.7	4.2	6.0	8.7	10.0	11.1	12.2	12.1	11.3	7.4	3.0
1994	1.5	1.9	2.1	3.3	3.7	3.6	3.7	3.3	2.2	1.9	1.7	1.7	3.2	4.2	6.4	7.0	7.0	7.1	6.1	6.3	7.7	7.1	4.3	3.1
1995	1.1	1.1	1.6	1.1	1.6	1.6	1.9	1.9	1.9	1.8	2.1	2.1	1.8	2.4	10.1	10.5	9.7	10.0	8.2	8.0	6.8	6.7	3.5	2.6
1996	1.6	1.5	2.4	2.3	2.2	2.2	3.1	3.2	2.7	2.7	2.1	2.0	2.2	2.5	6.2	7.9	9.4	8.3	7.6	7.0	6.0	6.0	4.8	4.1
1997	1.5	1.3	2.0	1.9	2.6	2.5	3.7	3.0	1.8	1.8	1.6	1.5	1.8	2.8	8.1	8.8	9.2	8.4	7.5	7.3	7.0	6.6	4.0	3.1
AVG	1.4	1.2	1.3	1.7	1.6	1.8	1.9	1.7	1.4	1.4	1.3	1.5	1.7	3.9	7.4	7.5	8.1	8.6	8.9	8.8	9.3	8.9	5.9	2.7
MIN	0.8	0.7	0.8	0.7	0.7	0.6	0.7	0.7	0.8	0.7	0.8	1.0	0.9	2.3	3.3	4.4	6.6	7.1	6.1	6.3	6.0	6.0	3.1	1.1
MAX	2.0	1.9	2.4	3.3	3.7	3.6	4.7	4.0	2.7	2.7	2.1	2.2	3.2	5.7	12.1	12.1	11.4	10.1	11.6	12.4	12.9	12.8	9.4	4.1

Table C-5. Percent of total passage per hour at John Day Dam for **wild steelhead**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700	
1985																									
1986																									
1987	0.7	0.4	0.5	0.4	0.5	0.4	0.6	0.3	0.6	0.2	0.4	0.3	0.5	2.7	10.9	13.4	11.2	10.7	9.6	10.1	10.7	8.7	5.1	1.5	
1988	1.2	2.4	2.9	1.3	1.5	1.3	2.0	1.0	1.2	1.0	0.9	1.5	2.0	4.9	8.1	10.5	8.0	7.8	8.5	8.6	8.0	7.7	5.2	2.5	
1989	2.5	1.8	2.1	3.1	2.9	1.8	2.1	1.8	2.0	2.3	2.3	3.1	3.5	7.3	12.8	9.1	6.7	6.5	5.8	6.0	5.6	4.6	2.7	1.9	
1990	0.4	0.3	0.5	0.1	0.3	20.0	0.5	0.2	0.4	0.1	0.5	0.2	0.5	5.9	12.6	12.6	8.9	6.5	7.1	6.1	7.4	6.2	2.4	0.4	
1991	1.1	0.6	0.7	0.6	1.0	0.5	0.7	0.3	0.6	0.9	0.8	1.4	1.9	6.0	18.0	16.1	11.4	9.1	6.5	7.2	5.8	5.4	2.1	1.1	
1992	0.3	0.5	0.3	0.4	0.4	0.5	0.3	0.4	0.3	0.6	0.2	0.1	0.3	2.1	8.1	13.0	13.7	12.4	12.6	11.1	9.9	8.7	3.3	0.6	
1993	1.9	1.5	1.1	1.2	1.1	1.1	1.1	1.2	1.4	1.2	1.4	1.5	2.2	6.5	17.2	14.8	8.9	6.9	6.5	5.0	5.0	5.3	3.6	2.3	
1994	0.7	0.6	0.5	2.6	0.4	0.4	0.3	0.5	0.5	0.4	0.4	0.5	0.6	2.4	8.1	11.4	10.8	9.3	11.0	10.8	12.0	10.7	3.9	1.1	
1995	0.8	1.3	0.5	0.5	0.2	0.4	0.4	0.4	0.6	0.5	0.9	0.7	1.6	2.3	12.7	12.8	10.3	10.3	8.1	8.0	7.5	7.4	6.1	5.5	
1996	1.5	1.6	1.1	1.2	1.4	1.2	1.4	1.3	1.4	1.0	2.1	2.0	3.8	4.3	15.3	15.1	9.0	8.9	6.2	5.9	3.9	3.6	3.7	3.1	
1997	2.9	3.0	2.3	2.4	2.4	2.2	2.6	2.3	2.6	2.6	3.5	3.2	5.2	6.8	9.8	8.7	5.4	5.3	4.3	4.4	4.7	4.4	4.6	4.3	
AVG	1.3	1.3	1.1	1.3	1.1	2.3	1.1	0.9	1.1	1.0	1.3	1.4	2.1	4.6	12.6	12.6	9.3	8.5	7.6	7.3	7.1	6.5	4.1	2.5	
MIN	0.3	0.3	0.3	0.1	0.2	0.4	0.3	0.2	0.3	0.1	0.2	0.1	0.3	2.1	8.1	8.7	5.4	5.3	4.3	4.4	3.9	3.6	2.1	0.4	
MAX	2.9	3.0	2.9	3.1	2.9	20.0	2.6	2.3	2.6	2.6	3.5	3.2	5.2	7.3	18.0	16.1	13.7	12.4	12.6	11.1	12.0	10.7	6.1	5.5	

Table C-6. Percent of total passage per hour at John Day Dam for **hatchery steelhead**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	1.0	0.8	0.8	0.8	0.7	0.9	1.0	0.8	0.7	0.7	0.7	0.7	0.9	3.0	9.6	10.7	10.1	10.9	9.9	10.0	10.1	9.2	4.2	1.6
1986	2.0	1.4	1.3	0.9	0.8	0.8	1.1	0.9	1.0	1.1	1.2	1.5	3.0	6.4	10.8	13.0	9.8	8.1	7.6	6.7	5.6	5.9	5.9	3.1
1987	1.9	1.1	1.3	0.7	0.9	0.6	1.0	0.7	0.9	0.7	0.9	0.6	0.9	2.3	6.0	9.7	8.4	8.8	9.8	10.2	10.9	10.0	7.9	3.7
1988	2.8	3.0	3.1	2.2	1.8	2.1	2.6	2.0	2.1	1.7	1.5	1.5	2.0	6.0	6.9	7.6	6.5	6.6	5.7	6.6	7.2	6.6	6.9	5.0
1989	3.5	1.9	1.6	1.5	1.3	0.9	1.0	1.0	0.8	0.7	0.8	0.8	0.9	2.5	9.7	9.3	7.6	8.3	8.1	8.3	8.5	7.8	7.6	5.5
1990	0.5	0.2	0.7	0.1	0.4	0.2	0.8	0.1	0.6	0.1	0.7	0.3	0.9	3.2	10.5	12.5	10.1	9.8	9.2	9.4	11.4	11.6	5.9	0.9
1991	0.9	0.7	0.8	0.6	0.5	0.5	0.6	0.4	0.5	0.5	0.7	1.1	1.5	5.2	13.8	15.0	12.0	10.0	8.6	7.5	6.9	6.5	4.3	1.0
1992	0.9	0.8	0.6	0.9	0.9	0.9	0.5	0.4	0.4	1.1	0.6	0.2	0.3	2.2	6.4	12.3	11.6	12.7	12.0	11.5	11.3	7.9	3.1	0.7
1993	3.8	2.4	1.8	1.5	1.5	0.9	0.9	0.8	0.8	0.7	0.7	0.8	1.2	3.3	13.1	16.2	9.4	8.0	6.7	6.3	6.0	5.7	4.1	3.5
1994	2.3	2.1	1.5	2.3	1.1	1.1	1.0	1.3	1.3	1.0	1.0	0.9	1.0	3.7	6.5	7.8	8.5	8.0	8.8	9.9	11.3	9.2	5.8	2.8
1995	3.3	4.2	1.4	1.3	0.6	0.6	0.6	0.7	0.6	0.5	0.6	0.6	0.9	1.1	6.5	6.6	7.8	7.8	8.5	8.4	8.9	8.9	9.8	9.7
1996	2.5	2.5	1.9	1.9	1.5	1.6	1.5	1.6	1.5	1.6	1.5	1.7	3.5	3.4	10.2	10.4	8.7	8.5	6.6	6.5	4.8	4.9	5.7	5.8
1997	2.6	2.5	2.2	2.1	2.1	2.0	1.9	1.8	2.2	2.2	2.5	2.7	4.1	4.5	11.4	10.5	6.6	6.5	5.1	5.2	4.4	4.5	5.1	5.1
AVG	2.5	2.3	1.5	1.4	1.1	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.8	3.4	9.6	10.8	8.8	8.4	7.8	7.7	7.5	7.1	6.2	4.8
MIN	0.5	0.2	0.6	0.1	0.4	0.2	0.5	0.1	0.4	0.1	0.6	0.2	0.3	1.1	6.0	6.6	6.5	6.5	5.1	5.2	4.4	4.5	3.1	0.7
MAX	3.8	4.2	3.1	2.3	2.1	2.1	2.6	2.0	2.2	2.2	2.5	2.7	4.1	6.4	13.8	16.2	12.0	12.7	12.0	11.5	11.4	11.6	9.8	9.7

Table C-7. Percent of total passage per hour at John Day Dam for **coho**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	0.7	0.5	1.5	0.3	0.5	0.7	0.5	0.3	1.7	0.8	0.7	0.0	1.3	1.8	5.0	12.4	11.7	13.4	13.4	11.5	10.5	6.7	3.2	0.8
1986	0.2	0.3	0.4	0.1	0.6	0.6	0.6	0.4	0.2	0.1	0.3	0.4	0.7	1.1	9.9	22.2	16.7	12.3	9.1	8.4	7.1	6.1	1.9	0.6
1987	0.6	0.5	0.7	0.2	0.3	0.2	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.5	7.1	11.0	9.4	10.8	10.6	11.0	12.6	13.6	7.9	1.4
1988	1.5	2.1	1.9	1.1	0.7	1.1	1.8	1.0	1.1	0.7	0.6	0.5	0.8	3.3	7.7	11.3	8.0	8.2	8.2	9.4	10.0	9.5	6.9	2.6
1989	1.0	0.4	0.7	0.4	0.5	0.4	0.7	0.2	0.3	0.3	0.4	0.5	0.6	6.2	15.8	13.4	10.8	9.9	8.3	8.5	8.0	7.0	4.1	1.7
1990	0.3	0.2	0.5	0.2	0.6	0.3	0.8	0.2	0.5	0.2	0.4	0.0	0.3	2.5	10.2	11.6	9.1	7.8	9.1	11.3	15.3	13.3	5.2	0.3
1991	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.1	0.5	0.3	0.5	0.5	1.2	4.3	25.0	18.0	12.7	8.2	6.9	6.6	6.2	5.0	1.5	0.4
1992	0.3	0.1	0.2	0.5	0.3	0.4	0.2	0.5	0.3	0.6	0.4	0.3	0.2	3.2	12.8	15.6	11.6	10.3	9.9	9.2	11.4	8.4	3.2	0.3
1993	1.0	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.5	3.8	24.4	17.1	11.8	9.4	6.8	6.4	5.9	5.6	3.2	2.0
1994	0.9	0.7	0.4	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	1.7	10.4	10.4	9.1	8.3	9.6	12.0	12.6	11.9	5.2	1.8
1995	0.6	0.8	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.4	0.5	19.9	19.8	8.6	8.5	6.4	6.4	7.5	7.5	5.8	5.6
1996	1.3	1.2	1.3	1.3	1.6	1.6	1.6	1.6	1.2	1.1	1.6	1.6	2.9	3.5	14.7	14.6	8.9	8.9	5.4	5.4	4.9	4.7	4.6	4.3
1997	1.7	1.4	2.3	2.1	2.3	2.1	2.5	2.0	2.1	1.9	3.5	3.4	5.2	5.4	13.1	12.3	5.7	5.0	5.5	5.5	4.9	4.8	2.8	2.5
AVG	0.9	0.8	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.5	0.8	0.7	1.3	2.7	14.7	14.7	9.4	8.8	7.5	7.9	8.4	8.0	5.0	2.9
MIN	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.5	5.0	10.4	5.7	5.0	5.4	5.4	4.9	4.7	1.5	0.3
MAX	1.7	2.1	2.3	2.1	2.3	2.1	2.5	2.0	2.1	1.9	3.5	3.4	5.2	6.2	25.0	22.2	16.7	13.4	13.4	12.0	15.3	13.6	7.9	5.6

