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MONITORING OF DOWNSTREAM SALMON AND STEELHEAD AT FEDERAL HYDROELECTRIC FACILITIES - 1995

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