Table C-8. Percent of total passage per hour at John Day Dam for **sockeye**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	0.8	0.8	1.0	1.1	1.0	1.5	1.6	1.1	1.1	1.1	1.2	1.1	1.2	5.5	12.2	10.1	10.7	10.4	9.2	8.2	8.9	7.1	2.1	1.0
1986	1.0	1.5	1.4	1.4	1.5	1.6	1.8	1.6	1.5	1.8	2.1	2.6	3.2	7.1	14.1	12.6	9.7	7.3	7.5	5.6	4.8	4.4	3.0	1.0
1987	0.3	0.4	0.6	0.3	0.4	0.2	0.5	0.3	0.4	0.3	0.5	0.2	0.4	1.1	5.2	8.7	12.1	14.5	13.6	12.3	12.1	10.0	4.8	0.8
1988	1.2	1.1	1.3	0.7	0.6	0.6	1.3	1.0	1.3	0.6	0.7	0.4	0.9	2.4	4.9	7.3	6.8	8.8	12.3	13.0	11.9	10.3	8.0	2.5
1989	2.7	1.6	2.1	2.0	1.6	1.5	1.9	1.5	1.6	1.1	1.6	1.5	1.6	5.9	13.0	8.1	5.5	6.7	6.4	8.2	8.6	8.5	4.9	1.8
1990	1.2	0.8	1.8	0.8	1.5	0.6	2.5	0.5	2.0	0.7	1.5	1.2	2.4	8.8	12.2	8.6	9.1	7.9	8.0	7.9	9.2	7.2	2.4	1.0
1991	1.2	0.8	1.1	1.1	1.3	1.6	1.3	0.8	1.8	1.9	2.2	3.1	4.8	11.6	16.8	9.0	7.0	5.9	6.1	5.1	6.4	5.5	2.3	1.3
1992	0.4	0.2	0.2	0.6	0.3	0.3	0.6	0.4	0.4	0.6	0.3	0.5	0.5	2.6	10.9	12.0	11.5	13.6	11.9	11.0	9.7	8.4	2.2	0.6
1993	0.6	0.7	0.7	1.0	1.0	1.2	0.9	1.0	1.5	2.1	2.8	3.2	3.4	13.5	24.3	11.7	5.1	3.7	3.6	4.6	4.8	5.5	3.3	1.2
1994	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	1.9	8.0	10.6	14.0	11.9	11.3	9.8	10.7	9.4	5.2	0.9
1995	1.3	1.5	1.0	1.0	1.0	1.1	1.6	1.6	2.2	2.1	3.4	3.4	5.2	5.2	22.5	22.6	3.8	3.7	2.4	2.4	3.0	2.7	2.7	2.7
1996	2.7	3.0	2.3	1.9	2.6	1.9	3.7	3.5	2.8	2.7	4.2	4.2	7.3	7.7	10.5	9.9	4.9	4.3	3.7	3.2	4.0	3.3	2.6	3.2
1997	3.0	2.6	3.3	4.3	4.4	3.8	3.6	2.9	3.5	3.4	3.4	4.2	5.4	6.4	7.9	7.9	4.4	4.0	5.6	3.5	3.2	3.8	3.2	2.2
AVG	1.0	1.1	1.1	1.1	1.1	1.2	1.4	1.2	1.4	1.4	1.9	2.1	2.7	6.1	14.4	12.4	8.1	7.8	7.4	6.9	7.0	6.2	3.5	1.5
MIN	0.3	0.2	0.2	0.3	0.3	0.2	0.4	0.3	0.4	0.3	0.3	0.2	0.4	1.1	4.9	7.3	3.8	3.7	2.4	2.4	3.0	2.7	2.1	0.6
MAX	3.0	3.0	3.3	4.3	4.4	3.8	3.7	3.5	3.5	3.4	4.2	4.2	7.3	13.5	24.3	22.6	14.0	14.5	13.6	13.0	12.1	10.3	8.0	3.2

Table C-9. Percent of total passage per hour at John Day Dam for **all species combined**, 1985-1997.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1985	0.8	1.0	1.3	2.5	1.5	1.3	1.5	1.1	1.0	1.2	1.2	1.0	1.2	4.8	11.7	9.1	9.2	9.3	9.7	8.0	8.7	7.7	3.8	1.2
1986	1.7	1.4	1.5	1.5	1.5	2.1	1.8	1.6	1.6	1.7	1.7	1.7	2.3	5.7	9.3	10.3	8.3	7.9	7.4	7.1	7.1	7.0	5.4	2.5
1987	1.5	0.8	0.9	0.7	0.8	1.1	1.2	1.1	1.0	0.9	1.0	1.2	1.4	3.1	6.4	9.2	9.3	9.8	9.4	9.8	10.1	9.8	7.0	2.6
1988	2.0	1.6	1.6	1.1	1.1	1.5	1.7	1.5	1.4	1.4	1.3	1.7	1.9	5.1	7.4	7.5	6.8	7.4	8.1	8.8	9.2	8.9	7.4	3.5
1989	2.0	1.2	1.1	0.9	0.9	0.7	0.8	0.8	0.9	0.8	0.9	1.0	1.0	2.9	5.8	6.7	7.5	8.7	10.5	11.1	11.3	10.8	8.0	3.7
1990	0.8	1.0	1.2	1.1	1.3	2.9	1.9	1.4	1.7	1.0	1.1	0.9	1.2	3.7	8.6	11.7	10.4	9.2	9.0	8.7	8.8	8.0	3.7	0.8
1991	0.8	0.6	0.8	0.9	0.9	2.0	2.7	2.3	1.4	1.2	1.1	1.3	1.5	4.1	12.0	13.3	10.8	8.9	7.8	7.4	7.2	6.6	3.3	1.1
1992	1.0	1.1	1.1	1.6	1.5	2.2	1.8	1.7	1.5	1.5	1.3	1.3	1.6	4.1	6.7	9.6	9.8	9.6	9.7	9.5	9.9	7.9	3.2	1.0
1993	2.1	1.5	1.2	1.0	1.0	0.8	0.8	0.8	0.8	0.9	1.0	1.2	1.4	3.9	12.0	12.2	9.1	8.3	8.1	8.1	8.0	7.6	5.1	3.0
1994	1.4	1.7	1.7	2.6	2.7	2.7	2.8	2.5	1.9	1.5	1.4	1.4	2.3	3.8	7.0	7.9	8.0	7.8	7.4	7.7	8.8	8.0	4.4	2.5
1995	1.6	2.1	1.2	1.1	1.0	1.0	1.3	1.3	1.2	1.2	1.6	1.6	1.9	2.5	11.1	11.3	8.9	8.9	7.5	7.5	7.0	6.9	5.4	4.9
1996	2.0	1.9	2.0	2.0	2.0	2.0	2.4	2.4	2.0	1.9	2.3	2.3	3.6	3.9	10.4	10.9	8.4	8.1	6.0	5.8	4.7	4.6	4.4	4.1
1997	2.3	2.1	2.2	2.2	2.4	2.3	2.8	2.3	2.3	2.2	2.5	2.6	3.7	4.4	10.0	9.7	7.1	6.6	5.8	5.7	5.3	5.1	4.3	4.0
AVG	1.8	1.6	1.5	1.7	1.5	1.8	1.8	1.6	1.5	1.4	1.5	1.6	2.1	4.5	10.3	10.8	9.5	9.4	9.1	8.9	9.0	8.5	5.8	3.1
MIN	0.8	0.6	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.9	0.9	1.0	2.5	5.8	6.7	6.8	6.6	5.8	5.7	4.7	4.6	3.2	0.8
MAX	2.3	2.1	2.2	2.6	2.7	2.9	2.8	2.5	2.3	2.2	2.5	2.6	3.7	5.7	12.0	13.3	10.8	9.8	10.5	11.1	11.3	10.8	8.0	4.9

TABLE C-10. Descaling and mortality data from John Day Dam, 1985 - 1997.

CHINOOK 1						CHINOOK 0				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	62,790	3,846	6.2	809	1.3	228,211	4,567	2.0	5,425	2.4
1986	92,856	4,630	5.0	547	0.6	181,857	4,135	2.3	1,231	0.7
1987	84,312	5,617	6.8	1,505	1.8	95,693	2,290	2.5	2,313	2.4
1988	34,071	2,470	7.5	1,292	3.8	109,435	2,186	2.1	3,050	2.8
1989	34,935	3,749	10.9	694	2.0	129,957	5,922	4.7	3,273	2.5
1990	26,907	2,968	11.3	541	2.0	39,280	2,316	6.2	2,009	5.1
1991	26,879	4,487	16.9	320	1.2	46,785	2,696	5.9	775	1.7
1992	42,231	4,256	10.5	1,823	4.3	59,783	1,216	2.1	3,096	5.2
1993	52,821	5,342	10.6	2,464	4.7	116,804	3,954	3.6	6,413	5.5
1994	34,071	2,219	6.8	1,606	4.7	75,164	2,309	3.3	5,004	6.7
1995	34,308	3,361	10.1	1,032	3.0	48,896	3,325	7.1	2,029	4.2
1996	14,560	2,001	13.9	158	1.1	31,157	1,119	3.7	692	2.2
1997	4,586	859	19.1	84	1.8	20,487	1,133	5.6	322	1.6
TOTAL	545,327	45,805	8.6	12,875	2.4	1,183,509	37,168	3.2	35,632	3.0
WILD STEELHEAD						HATCHERY STEELHEAD				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	36,355	1,292	3.6	320	0.9					
1986	37,858	962	2.6	156	0.4					
1987	12,374	447	3.6	41	0.3	11,622	634	5.5	94	0.8
1988	6,810	335	5.0	56	0.8	8,227	1,012	12.7	268	3.3
1989	8,585	348	4.1	53	0.6	11,229	1,225	11.0	84	0.7
1990	6,104	303	5.0	76	1.2	4,867	665	13.9	90	1.8
1991	5,455	287	5.3	10	0.2	11,171	1,593	14.3	30	0.3
1992	5,141	332	6.5	54	1.1	11,970	1,663	14.4	389	3.2
1993	16,042	530	3.4	294	1.8	52,936	6,562	12.6	1,049	2.0
1994	7,604	290	3.9	85	1.1	14,454	1,761	12.7	554	3.8
1995	4,043	166	4.1	26	0.6	18,915	2,236	12.0	325	1.7
1996	3,973	134	3.4	3	0.1	11,171	1,310	11.8	30	0.3
1997	4,011	130	3.3	11	0.3	13,645	1,279	9.4	24	0.2
TOTAL	154,355	5,556	3.6	1,185	0.8	170,207	19,940	11.9	2,937	1.7
COHO						SOCKEYE				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	598	44	7.4	7	1.2	17,246	1,258	7.4	157	0.9
1986	1,990	62	3.1	4	0.2	17,539	1,688	9.7	151	0.9
1987	13,213	741	5.6	36	0.3	11,923	624	5.3	48	0.4
1988	8,680	363	4.3	153	1.8	6,336	320	5.1	45	0.7
1989	6,934	431	6.2	12	0.2	5,497	672	12.3	41	0.7
1990	6,261	418	6.7	7	0.1	1,769	144	8.3	41	2.3
1991	5,104	437	8.6	3	0.1	3,447	604	17.5	4	0.1
1992	9,804	636	6.6	158	1.6	2,608	183	7.1	39	1.5
1993	13,164	669	5.1	110	0.8	14,885	1,630	11.3	397	2.7
1994	11,385	446	4.0	281	2.5	7,270	719	10.1	155	2.1
1995	5,908	244	4.1	8	0.1	5,625	807	14.6	112	2.0
1996	8,551	579	6.8	13	0.2	1,147	84	7.4	9	0.8
1997	3,409	361	10.6	16	0.5	738	152	21.0	13	1.8
TOTAL	95,001	5,431	5.8	808	0.9	96,030	8,885	9.4	1,212	1.3

TABLE C-11. Yearling Chinook condition subsampling data from John Day Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	981	0.92	N/A	1.94	N/A	N/A	N/A	N/A	N/A	10.19
1986	950	1.37	N/A	2.11	N/A	N/A	N/A	N/A	N/A	20.11
1987	1,957	0.36	N/A	1.07	N/A	N/A	N/A	N/A	N/A	15.94
1988	1,870	0.75	0.48	1.34	0.11	N/A	0.8	N/A	0.37	12.03
1989	1,313	1.68	1.07	3.12	0.53	N/A	0.76	0.38	0.53	13.02
1990	1,143	0.26	1.05	0.7	0.09	N/A	0.96	0.61	0.35	20.65
1991	1,959	0.71	0.26	0.46	0.2	N/A	0.56	0.71	1.58	14.34
1992	1,507	0.6	0.13	0.33	0.07	N/A	1.33	0.86	1.39	10.95
1993	3,995	N/A	0.8	2.95	0.35	0.33	0.38	N/A	1.05	15.52
1994	3,879	N/A	0.18	6.21	0.03	0.75	0.85	N/A	1.47	14.54
1995	2,573	2.18	1.63	2.91	1.52	0.31	1.67	2.64	2.37	21.45
1996	2,596	0.58	0.58	1.5	0.5	0.04	0.15	0.39	1.16	28.58
1997	1,509	0.40	0.40	2.32	1.19	0.00	0.27	0.73	1.59	17.30

TABLE C-12. Subyearling Chinook condition subsampling data from John Day Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	2,707	1.81	N/A	1.55	0.04	N/A	0.92	N/A	N/A	7.35
1986	3,517	0.65	N/A	3.18	N/A	N/A	0.77	N/A	N/A	9.01
1987	4,407	0.34	N/A	3.36	N/A	N/A	N/A	N/A	N/A	11.64
1988	4,710	0.25	0.23	0.98	N/A	N/A	12.85	N/A	0.08	8.79
1989	2,997	0.17	0.2	0.33	0.23	N/A	3.77	0.13	0.3	9.68
1990	2,340	0.26	0.38	0.81	0.26	N/A	4.32	0.68	N/A	14.96
1991	3,106	0.35	0.06	0.58	0.19	N/A	4.15	0.06	0.03	9.01
1992	2,520	0.04	0.08	0.75	0.56	N/A	10.79	0.36	0.36	4.09
1993	5,869	N/A	0.15	3.14	0.34	8.62	2.25	N/A	0.12	10.36
1994	4,579	N/A	0.07	3.78	0.31	8.69	1.53	N/A	0.15	8.08
1995	4,392	0.3	0.3	2.44	0.84	2.87	0.34	0.93	0.43	8.06
1996	3,840	0.44	0.73	2.42	1.98	3.78	0.42	0.08	0.26	11.98
1997	5,380	0.69	0.20	1.58	0.22	0.86	0.09	0.11	0.26	8.10

TABLE C-13. Coho condition subsampling data from John Day Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	96	2.08	N/A	2.08	N/A	N/A	N/A	N/A	N/A	7.29
1986	230	1.3	N/A	3.48	N/A	N/A	N/A	N/A	N/A	8.26
1987	750	0.13	N/A	0.93	N/A	N/A	N/A	N/A	N/A	11.87
1988	1,080	0.09	N/A	0.28	0.09	N/A	0.46	N/A	0.37	5.93
1989	1,159	0.09	0.26	1.04	0.17	N/A	0.17	N/A	0.69	6.47
1990	849	N/A	N/A	1.3	N/A	N/A	1.18	N/A	1.06	13.43
1991	844	N/A	0.24	0.36	0.12	N/A	0.12	0.12	0.47	14.34
1992	834	0.36	N/A	0.48	N/A	N/A	0.72	N/A	0.96	9.11
1993	2,166	N/A	0.51	0.88	0.14	0.18	0.05	N/A	1.39	8.36
1994	1,450	N/A	0.07	2.69	0.14	0.14	0.28	N/A	2.69	9.66
1995	1,026	0.39	0.1	0.39	0.29	N/A	0.19	N/A	3.8	10.23
1996	1,738	1.09	0.69	1.38	0.46	0	0.23	0	1.55	21.52
1997	1,070	0.65	0.37	0.93	0.65	0.00	0.65	0.19	2.99	14.95

TABLE C-14. Wild Steelhead condition subsampling data from John Dav Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985										
1986										
1987										
1988										
1989										
1990	476	0.42	0.84	0.21	2.1	N/A	1.47	N/A	1.26	14.71
1991	899	0.44	1	0.67	7.45	N/A	N/A	0.33	1.67	7.56
1992	863	0.12	0.58	1.16	3.01	N/A	0.58	0.23	1.74	6.6
1993	2,265	N/A	0.75	1.41	2.65	0.49	0.26	N/A	1.81	10.95
1994	1,605	N/A	0.19	2.87	2.24	N/A	1.43	N/A	2.55	8.66
1995	1,131	2.48	1.33	1.86	15.21	0.18	2.21	0.18	3.45	11.41
1996	1,126	0.89	1.15	1.78	3.46	0	0.27	0	2.49	18.12
1997	1,035	0.40	0.40	2.32	2.22	0.00	0.58	0.10	2.42	9.76

TABLE C-15. Hatchery Steelhead condition subsampling data from John Dav Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	635	1.73	N/A	5.67	N/A	N/A	N/A	N/A	N/A	10.87
1986	1,022	1.86	N/A	3.42	N/A	N/A	N/A	N/A	N/A	21.33
1987	1,603	0.75	N/A	2.87	N/A	N/A	N/A	N/A	N/A	13.79
1988	1,758	1.54	0.85	3.47	1.59	N/A	1.99	N/A	1.37	12.34
1989	1,391	0.93	1.51	5.18	3.67	N/A	2.73	N/A	3.45	13.59
1990	507	0.99	1.18	3.55	1.18	N/A	1.78	N/A	3.16	24.46
1991	1,063	1.03	1.22	1.51	0.38	N/A	0.47	0.09	4.61	25.68
1992	938	0.32	1.71	3.62	0.32	N/A	2.99	N/A	6.08	14.61
1993	2,371	N/A	3.58	5.65	0.89	0.55	1.98	N/A	6.45	36.95
1994	1,812	N/A	1.88	9.93	0.06	0.06	3.92	N/A	15.07	24.17
1995	2,243	4.55	6.55	4.9	7.13	0.13	4.5	0.13	15.07	30.58
1996	2,185	2.24	2.24	4.3	0.64	0.09	0.96	0	9.61	41.05
1997	2,049	1.17	2.54	2.83	0.54	0.05	0.68	0.00	7.22	18.94

TABLE C-16. Sockeye condition subsampling data from John Dav Dam, 1985 - 1997.
Expressed as a percent of total sample.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	553	0.18	N/A	0.18	N/A	N/A	N/A	N/A	N/A	9.4
1986	588	1.02	N/A	2.55	N/A	N/A	N/A	N/A	N/A	17.18
1987	740	0.41	N/A	0.81	N/A	N/A	N/A	N/A	N/A	17.3
1988	1,004	0.2	0.4	0.1	N/A	N/A	0.4	N/A	N/A	6.08
1989	1,013	0.59	0.59	0.39	N/A	N/A	0.39	0.2	N/A	10.37
1990	361	N/A	0.28	N/A	N/A	N/A	0.83	N/A	N/A	10.25
1991	549	1.46	0.91	0.18	N/A	N/A	0.18	0.18	0.55	9.47
1992	291	1.03	0.34	0.69	N/A	N/A	N/A	N/A	N/A	12.71
1993	1,765	N/A	1.42	2.1	0.06	N/A	0.45	N/A	0.17	14.84
1994	1,656	N/A	0.48	2.05	N/A	0.06	0.18	N/A	0.54	16
1995	1,103	0.91	1.9	1.18	N/A	N/A	0.27	0.27	1	16.41
1996	399	0	1.25	0.25	0.25	0	0.25	0	0.5	20.3
1997	219	0.40	0.40	2.32	1.19	0.00	0.27	0.73	1.59	17.30

Table C-17. Pit Tag recaptures from John Day Dam, 1993 - 1997.

(Sample units indicated)

Species	Run	Rearing Type	1993 (3B & 3C)	1994 (3B)	1995 (3B)	1996 (3B & 3C)	1997 (3B)	
Chinook	Spring	Hatchery	199	205	267	677	66	
		Wild	23	10	101	37	8	
	Summer	Hatchery	24	16	52	145	57	
		Wild	4		20	40	4	
		Unknown				1		
	Fall	Hatchery	4	3	52	187	38	
		Wild	9	4	13	10	2	
	Unknown	Hatchery	44	19	915	795	9	
		Wild	17	4	253	182	1	
		Unknown	15	14	28	215	5	
	Chinook Total			339	275	1701	2289	190
	Steelhead	Spring	Hatchery				5	
Summer		Hatchery	195	210	1068	1321	663	
		Wild	62	26	115	141	61	
		Unknown				1		
Steelhead Total			257	236	1183	1468	724	
Coho	Fall	Hatchery				5	9	
	Spring	Hatchery					3	
Coho Total						5	12	
Sockeye	Spring	Hatchery	17		3			
	Summer	Hatchery				8		
		Wild		5	1			
	Unknown	Hatchery				12	1	
		Wild	19		9	2	1	
Sockeye Total			36	5	13	22	2	
TOTALS (all species combined)			632	516	2897	3784	928	

Table C-18. Brand recaptures at John Day Dam, 1985 - 1997.

Year	Yearling Chinook	Subyearling Chinook	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye	Total
1985	1,960	80	@	2,113	3	334	4,490
1986	6,084	1,927	@	4,324	2	304	12,641
1987	1,890	1,024	@	1,608	4	107	4,633
1988	2,262	1,797	@	895	3	80	5,037
1989	2,207	1,585	@	2,150	1	36	5,979
1990	732	337	@	599	1	9	1,678
1991	576	773	@	1,134		85	2,568
1992*	1,420	945		66	546		2,977
1993*	1,069	1,920		24	1,463	39	4,515
1994	265	830			416		1,511
1995	560	317			183		1,060
1996	255	130			75	2	462
1997					16		16

@ Brands not differentiated between wild and hatchery steelhead in these years.

* Samples from gatewells 3B and 3C combined.

Table C-19. Adult salmonid fallbacks in gatewell 3B at John Day Dam, 1985 - 1997.

Year	Chinook		Steelhead		Coho	Sockeye	Total	
	Adults	Jacks	Wild	Hatchery				
1985	28	85	?	50	1	12	176	
1986	78	80	?	134	3	4	299	
1987	25	4	?	58		1	88	
1988	7	2	?	47	2		58	
1989	18	7	?	80	1	22	128	
1990	14	6	?	35		3	58	
1991	10		?	34		6	50	
1992	12		?	42	1	4	59	
1993	12	2	?	145	1	8	168	
1994	5	10	?	52	2	5	74	
1995	11	12		40	71	1	2	137
1996	15	9		21	63		7	115
1997*							0	
TOTAL	235	217		61	811	12	74	1410

? Fallbacks were not consistently differentiated as wild or hatchery prior to 1995.

* An adult excluder was installed on the sample tank in 1997.

Table C-20. Collection numbers for the most numerous incidental species sampled from unit 3B at John Day Dam, 1985 - 1997.

Year	American Shad		Pacific Lamprey		Crappie	Sculpin	Mountain	Sucker	Walleye	S-Mouth	Blue-gill ¹	Squawfish	Peamouth	Chisel-
	Juvenile	Adult	Juvenile	Adult	Species	Species	Whitefish	Species		Bass				mouth
1985 ²	90,904	233	35	15	6,174	675	236	571	161	789	18	89	24	195
1986	49,916	516	890	24	279	201	675	501	308	191	35	250	42	137
1987	18,606	176	229	58	1,016	581	499	372	677	283	22	63	27	86
1988	39,474	312	629	52	293	481	236	178	70	163	16	37	65	27
1989	61,832	451	1,928	7	87	113	269	222	101	74	14	53	108	40
1990 ³	330,177	213	923	4	96	48	253	92	24	60	1,054	17	25	25
1991	168,602	179	9,337	44	99	59	383	162	12	79	159	646	14	16
1992	203,782	175	178	6	38	4,827	444	64	813	119	44	9	32	14
1993	180,088	615	4,348	7	58	256	582	295	133	93	237	56	26	11
1994	111,418	460	3,250	28	28	479	353	234	167	68	8	16	104	25
1995 ⁴	202,375	772	1,143	36	81	29	294	142	84	115	102	41	200	34
1996	56,245	657	481	10	8	23	303	137	28	38	27	18	28	14
1997	108,961	50	486	3	20	11	79	291	4	16	18	3	6	8

¹ Bluegill and Pumpkinseed are not differentiated.

² Unit 3 was out of service from April 2-26 for STS installations and testing in 1985.

³ Sampling was done in gatewell 5B during the 1990 season, and an electrical fire shut down the unit from 29 May to 10 June.

⁴ Starting in 1995, subsampling was implemented and collection estimates were calculated. Prior to 1995, all sampling was at 100%.

Table C-21. Summary of airlift sampling at John Day Dam, 1985-1997.

Year	Sampling Dates	Sub-Effort	Sub-Sampling	Sample Rate	Yearling Chinook					Subyearling Chinook					Coho				
					Collection		Index			Collection		Index			Collection		Index		
					Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily
1997	4/8-9/8	24/day	YES	.25-1	4,586	7,646	7,646	148,993	154,026	20,487	24,290	24,333	422,730	448,328	3,409	6,556	6,615	143,291	147,267
1996	4/8-9/9	24/day	YES	.25-1	14,560	38,995	38,975	737,815	738,311	31,157	46,238	46,232	747,428	737,841	8,551	27,021	27,043	511,251	504,863
1995	4/6-9/29	24/day	YES	.25-1	34,308	90,704	90,348	1,344,193	1,329,229	48,896	89,790	90,350	1,237,324	1,240,260	5,908	22,341	22,135	343,606	335,902
1994	4/5-9/30	24/day	NO	1	34,071	34,199	34,199	455,553	446,854	75,164	121,272	121,272	1,150,694	1,207,368	11,385	11,413	11,413	159,173	151,135
1993 (3b)	4/6-10/29	24/day	NO	1	41,767	41,767	41,767	715,853	720,361	66,561	66,561	66,561	671,625	717,434	9,727	9,727	9,727	170,849	173,193
1993(3c)**	4/6-10/29	24/day	NO	1	11,054	11,054	11,054	NA	NA	50,243	50,243	50,243	NA	NA	3,437	3,437	3,437	NA	NA
1992 (3b)	3/25-10/13	24/day	NO	1	19,179	NA	19,179	-	237,172	32,376	NA	32,376	-	294,861	3,917	NA	3,917	-	48,898
1992(3c)	3/25-10/13	24/day	NO	1	23,052	NA	23,052	NA	NA	27,407	NA	27,407	NA	NA	5,887	NA	5,887	NA	NA
1991	4/7-10/31	24/day	NO	1	26,878	NA	26,878	NA	374,387	46,785	NA	46,785	NA	568,206	5,106	NA	5,106	NA	72,725
1990	3/27-10/31	24/day	NO	1	26,992	NA	26,992	NA	361,968	39,602	NA	39,602	NA	513,669	6,261	NA	6,261	NA	84,342
1989	3/28-10/31	24/day	NO	1	34,930	NA	34,930	NA	502,642	129,870	NA	129,870	NA	1,017,342	6,930	NA	6,930	NA	99,811
1988	3/30-10/31	24/day	NO	1	34,045	NA	34,045	NA	408,675	109,448	NA	109,448	NA	363,101	8,650	NA	8,650	NA	109,325
1987	4/1-11/30	24/day	NO	1	84,455	NA	84,455	NA	1,020,768	95,505	NA	95,505	NA	760,605	13,200	NA	13,200	NA	170,353
1986	3/28-10/30	24/day	NO	1	92,591	NA	92,951	NA	-	182,117	NA	182,117	NA	-	1,994	NA	1,994	NA	-
1985	4/27-10/29	24/day	NO	1	63,578	NA	63,578	NA	-	226,577	NA	226,577	NA	-	600	NA	600	NA	-

Year	Sampling Dates	Sub-Effort	Sub-Sampling	Sample Rate	Wild Steelhead					Hatchery Steelhead					Sockeye				
					Collection		Index			Collection		Index			Collection		Index		
					Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily
1997		24/day	YES	.25-1	4,011	7,328	7,337	145,192	151,061	13,645	28,504	28,547	598,959	614,087	738	1,171	1,184	25,441	26,519
1996	4/8-9/9	24/day	YES	.25-1	3,973	11,875	11,903	229,600	228,911	11,171	36,202	36,174	705,551	701,899	1,147	3,367	3,373	64,122	64,584
1995	4/6-9/29	24/day	YES	.25-1	4,043	11,799	11,584	176,102	170,993	18,915	61,865	61,385	930,405	919,021	5,625	18,982	19,526	287,626	293,065
1994	4/5-9/30	24/day	NO	1	7,604	7,604	7,604	99,845	96,800	14,454	14,457	14,457	196,281	189,420	7,260	7,270	7,270	101,105	96,621
1993 (3b)	4/6-10/29	24/day	NO	1	11,374	11,374	11,374	186,696	189,400	45,520	45,520	45,520	879,844	882,474	14,072	14,072	14,072	267,763	272,869
1993(3c)**	4/6-10/29	24/day	NO	1	4,668	4,668	4,668	NA	NA	7,416	7,416	7,416	NA	NA	813	813	813	NA	NA
1992 (3b)	3/25-10/13	24/day	NO	1	2,371	NA	2,371	-	28,712	5,053	NA	5,053	-	63,494	961	NA	961	-	12,051
1992(3c)	3/25-10/13	24/day	NO	1	2,770	NA	2,770	NA	NA	6,917	NA	6,917	NA	NA	1,647	NA	1,647	NA	NA
1991	4/7-10/31	24/day	NO	1	5,456	NA	5,456	NA	75,687	11,166	NA	11,166	NA	158,305	3,450	NA	3,450	NA	52,203
1990	3/27-10/31	24/day	NO	1	5,028	NA	5,028	NA	68,428	4,921	NA	4,921	NA	6,349	1,755	NA	1,755	NA	23,592
1989	3/28-10/31	24/day	NO	1	*	NA	*	NA	NA	19,818	NA	19,818	NA	281,685	5,496	NA	5,496	NA	78,190
1988	3/30-10/31	24/day	NO	1	*	NA	*	NA	NA	14,985	NA	14,985	NA	179,089	6,333	NA	6,333	NA	80,406
1987	4/1-11/30	24/day	NO	1	*	NA	*	NA	NA	23,988	NA	23,988	NA	300,410	11,911	NA	11,911	NA	145,232
1986	3/28-10/30	24/day	NO	1	*	NA	*	NA	NA	37,822	NA	37,822	NA	-	17,505	NA	17,505	NA	-
1985	4/27-10/29	24/day	NO	1	*	NA	*	NA	NA	36,616	NA	36,616	NA	-	17,235	NA	17,235	NA	-

*Wild and hatchery steelhead were not differentiated prior to 1990.

**3C airlift inoperational 5/13-6/18

APPENDIX D
HISTORICAL DATA
BONNEVILLE DAM

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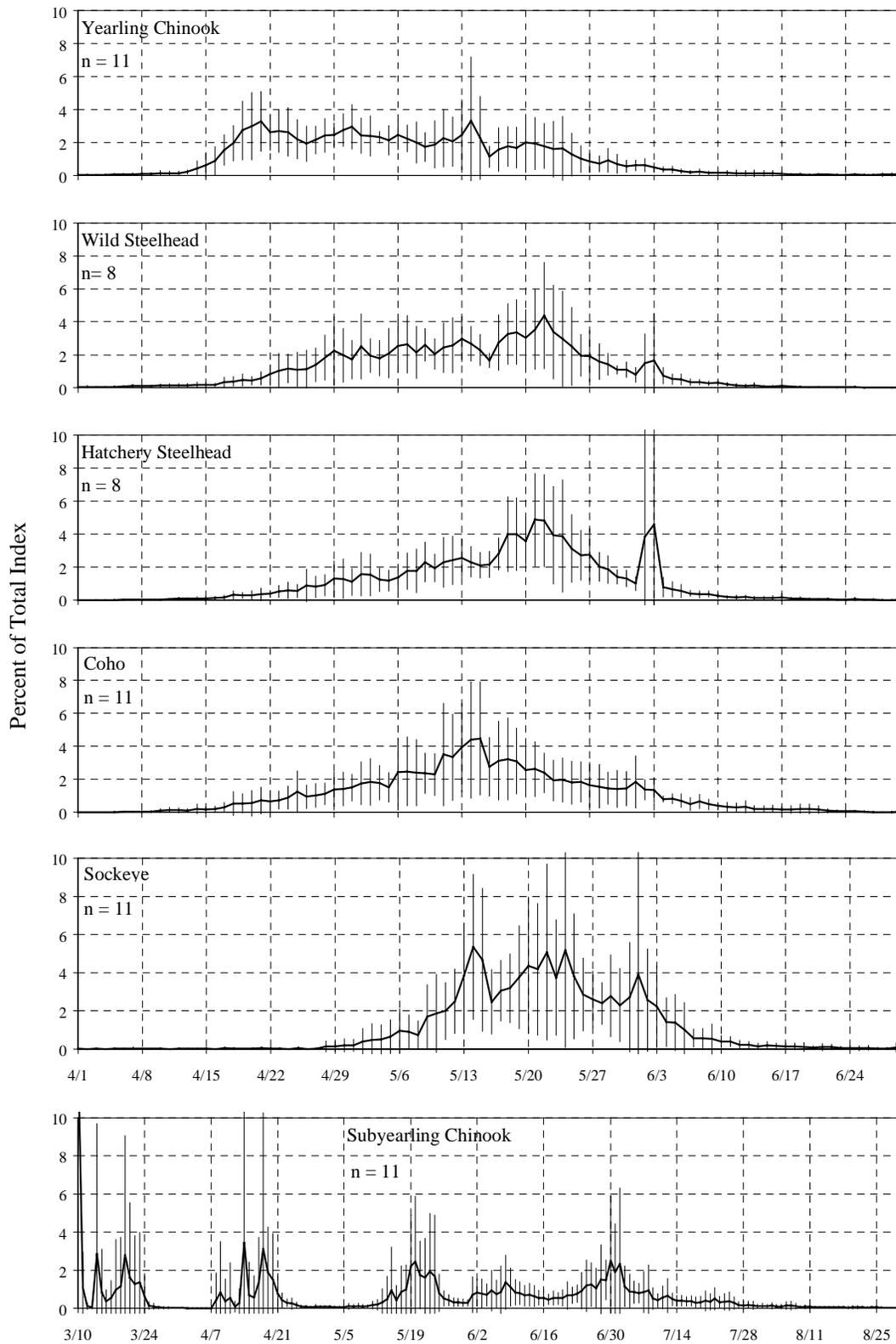


Figure D-1. Historical average passage pattern with standard deviation, Bonneville Dam, 1985 - 1997.

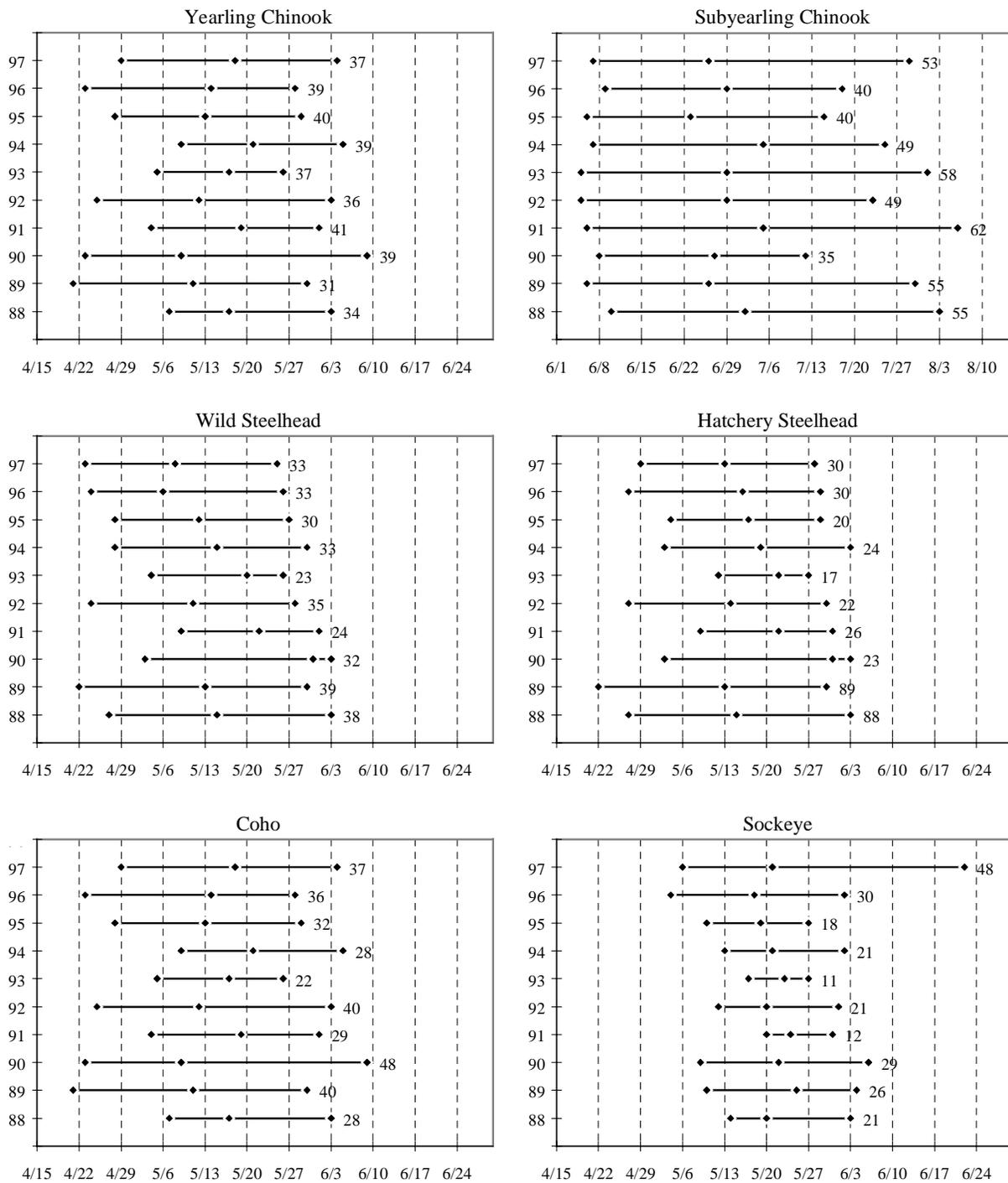


Figure D-2. 10%, 50%, and 90% passage dates for each season at Bonneville Dam, by species, 1988-1996. The duration between 10-90% dates (in days) is indicated for each year. Hatchery and wild steelhead were not differentiated before 1991.

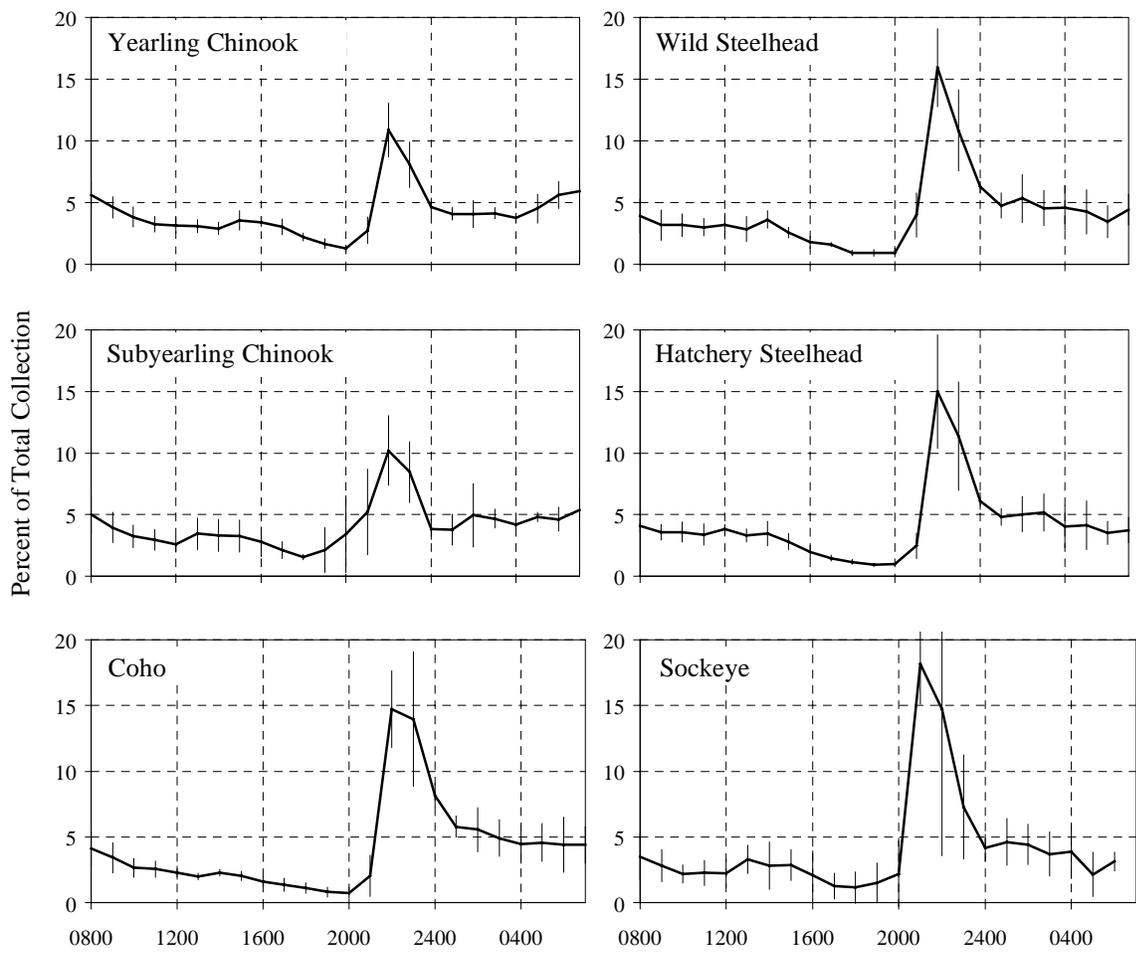


Figure D-3. Historical average diel passage with standard deviation, Bonneville Dam, 1992-1995.

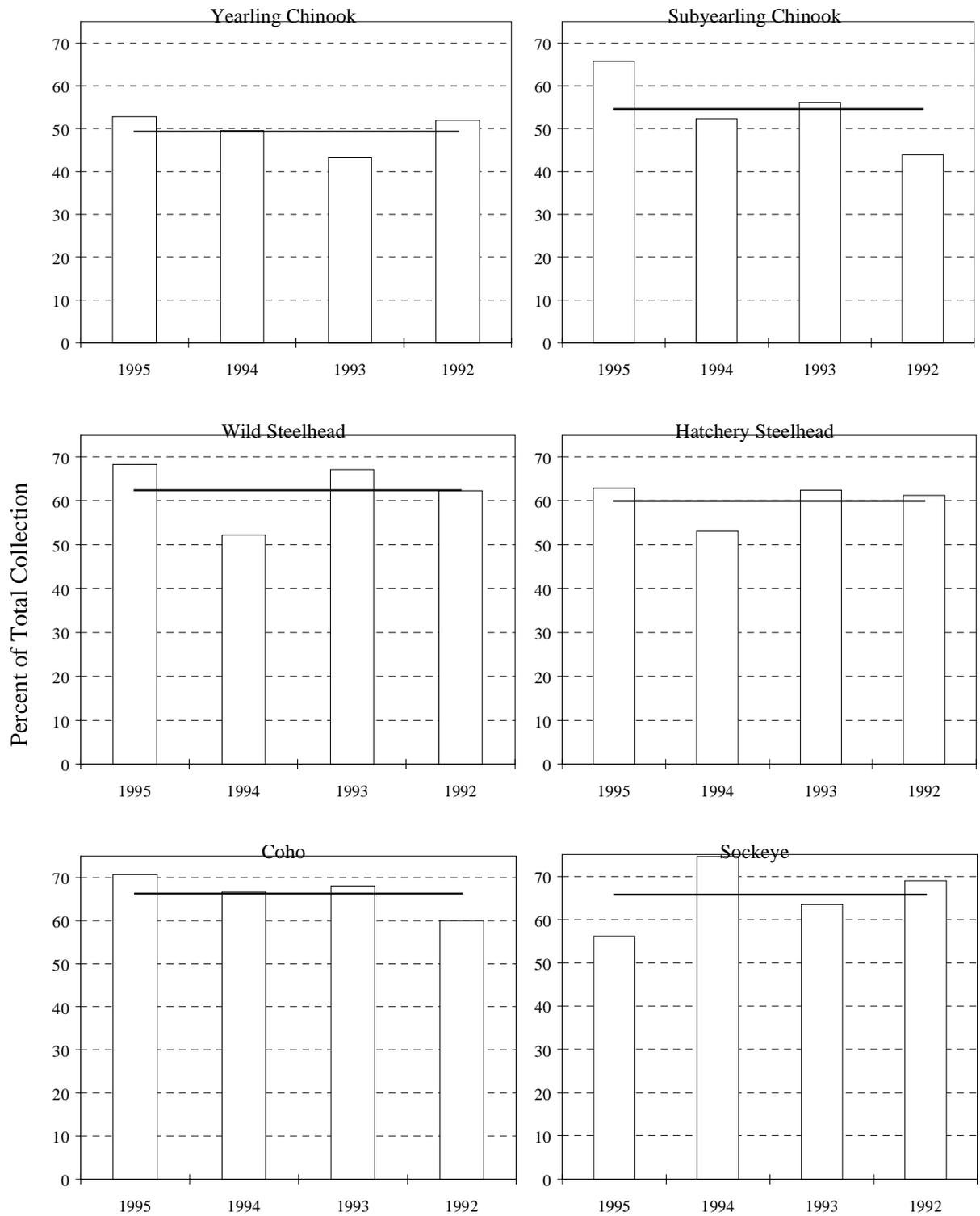


Figure D-4. Percent night passage (2000-0500) for each season of 24 hour monitoring at Bonneville Dam, by species, including the average, 1992-1995.

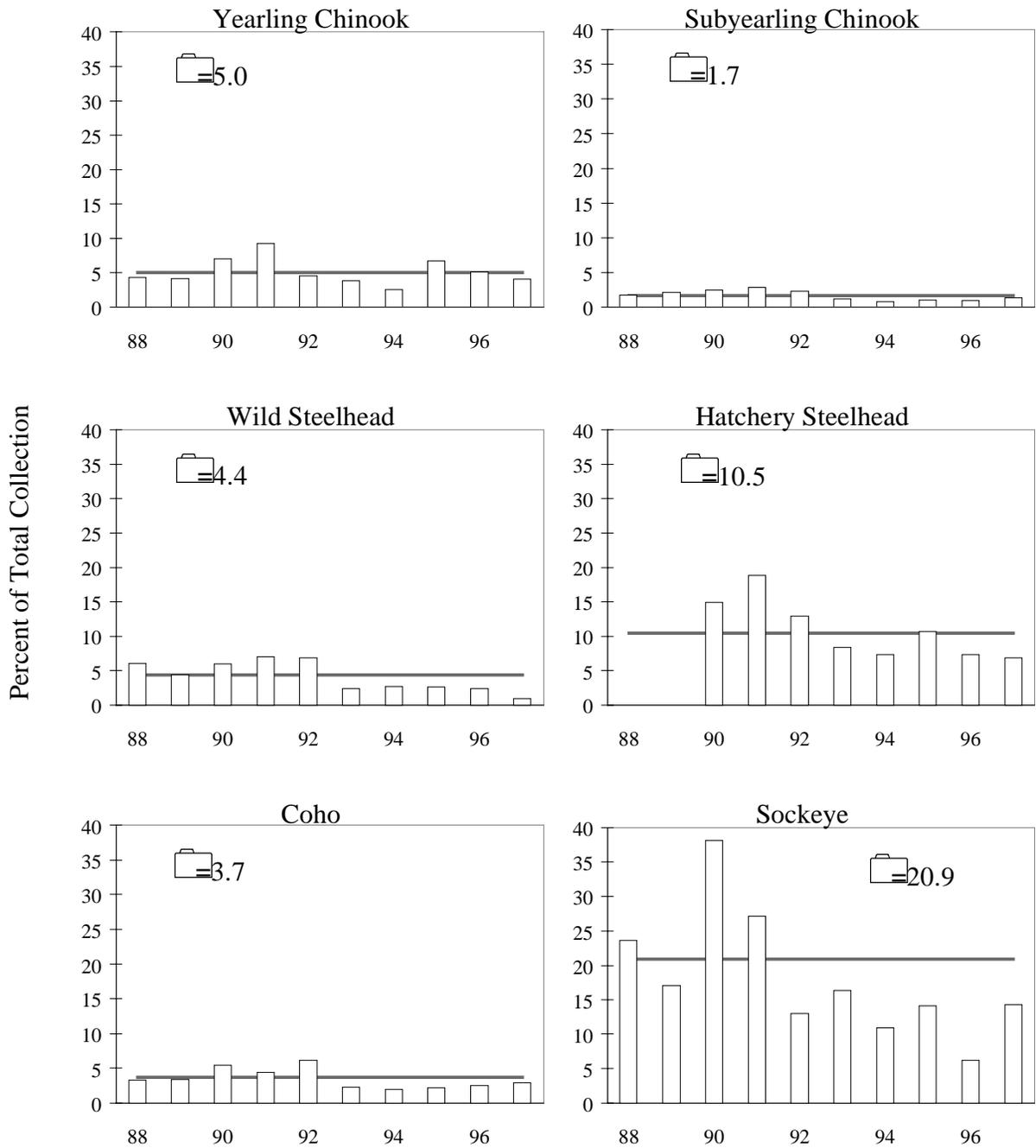


Figure D-5. Historical descaling percentages with the average at Bonneville Dam, PH1, 1988-1997. Hatchery and wild steelhead not differentiated before 1990.

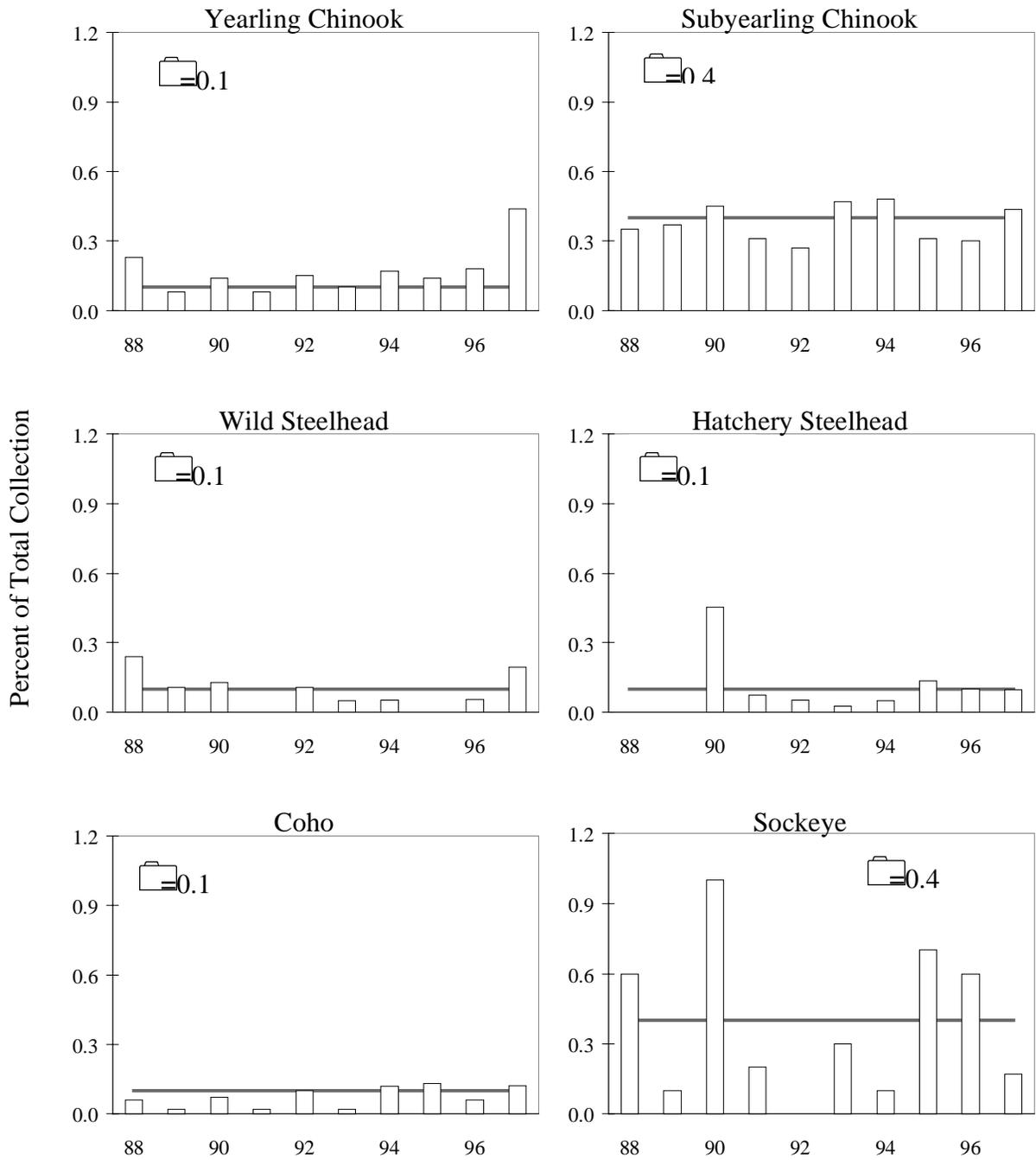


Figure D-6. Historical mortality percentages with the average at Bonneville Dam PH1, 1988-1997. Hatchery and wild steelhead not differentiated before 1990.

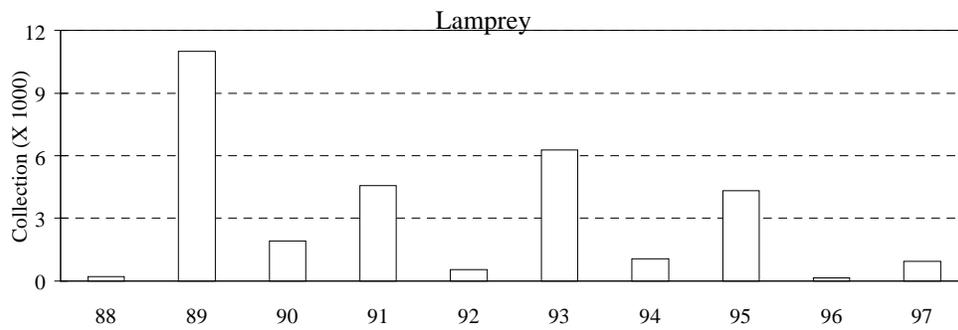
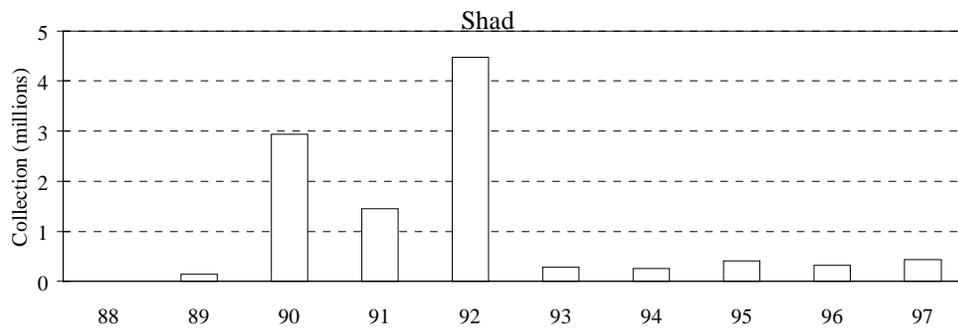


Figure D-7. Historical juvenile shad and lamprey counts at Bonneville Dam, 1988-1997.

Table D-1. 10%, 50%, and 90% passage dates at Bonneville Dam, PH1, based on the "daily" index.

Yearling Chinook					Subyearling Chinook - "Brights" Only				
	10 %	50%	90 %	# of Days		10 %	50%	90 %	# of Days
1997	20-Apr	4-May	26-May	37	1997	7-Jun	26-Jun	29-Jul	53
1996	19-Apr	02-May	27-May	39	1996	9-Jun	29-Jun	18-Jul	40
1995	17-Apr	09-May	26-May	40	1995	6-Jun	23-Jun	15-Jul	40
1994	20-Apr	03-May	28-May	39	1994	07-Jun	05-Jul	25-Jul	49
1993	22-Apr	18-May	28-May	37	1993	05-Jun	29-Jun	01-Aug	58
1992	18-Apr	25-Apr	23-May	36	1992	05-Jun	29-Jun	23-Jul	49
1991	22-Apr	15-May	01-Jun	41	1991	06-Jun	05-Jul	06-Aug	62
1990	17-Apr	03-May	25-May	39	1990	08-Jun	27-Jun	12-Jul	35
1989	21-Apr	06-May	21-May	31	1989	06-Jun	26-Jun	30-Jul	55
1988	19-Apr	02-May	22-May	34	1988	10-Jun	02-Jul	03-Aug	55
1987**	20-Apr	08-May	15-May	**	1987**	03-Jun	30-Jun	02-Jul	**
1986**	12-May	22-May	30-May	**	1986**	02-Jun	06-Jul	29-Oct	**
MEDIAN	19-Apr	03-May	26-May	38	MEDIAN	06-Jun	29-Jun	25-Jul	50
MIN	17-Apr	25-Apr	21-May	35	MIN	05-Jun	23-Jun	12-Jul	38
MAX	22-Apr	18-May	01-Jun	41	MAX	10-Jun	05-Jul	06-Aug	58
N =	10				N =	10			

Wild Steelhead					Hatchery Steelhead				
	10 %	50%	90 %	# of Days		10 %	50%	90 %	# of Days
1997	23-Apr	8-May	25-May	33	1997	29-Apr	13-May	28-May	30
1996	24-Apr	6-May	26-May	33	1996	27-Apr	16-May	29-May	33
1995	28-Apr	12-May	27-May	30	1995	04-May	17-May	29-May	26
1994	28-Apr	15-May	30-May	33	1994	03-May	19-May	03-Jun	32
1993	04-May	20-May	26-May	23	1993	12-May	22-May	27-May	16
1992	24-Apr	11-May	28-May	35	1992	27-Apr	14-May	30-May	34
1991	09-May	22-May	01-Jun	24	1991	09-May	22-May	31-May	23
1990*	03-May	31-May	03-Jun	32	1990*				
1989*	22-Apr	13-May	30-May	39	1989*				
1988*	27-Apr	15-May	03-Jun	38	1988*				
1987**	01-May	12-May	01-Jun	**	1987**				**
1986**	19-May	27-May	02-Jun	**	1986**				**
MEDIAN	28-Apr	17-May	30-May	33	MEDIAN	03-May	18-May	29-May	27
MIN	24-Apr	11-May	26-May	33	MIN	27-Apr	14-May	27-May	31
MAX	09-May	22-May	01-Jun	24	MAX	12-May	22-May	03-Jun	23
N =	7				N =	7			

Coho					Sockeye (Wild + Hatchery)				
	10 %	50%	90 %	# of Days		10 %	50%	90 %	# of Days
1997	29-Apr	18-May	4-Jun	37	1997	6-May	21-May	22-Jun	48
1996	23-Apr	14-May	28-May	36	1996	4-May	18-May	2-Jun	30
1995	28-Apr	13-May	29-May	32	1995	10-May	19-May	27-May	18
1994	09-May	21-May	05-Jun	28	1994	13-May	21-May	2-Jun	21
1993	05-May	17-May	26-May	22	1993	17-May	23-May	27-May	11
1992	25-Apr	12-May	03-Jun	40	1992	12-May	20-May	1-Jun	21
1991	04-May	19-May	01-Jun	29	1991	20-May	24-May	31-May	12
1990	23-Apr	09-May	09-Jun	48	1990	9-May	22-May	6-Jun	29
1989	21-Apr	11-May	30-May	40	1989	10-May	25-May	4-Jun	26
1988	07-May	17-May	03-Jun	28	1988	14-May	20-May	3-Jun	21
1987**	06-May	12-May	01-Jun	**	1987**	13-May	01-Jun	05-Jun	**
1986**	21-May	28-May	04-Jun	**	1986**	19-May	28-May	02-Jun	**
MEDIAN	28-Apr	14-May	01-Jun	35	MEDIAN	12-May	21-May	02-Jun	22
MIN	21-Apr	09-May	26-May	36	MIN	04-May	19-May	27-May	24
MAX	09-May	21-May	09-Jun	32	MAX	20-May	25-May	06-Jun	18
N =	10				N =	10			

* Years in which no differentiation was made between wild and hatchery steelhead for index purposes.

** 1986 and 1987 data not included; the PH1 sampler was operating for testing only.

Table D-2. Percent night passage (1800-0600) at Bonneville Dam, PH1, 1992-1995.

YEAR	Yearling Chinook	Subyearling Chinook	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye	All Species Combined
1992	58.8	49.1	66.0	65.7	65.3	69.7	53.4
1993	46.9	68.6	68.9	64.3	70.4	67.3	62.9
1994	58.2	52.6	54.9	58.2	70.4	75.6	56.3
1995	58.6	71.4	72.5	66.8	74.6	60.2	68.1
AVG	54.7	58.3	63.5	63.6	70.8	67.9	59.8
MIN	46.9	49.1	54.9	58.2	65.3	60.2	53.4
MAX	58.8	71.4	72.5	66.8	74.6	75.6	68.1

Table D-3. Percent of total passage per hour at Bonneville Dam for **yearling chinook**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	5.1	5.4	4.1	3.6	3.2	2.9	2.6	2.8	3.1	2.5	1.9	1.4	1.5	3.9	11.8	10.5	4.9	4.2	3.8	4.3	3.6	3.6	5.2	3.8
1993	6.7	5.0	4.8	4.0	4.0	3.4	2.9	4.3	3.8	3.9	2.6	2.2	1.4	1.5	7.9	6.8	3.5	3.5	3.1	3.5	3.4	3.8	6.2	7.7
1994	6.2	4.5	3.2	2.7	2.5	2.4	2.4	2.9	3.2	2.7	2.2	1.6	1.0	2.4	11.0	8.5	4.9	4.1	3.7	4.3	3.8	6.2	6.8	6.9
1995	4.4	3.4	3.1	2.8	2.9	3.6	3.6	4.0	3.4	3.0	2.1	1.4	1.1	3.2	12.9	6.6	5.2	4.7	5.7	4.5	4.3	4.6	4.3	5.1
AVG	5.8	4.5	3.8	3.2	3.1	3.0	2.9	3.6	3.4	3.1	2.3	1.7	1.2	2.5	10.5	7.8	4.5	4.1	4.0	4.1	3.8	4.7	5.8	6.4
MIN	4.4	3.4	3.1	2.7	2.5	2.4	2.4	2.8	3.1	2.5	1.9	1.4	1.0	1.5	7.9	6.6	3.5	3.5	3.1	3.5	3.4	3.6	4.3	3.8
MAX	6.7	5.4	4.8	4.0	4.0	3.6	3.6	4.3	3.8	3.9	2.6	2.2	1.5	3.9	12.9	10.5	5.2	4.7	5.7	4.5	4.3	6.2	6.8	7.7

Table D-4. Percent of total passage per hour at Bonneville Dam for **subyearling chinook**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	6.5	4.6	4.1	4.0	3.3	5.1	4.4	4.2	4.1	3.0	1.8	1.0	0.6	4.3	9.4	7.9	3.1	2.6	3.1	4.5	4.0	4.5	4.0	5.8
1993	4.5	3.2	2.8	2.3	2.1	2.0	1.9	2.1	1.8	1.6	1.6	4.8	7.7	10.2	7.4	6.1	4.5	5.0	3.8	3.9	4.1	5.0	6.0	5.5
1994	5.8	5.1	3.8	3.2	2.9	3.2	4.2	4.5	3.6	2.2	1.6	0.9	2.0	4.0	9.9	7.7	3.2	2.9	4.3	4.5	4.1	4.7	4.4	7.1
1995	3.2	2.7	2.2	2.4	2.1	3.5	2.6	2.2	1.8	1.7	1.3	1.8	3.5	2.4	14.0	11.9	4.6	4.7	8.7	5.7	4.7	5.2	4.1	3.0
AVG	5.2	4.3	3.4	3.0	2.7	3.3	3.5	3.6	3.0	2.1	1.6	1.8	3.1	5.0	10.1	8.1	3.6	3.5	4.7	4.6	4.2	4.8	4.6	6.0
MIN	3.2	2.7	2.2	2.3	2.1	2.0	1.9	2.1	1.8	1.6	1.3	0.9	0.6	2.4	7.4	6.1	3.1	2.6	3.1	3.9	4.0	4.5	4.0	3.0
MAX	6.5	5.1	4.1	4.0	3.3	5.1	4.4	4.5	4.1	3.0	1.8	4.8	7.7	10.2	14.0	11.9	4.6	5.0	8.7	5.7	4.7	5.2	6.0	7.1

Table D-5. Percent of total passage per hour at Bonneville Dam for **wild steelhead**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	3.8	3.7	3.2	3.7	3.9	2.6	3.4	2.2	1.1	1.6	0.7	0.7	0.7	4.1	16.9	15.3	6.3	4.1	4.3	4.4	3.2	2.8	3.0	4.2
1993	4.0	2.3	2.4	2.8	2.8	1.9	2.7	2.4	1.8	1.8	1.2	1.0	0.8	2.8	11.9	8.1	6.3	6.2	6.9	6.4	6.7	6.5	5.4	4.9
1994	5.5	4.7	4.4	3.6	4.1	4.4	4.4	3.3	2.4	1.6	1.0	0.8	0.7	2.6	15.5	11.1	5.5	4.1	3.0	2.8	3.0	2.8	3.0	5.5
1995	2.2	2.0	2.6	2.1	2.0	2.7	4.1	2.7	1.9	1.5	0.8	1.3	1.4	6.5	19.4	8.7	6.8	4.3	7.0	4.5	5.3	4.8	2.4	2.8
AVG	4.4	3.4	3.3	3.1	3.3	3.1	3.7	2.8	2.0	1.7	1.0	0.9	0.9	3.3	14.8	10.0	6.0	4.9	5.1	4.5	4.7	4.5	3.8	4.8
MIN	2.2	2.0	2.4	2.1	2.0	1.9	2.7	2.2	1.1	1.5	0.7	0.7	0.7	2.6	11.9	8.1	5.5	4.1	3.0	2.8	3.0	2.8	2.4	2.8
MAX	5.5	4.7	4.4	3.7	4.1	4.4	4.4	3.3	2.4	1.8	1.2	1.3	1.4	6.5	19.4	15.3	6.8	6.2	7.0	6.4	6.7	6.5	5.4	5.5

Table D-6. Percent of total passage per hour at Bonneville Dam for **hatchery steelhead**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	3.8	3.3	3.2	3.5	4.0	3.3	3.1	2.5	1.3	1.3	1.3	1.1	0.9	3.2	16.5	16.1	6.9	4.3	3.6	3.9	2.7	3.0	3.4	3.6
1993	4.6	3.8	3.3	3.0	4.0	2.6	2.3	2.6	1.9	1.8	1.1	0.9	1.0	1.8	11.0	6.5	5.5	5.7	6.6	7.1	6.4	7.1	4.6	4.6
1994	4.4	4.4	4.7	4.4	3.2	3.5	4.3	3.7	2.6	1.3	1.0	0.9	0.9	1.5	12.1	14.0	6.5	4.4	4.2	4.1	2.8	3.3	3.7	4.3
1995	3.5	2.8	3.1	2.5	4.0	3.9	3.9	2.3	2.0	1.5	1.3	0.8	1.2	3.4	20.8	8.9	5.7	4.8	5.8	5.6	4.1	3.3	2.4	2.4
AVG	4.2	3.7	3.6	3.3	3.8	3.2	3.2	2.8	2.1	1.6	1.1	0.9	1.0	2.2	14.0	9.4	5.8	5.1	5.7	5.9	4.8	5.0	3.8	3.9
MIN	3.5	2.8	3.1	2.5	3.2	2.6	2.3	2.3	1.3	1.3	1.0	0.8	0.9	1.5	11.0	6.5	5.5	4.3	3.6	3.9	2.7	3.0	2.4	2.4
MAX	4.6	4.4	4.7	4.4	4.0	3.9	4.3	3.7	2.6	1.8	1.3	1.1	1.2	3.4	20.8	16.1	6.9	5.7	6.6	7.1	6.4	7.1	4.6	4.6

Table D-7. Percent of total passage per hour at Bonneville Dam for **coho**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	5.5	4.9	3.6	3.4	2.9	2.1	2.2	1.7	1.4	1.4	0.9	0.5	0.4	1.4	14.1	18.5	9.2	4.8	3.5	3.2	2.7	2.7	4.4	4.6
1993	3.5	3.0	2.3	2.1	2.5	1.7	2.2	2.4	2.0	2.0	1.7	1.2	1.1	2.6	11.1	8.1	7.2	6.7	6.4	6.4	6.1	6.1	7.4	4.2
1994	4.6	3.7	2.6	2.1	1.9	2.0	2.1	1.9	1.2	0.8	0.9	0.5	0.4	0.3	15.3	18.1	8.5	5.6	5.1	4.6	4.4	4.7	3.0	5.8
1995	2.7	2.1	2.1	2.5	1.9	2.2	2.6	2.2	1.8	1.4	1.0	1.1	1.1	3.9	18.1	11.2	7.7	6.1	7.4	5.5	4.8	4.8	2.9	2.7
AVG	3.9	3.3	2.5	2.3	2.2	2.0	2.3	2.1	1.6	1.3	1.1	0.8	0.8	1.8	14.5	13.8	8.0	6.0	5.8	5.2	4.8	5.0	4.4	4.6
MIN	2.7	2.1	2.1	2.1	1.9	1.7	2.1	1.7	1.2	0.8	0.9	0.5	0.4	0.3	11.1	8.1	7.2	4.8	3.5	3.2	2.7	2.7	2.9	2.7
MAX	5.5	4.9	3.6	3.4	2.9	2.2	2.6	2.4	2.0	2.0	1.7	1.2	1.1	3.9	18.1	18.5	9.2	6.7	7.4	6.4	6.1	6.1	7.4	5.8

Table D-8. Percent of total passage per hour at Bonneville Dam for **sockeye**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	3.8	5.8	4.5	1.7	2.0	1.8	2.9	1.6	2.6	0.4	0.4	0.1	0.7	0.4	21.0	22.4	11.5	3.7	2.9	2.9	1.8	1.9	0.4	2.9
1993	5.0	2.8	2.9	2.7	2.0	1.8	2.7	2.7	2.2	2.2	1.7	1.6	1.9	2.9	17.0	5.1	4.7	5.4	7.0	6.1	5.5	5.7	4.3	3.9
1994	3.4	3.6	1.9	1.6	1.3	1.3	2.5	1.6	2.1	1.1	0.5	0.3	0.1	0.1	20.2	26.1	9.8	4.5	4.1	3.4	3.0	2.4	1.6	3.6
1995	1.7	1.6	2.1	2.8	3.5	3.9	4.9	5.4	4.7	4.6	2.5	2.7	3.4	5.4	14.4	5.2	3.3	3.1	4.8	5.3	4.7	5.6	2.3	2.2
AVG	3.9	2.8	2.5	2.5	2.1	2.1	3.1	2.9	2.7	2.4	1.6	1.5	1.7	2.7	17.3	10.6	5.8	4.7	5.8	5.2	4.7	4.8	3.2	3.5
MIN	1.7	1.6	1.9	1.6	1.3	1.3	2.5	1.6	2.1	0.4	0.4	0.1	0.1	0.1	14.4	5.1	3.3	3.1	2.9	2.9	1.8	1.9	0.4	2.2
MAX	5.0	5.8	4.5	2.8	3.5	3.9	4.9	5.4	4.7	4.6	2.5	2.7	3.4	5.4	21.0	26.1	11.5	5.4	7.0	6.1	5.5	5.7	4.3	3.9

Table D-9. Percent of total passage per hour at Bonneville Dam for **all species combined**, 1992-1995.

	0800	0900	1000	1100	NOON	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	MID	0100	0200	0300	0400	0500	0600	0700
1992	6.0	4.8	4.0	3.8	3.2	4.2	3.7	3.6	3.5	2.7	1.7	1.0	0.8	3.9	10.6	9.8	4.3	3.2	3.3	4.3	3.7	4.1	4.3	5.2
1993	4.9	3.6	3.3	2.8	2.8	2.3	2.3	2.8	2.4	2.3	1.8	3.0	4.1	5.6	9.1	6.6	4.8	5.0	4.5	4.6	4.6	5.1	6.1	5.7
1994	5.7	4.8	3.6	3.0	2.7	2.9	3.7	3.8	3.2	2.1	1.6	0.9	1.5	3.2	11.1	9.7	4.3	3.5	4.3	4.5	4.0	4.8	4.5	6.8
1995	3.3	2.7	2.5	2.5	2.4	3.3	3.0	2.8	2.3	2.1	1.5	1.6	2.4	3.0	14.8	10.0	5.3	4.9	7.4	5.3	4.6	4.9	3.8	3.4
AVG	5.1	4.1	3.3	2.9	2.7	3.0	3.2	3.3	2.9	2.2	1.6	1.6	2.3	3.8	11.2	9.0	4.6	4.1	4.8	4.7	4.2	4.8	4.7	5.7
MIN	3.3	2.7	2.5	2.5	2.4	2.3	2.3	2.8	2.3	2.1	1.5	0.9	0.8	3.0	9.1	6.6	4.3	3.2	3.3	4.3	3.7	4.1	3.8	3.4
MAX	6.0	4.8	4.0	3.8	3.2	4.2	3.7	3.8	3.5	2.7	1.8	3.0	4.1	5.6	14.8	10.0	5.3	5.0	7.4	5.3	4.6	5.1	6.1	6.8

Table D-10. Descaling and mortality data from Bonneville Dam, PH1, 1988 - 1997.

YEARLING CHINOOK						SUBYEARLING CHINOOK				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1988	28,958	1,265	4.4	67	0.2	96,415	1,659	1.7	337	0.4
1989	27,934	1,164	4.2	22	0.1	98,571	2,119	2.2	361	0.4
1990	23,821	1,675	7.0	34	0.1	80,446	1,956	2.4	358	0.5
1991	29,409	2,741	9.3	24	0.1	83,240	2,383	2.9	257	0.3
1992	42,523	1,952	4.6	62	0.2	112,037	2,517	2.3	301	0.3
1993	52,623	2,050	3.9	51	0.1	130,615	1,557	1.2	611	0.5
1994	34,361	896	2.6	58	0.2	125,967	999	0.8	600	0.5
1995	19,557	1,310	6.7	27	0.1	60,356	651	1.1	189	0.3
1996	7,246	370	5.1	13	0.2	27,113	254	0.9	82	0.3
1997	5,938	239	4.0	26	0.4	44,024	595	1.4	192	0.4
TOTAL	272,370	13,662	5.0	384	0.1	858,784	14,690	1.7	3,288	0.4

WILD STEELHEAD						HATCHERY STEELHEAD				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1988	7,478	452	6.1	18	0.2					
1989	12,240	536	4.4	13	0.1					
1990	3,894	232	6.0	5	0.1	5,521	818	14.9	25	0.5
1991	2,772	194	7.0	0	0.0	5,502	1,036	18.8	4	0.1
1992	2,837	194	6.8	3	0.1	3,767	487	12.9	2	0.1
1993	4,025	96	2.4	2	0.0	7,456	622	8.3	2	0.0
1994	3,730	102	2.7	2	0.1	3,981	290	7.3	2	0.1
1995	1,240	32	2.6	0	0.0	3,737	397	10.6	5	0.1
1996	1,821	44	2.4	1	0.1	5,075	369	7.3	5	0.1
1997	3,615	35	1.0	7	0.2	9,285	635	6.8	9	0.1
TOTAL	43,652	1,917	4.4	51	0.1	44,324	4,654	10.5	54	0.1

COHO						SOCKEYE				
DATE	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1988	40,776	1,340	3.3	24	0.1	4,588	1,077	23.6	28	0.6
1989	29,747	998	3.4	5	0.0	7,723	1,319	17.1	11	0.1
1990	43,032	2,325	5.4	30	0.1	4,537	1,710	38.1	45	1.0
1991	23,842	1,059	4.4	5	0.0	4,462	1,205	27.1	9	0.2
1992	23,971	1,485	6.2	24	0.1	638	83	13.0	0	0.0
1993	28,243	649	2.3	6	0.0	4,939	803	16.3	15	0.3
1994	22,378	430	1.9	27	0.1	2,965	322	10.9	2	0.1
1995	11,868	258	2.2	16	0.1	2,184	305	14.1	15	0.7
1996	12,689	320	2.5	8	0.1	694	43	6.2	4	0.6
1997	12,346	363	2.9	15	0.1	589	84	14.3	1	0.2
TOTAL	248,892	9,227	3.7	160	0.1	33,319	6,951	20.9	130	0.4

* Wild and hatchery steelhead numbers are combined for 1988-89.

TABLE D-11. Descaling and mortality data from Bonneville Dam, PH-2, 1988 - 1997.

YEARLING CHINOOK						SUBYEARLING CHINOOK				
YEAR	SAMPLED	DESC	%DESC	MORT	%MORT	SAMPLED	DESC	%DESC	MORT	%MORT
1988	7,076	361	5.2	147	2.1	9,711	185	2.0	390	4.0
1989	15,579	671	4.4	478	3.1	12,144	74	0.6	176	1.5
1990	5,267	278	5.3	36	0.7	2,669	8	0.3	10	0.4
1991	17,943	1,780	10.0	143	0.8	7,846	140	1.8	39	0.5
1992	358	36	10.2	5	1.4	1,452	42	2.9	6	0.4
1993	5,468	393	7.2	36	0.7	5,545	65	1.2	36	0.7
1994	4,172	208	5.1	54	1.3	5,703	80	1.4	138	2.4
1995	2,709	180	6.7	16	0.6	4,696	108	2.3	31	0.7
1996	3,059	304	10.0	16	0.5	8,662	176	2.0	29	0.3
1997	1,311	72	5.5	2	0.2	7,415	138	1.9	52	0.7
TOTAL	62,942	4,283	6.9	933	1.5	65,843	1,016	1.6	907	1.4

WILD STEELHEAD						HATCHERY STEELHEAD				
YEAR	SAMPLED	DESC	%DESC	MORT	%MORT	SAMPLED	DESC	%DESC	MORT	%MORT
1988	762	43	5.7	12	1.6					
1989	2,049	84	4.2	31	1.5					
1990	206	5	2.5	4	1.9	176	25	15.6	16	9.1
1991	921	88	9.6	6	0.7	1,614	321	20.1	17	1.1
1992	3	0	0.0	0	0.0	4	0	0.0	0	0.0
1993	255	16	6.3	0	0.0	462	79	17.1	1	0.2
1994	279	31	11.2	1	0.4	218	5	2.3	2	0.9
1995	65	4	6.3	1	1.5	184	35	19.1	1	0.5
1996	182	1	0.6	1	0.5	531	48	9.1	1	0.2
1997	461	14	3.0	0	0.0	1,596	134	8.4	3	0.2
TOTAL	5,183	286	5.6	56	1.1	4,785	647	13.6	41	0.9

COHO						SOCKEY				
YEAR	SAMPLED	DESC	%DESC	MORT	%MORT	SAMPLED	DESC	%DESC	MORT	%MORT
1988	5,556	195	3.6	61	1.1	237	33	16.4	36	15.2
1989	9,192	282	3.1	207	2.3	2,247	343	19.1	451	20.1
1990	5,498	204	3.7	16	0.3	137	25	18.5	2	1.5
1991	7,284	448	6.2	33	0.5	2,575	761	30.3	61	2.4
1992	119	9	7.6	1	0.8	1	1	100	0	0.0
1993	3,621	162	4.5	7	0.2	623	126	20.4	4	0.6
1994	2,678	69	2.6	18	0.7	400	75	18.9	4	1.0
1995	1,075	29	2.7	5	0.5	348	61	18	9	2.6
1996	4,296	113	2.6	18	0.4	196	33	17.2	4	2.0
1997	2,169	54	2.5	6	0.3	520	118	23.0	6	1.2
TOTAL	41,488	1,565	3.8	372	0.9	7,284	1,576	23.5	577	7.9

* Wild and hatchery steelhead numbers are combined for 1988-89.

TABLE D-12. Yearling Chinook condition subsampling data from Bonneville Dam, PH1, 1988 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988	1856	0.27	0.05	0.59	0.05	N/A	0.11	0.00	0.16	4.20
1989	2327	0.39	0.39	1.12	0.21	N/A	0.34	0.17	0.43	8.04
1990	3111	0.10	0.13	0.84	0.13	N/A	0.51	0.23	0.58	9.64
1991	2158	0.42	0.32	0.65	0.00	N/A	0.23	0.23	0.42	5.38
1992	2190	0.41	0.23	0.73	0.27	N/A	0.37	0.87	0.50	6.39
1993	2934	0.00	0.65	3.03	0.55	N/A	0.85	0.00	0.55	14.25
1994	4018	0.00	0.37	1.84	0.20	N/A	0.77	0.00	1.14	9.98
1995	2648	1.44	1.36	4.80	0.98	N/A	0.87	1.13	0.98	14.31
1996	2305	0.52	0.56	1.52	0.22	0.00	0.48	0.43	1.13	12.75
1997	1591	0.19	0.44	1.19	0.06	0.00	0.31	0.13	0.94	9.99

TABLE D-13. Subyearling Chinook condition subsampling data from Bonneville Dam, PH1, 1988 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988	3451	0.09	0.03	0.67	0.03	N/A	0.09	0.00	0.12	2.98
1989	8481	0.15	0.09	1.29	0.15	N/A	0.05	0.12	0.04	4.55
1990	6929	0.10	0.14	0.64	0.16	N/A	0.07	0.32	0.27	1.93
1991	4404	0.23	0.11	0.43	0.30	N/A	0.05	0.52	0.09	2.45
1992	4422	0.09	0.25	0.34	0.41	N/A	0.05	0.79	0.47	3.55
1993	8343	0.00	0.36	3.12	0.31	N/A	0.08	0.00	0.11	7.76
1994	7149	0.00	0.29	0.92	0.10	N/A	0.10	0.00	0.08	4.00
1995	5230	0.33	0.44	1.97	0.23	N/A	0.13	0.17	0.13	5.35
1996	4080	0.32	0.47	0.69	0.12	0.00	0.17	0.05	0.22	4.56
1997	4893	0.25	0.49	0.76	0.25	0.02	0.16	0.14	0.16	5.89

TABLE D-14. Coho condition subsampling data from Bonneville Dam, PH1, 1988 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988	2148	0.09	0.05	0.28	0.05	N/A	0.61	0.00	0.05	3.17
1989	2626	0.42	0.23	0.42	0.19	N/A	0.30	0.00	0.19	6.28
1990	3468	0.09	0.09	0.43	0.09	N/A	0.40	0.06	0.46	7.73
1991	1967	0.20	0.20	0.36	0.20	N/A	0.15	0.10	0.31	1.83
1992	1883	0.27	0.37	0.32	0.16	N/A	0.64	0.00	0.32	5.47
1993	2227	0.00	0.45	1.93	0.27	N/A	0.90	0.00	0.31	5.34
1994	2725	0.00	0.22	1.10	0.11	N/A	1.10	0.00	0.33	6.68
1995	2574	0.62	0.35	3.11	0.85	N/A	1.09	0.12	0.47	7.58
1996	2720	0.18	0.18	0.55	0.18	0.11	0.37	0.04	1.03	10.22
1997	2347	0.30	0.09	0.60	0.09	0.00	0.30	0.04	0.55	7.93

TABLE D-15. Wild Steelhead condition subsampling data from Bonneville Dam, PH1, 1990 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988										
1989										
1990	1042	0.38	0.19	1.44	4.03	N/A	1.25	0.00	2.11	10.08
1991	706	0.85	0.71	1.56	8.22	N/A	0.71	0.00	1.56	2.55
1992	590	0.17	0.17	0.68	5.59	N/A	0.34	0.00	2.20	5.59
1993	1250	0.00	0.24	1.60	6.64	N/A	0.72	0.00	5.84	6.56
1994	1429	0.00	0.49	2.59	8.33	N/A	0.49	0.00	2.80	9.24
1995	419	1.67	1.19	2.86	19.33	N/A	0.24	0.00	3.10	9.79
1996	789	0.25	0.63	0.38	8.11	0.00	0.25	0.00	1.52	9.00
1997	1306	0.61	0.77	1.23	4.59	0.00	0.23	0.00	2.07	6.89

TABLE D-16. Hatchery Steelhead condition subsampling data from Bonneville Dam, PH1, 1988 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988	1403	0.78	0.29	0.78	1.50	0.50	0.00	0.00	3.85	7.48
1989	2319	0.43	0.73	1.21	3.32	N/A	1.03	0.04	2.50	10.48
1990	1366	0.88	0.73	1.46	0.15	N/A	3.07	0.00	6.15	21.52
1991	1024	0.29	4.39	0.88	0.20	N/A	0.78	0.20	3.81	9.67
1992	735	0.41	2.99	1.09	0.41	N/A	1.22	0.00	4.76	11.02
1993	1669	0.00	1.86	3.18	2.22	N/A	1.44	0.00	0.00	16.12
1994	1595	0.00	3.13	3.64	0.94	N/A	0.56	0.00	8.40	21.63
1995	1278	1.88	3.36	5.71	2.11	N/A	3.05	0.08	8.29	25.67
1996	1789	0.28	3.47	2.12	0.11	0.00	0.78	0.06	10.01	27.56
1997	1978	0.01	0.03	0.02	0.051	0.15	0.40	0.00	6.7745	25.28

TABLE D-17. Sockeye condition subsampling data from Bonneville Dam, PH1, 1988 - 1997.

YEAR	NO. SMPLD	INJURY			DISEASE				BIRD PRED	3-19% DESC
		HEAD	OPERC.	BODY	PAR.	COL.	FUN.	BKD		
1988	686	0.00	0.00	0.00	0.00	N/A	0.00	0.00	0.00	9.62
1989	1397	0.50	0.50	0.36	0.00	N/A	0.07	0.07	0.07	16.11
1990	1425	1.26	0.77	0.49	0.07	N/A	0.14	0.07	0.14	14.88
1991	621	0.97	2.25	0.81	0.00	N/A	0.32	0.00	0.32	11.27
1992	131	0.76	2.29	0.76	0.00	N/A	0.00	0.00	0.00	17.56
1993	940	0.11	2.34	3.09	0.32	N/A	0.43	0.00	0.21	23.83
1994	1047	0.00	1.91	1.43	0.00	N/A	0.29	0.00	0.19	26.65
1995	829	0.97	2.41	1.09	0.00	N/A	0.72	0.00	0.24	23.88
1996	307	0.00	1.30	1.63	0.33	0.00	0.00	0.00	0.00	13.36
1997	215	1.40	2.79	0.47	0.00	0.00	0.00	0.00	0.00	25.58

Table D-18. Pit Tag recaptures from Bonneville Dam, PH1, 1992 - 1997.

(Sample units indicated)

Species	Run	Rearing Type	1992	1993	1994	1995	1996*	1997^
Chinook	Spring	Hatchery	1	70	48	38	831	2,323
		Wild	1	13	5	13	60	127
		Unknown	4					
	Summer	Hatchery		6	6	9	273	1,199
		Wild		1	2	5	43	75
	Fall	Hatchery		1		20	140	1,608
		Wild		2	3	2	2	117
		Unknown	2					7,127
	Unknown	Hatchery	4	15	7	131	1,057	161
		Wild		6	2	60	180	2
		Unknown	5	9	4	2	223	78
	Chinook Total			17	123	77	280	2,809
Steelhead	Spring	Hatchery					18	
	Summer	Hatchery		16	19	46	1,454	7,242
		Wild		5	4	3	200	423
		Unknown		1			2	8
Steelhead Total			0	22	23	49	1,674	7,673
Coho	Spring	Hatchery						102
	Fall	Hatchery					13	76
	Unknown	Unknown						4,789
Coho Total								4,967
Sockeye	Spring	Hatchery		6				
	Summer	Hatchery					11	5
		Wild					2	1
	Unknown	Hatchery	2		1		23	11
Wild			4	4	1	16	33	
Sockeye Total			2	10	5	1	52	50
TOTALS (all detections combined) =			25	155	105	330	4,548	25,507

* Includes all detections from PH1 and the flat plate detector in PH1.

^ Includes all detections in PH1, PH1 flat plate, and PH2.

Table D-19. Brand recaptures at Bonneville Dam PH-1, 1988 - 1997.

Year	Yearling Chinook	Subyearling Chinook	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye	Total
1988	425	165	@	157	2	55	804
1989	521	364	@	443		16	1,344
1990	286	189	@	218		6	699
1991	258	235	@	204	2	48	747
1992	220	212	18	40			490
1993	349	360	6	57		19	791
1994	55	187		27			269
1995	181	147		77			405
1996*	91	56		63	1		211
1997*				32			32

@ Brands not differentiated between wild and hatchery steelhead in these years.

* Includes data from PH1 and PH2.

Table D-20. Adult salmonid fallbacks captured at PH1, Bonneville Dam, 1988-1997.

Year	Chinook	Steelhead	Coho	Sockeye	Total
1988	1	1			2
1989	4	1	1	1	7
1990	1				1
1991	3	5		7	15
1992	1				1
1993	4				4
1994	2	1			3
1995	1	6			7
1996	1	3		1	5
1997		1		1	2
TOTAL	18	18	1	10	47

Table D-19. Brand recaptures at Bonneville Dam PH-1, 1988 - 1997.

Year	Yearling Chinook	Subyearling Chinook	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye	Total
1988	425	165	@	157	2	55	804
1989	521	364	@	443		16	1,344
1990	286	189	@	218		6	699
1991	258	235	@	204	2	48	747
1992	220	212	18	40			490
1993	349	360	6	57		19	791
1994	55	187		27			269
1995	181	147		77			405
1996*	91	56		63	1		211
1997*				32			32

@ Brands not differentiated between wild and hatchery steelhead in these years.

* Includes data from PH1 and PH2.

Table D-20. Adult salmonid fallbacks captured at PH1, Bonneville Dam, 1988-1997.

Year	Chinook	Steelhead	Coho	Sockeye	Total
1988	1	1			2
1989	4	1	1	1	7
1990	1				1
1991	3	5		7	15
1992	1				1
1993	4				4
1994	2	1			3
1995	1	6			7
1996	1	3		1	5
1997		1		1	2
TOTAL	18	18	1	10	47

Table D-21. Collection numbers for the most numerous incidental species sampled at PH1, Bonneville Dam, 1988 - 1997.

Year	American Shad		Pacific Lamprey		Stickleback	Peamouth	Squawfish	Redside Shiner	S-mouth Bass	Sculpin Species	Mountain Whitefish
	Juvenile	Adult	Juvenile	Adult							
1988	2,361	17	204	37	1,017	754	243	264	228	177	33
1989	435,653	39	34,756	63	2,473	1,413	698	384	5	193	34
1990	2,939,363	0	1,909	0	4,527	224	520	56	88	47	58
1991	1,454,524	8	4,567	4	1,862	849	889	224	31	12	121
1992	4,479,820	46	531	86	6,581	1,053	672	67	162	136	41
1993	288,463	148	6,269	78	6,583	1,603	264	377	251	268	75
1994	252,474	85	1,074	47	78,799	4,669	311	269	122	56	65
1995	414,487	1,130	4,329	213	5,931	2,227	979	677	567	233	665
1996	318,190	104	146	60	88	823	21	259	59	60	73
1997	437,715	1,097	945	48	175	1,175	50	128	805	87	113

Note: All values are based on 8 hour samples except for the years 1992 - 1995, which are based on 24 hour sample numbers.

Table D-22. Sample and collection numbers of chinook and coho fry at Bonneville Dam, ph1, 1992-97.

YEAR	# of sample hours/day	Chinook		Coho	
		Sampled	Collected	Sampled	Collected
1992	24	2,742	15,165		
1993	24	5,659	61,457		
1994	24	1,538	14,731	72	459
1995	24	1,917	30,440	156	1,389
1996	8	79	647	9	97
1997	8	459	3,761	13	105

Table D-23. Summary of smolt monitoring at Bonneville Dam, PH 1, 1986-1997.

Year	Dates	Sampling Effort	Sample Rate	Yearling Chinook					Subyearling Chinook					Coho				
				Collection		Index			Collection		Index			Collection		Index		
				Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily
1997	3/17-10/30	8hr/day	1-12 m/h	56,891	56,896	56,891	279,280	286,666	342,191	342,207	342,192	1,509,895	1,501,962	128,031	128,034	128,031	681,513	706,780
1996	3/11-10/31	8hr/day	1-12 m/h	7,825	82,434	77,780	470,119	360,961	29,556	350,426	432,364	1,921,906	1,593,073	13,076	158,438	156,957	863,827	675,605
1995	3/11-10/31	24hr/day	1-12 m/h	19,557	496,882	500,804	1,784,311	1,776,344	60,356	1,001,033	994,015	3,936,028	3,406,412	11,868	303,527	301,950	1,159,892	1,104,471
1994	3/10-10/31	24hr/day	1-12 m/h	34,362	242,624	248,741	789,593	779,713	125,967	1,361,893	1,360,832	3,810,943	3,607,383	22,378	205,520	201,310	699,119	626,443
1993	3/17-11/24	24hr/day	1-12 m/h	52,623	707,748	715,905	2,255,149	2,168,019	130,615	1,190,261	1,181,615	4,872,526	4,339,394	28,243	421,432	392,627	1,596,578	1,250,698
1992	3/13-11/20	24hr/day	1-12 m/h	42,523	NA	284,983	799,800	723,655	112,037	NA	882,211	2,433,053	2,320,423	23,971	NA	140,403	471,205	388,809
1991	3/15-11/30	8hr/day	1-12 m/h	29,374	NA	242,016	NA	609,411	83,189	NA	604,368	NA	1,257,388	23,842	NA	216,330	NA	575,098
1990	3/12-11/30	8hr/day	1-12 m/h	23,843	NA	196,216	NA	332,792	80,422	NA	658,702	NA	1,219,778	43,030	NA	365,826	NA	677,413
1989	3/15-11/30	8hr/day	6-15 m/h	27,935	NA	223,134	NA	435,455	98,521	NA	1,332,736	NA	1,756,794	29,746	NA	257,244	NA	491,618
1988	3/15-11/30	8hr/day	-	26,955	NA	301,479	NA	365,812	96,413	NA	580,644	NA	724,102	40,750	NA	419,286	NA	599,194
1987	3/13-11/20	8hr, 5 d/wk	-	28,828	NA	120,108	NA	NA	61,925	NA	371,000	NA	NA	23,188	NA	102,228	NA	NA
1986	5/12-11/26	8hr, 5 d/wk	-	9,495	NA	48,282	NA	NA	23,252	NA	86,220	NA	NA	11,538	NA	54,181	NA	NA

Year	Dates	Sampling Effort	Sample Rate	Wild Steelhead					Hatchery Steelhead					Sockeye				
				Collection		Index			Collection		Index			Collection		Index		
				Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily	Sample #	Hourly	Daily	Hourly	Daily
1997	3/17-10/30	8hr/day	1-12 m/h	38,829	38,830	38,829	200,764	205,873	105,516	105,517	105,516	557,832	575,077	5,765	5,774	5,765	30,107	31,099
1996	3/11-10/31	8hr/day	1-12 m/h	1,885	22,003	22,787	121,996	101,655	5,083	58,033	58,825	314,846	254,448	703	7,271	7,239	37,409	28,513
1995	3/11-10/31	24hr/day	1-12 m/h	1,240	30,225	29,963	111,694	106,889	3,737	102,933	103,508	394,457	376,571	2,184	67,625	71,990	256,946	263,680
1994	3/10-10/31	24hr/day	1-12 m/h	3,730	29,422	29,796	99,490	93,520	3,981	33,233	33,827	112,506	105,693	2,965	29,845	27,945	106,584	87,146
1993	3/17-11/24	24hr/day	1-12 m/h	4,025	77,143	74,138	258,236	226,120	7,456	190,608	185,240	618,692	563,884	4,939	184,129	178,245	575,586	538,837
1992	3/13-11/20	24hr/day	1-12 m/h	2,837	NA	16,503	60,823	46,098	3,767	NA	21,915	81,871	62,486	638	NA	3,872	13,196	10,835
1991	3/15-11/30	8hr/day	1-12 m/h	2,775	NA	26,295	NA	74,438	5,504	NA	54,528	NA	155,754	4,462	NA	47,722	NA	147,174
1990	3/12-11/30	8hr/day	1-12 m/h	3,894	NA	36,812	NA	62,826	5,525	NA	64,400	NA	65,056	4,537	NA	42,633	NA	81,403
1989	3/15-11/30	8hr/day	6-15 m/h	*	NA	*	NA	*	12,240	NA	106,787	NA	206,226	7,723	NA	72,962	NA	138,310
1988	3/15-11/30	8hr/day	-	*	NA	*	NA	*	7,473	NA	75,662	NA	103,701	4,587	NA	52,023	NA	77,921
1987	3/13-11/20	8hr, 5 d/wk	-	*	NA	*	NA	NA	8,760	NA	38,306	NA	NA	4,079	NA	18,733	NA	NA
1986	5/12-11/26	8hr, 5 d/wk	-	*	NA	*	NA	NA	3,753	NA	19,181	NA	NA	2,883	NA	14,350	NA	NA

*Wild and hatchery steelhead were not differentiated prior to 1990.

Table D-24. Summary of smolt monitoring sample numbers at Bonneville Dam, PH 2, 1986-1997.

Year	Season Dates	Sampling Effort	Sample Rate	Chinook				Coho	Sockeye	Total Sampled
				Yearling	Subyearling	Wild	Hatchery			
1997	5/1-10/3	up to 24, MWF	0.1	1,311	7,415	461	1,596	2,169	520	13,472
1996	3/13-9/13	up to 24, MWF	0.1	3,059	8,662	182	531	4,296	196	16,926
1995	3/11-10/31	up to 24, MWF	0.1	2,709	4,696	65	183	1,075	355	9,083
1994	3/10-10/31	up to 24, MWF	0.1	4,172	5,703	218	279	2,678	400	13,450
1993	3/17-11/24	up to 24, MWF	0.1	5,468	5,545	255	462	3,621	624	15,975
1992	3/13-11/20	up to 7, MWF	0.1	358	1,461	3	4	119	1	1,946
1991	3/15-11/30	24, daily	0.1	18,372	19,050	952	1,630	8,070	2,592	50,666
1990	3/12-11/30	24 cumulative, daily	0.1	5,463	20,469	238	205	6,300	164	32,839
1989	3/17-11/30	24 cumulative, daily	0.1	15,579	12,197	*	2,049	9,192	2,247	41,264
1988	3/17-11/30	24 cumulative, daily	0.1	7,068	9,744	*	762	5,555	238	23,367
1987	3/10-11/20	24 cumulative, 4days	0.1	6,461	5,438	*	823	3,940	642	17,304
1986	3/4-11/25	24 cumulative	0.1	10,917	16,844	*	1,494	6,112	2,599	37,966

*Wild and hatchery steelhead were not differentiated prior to 1990.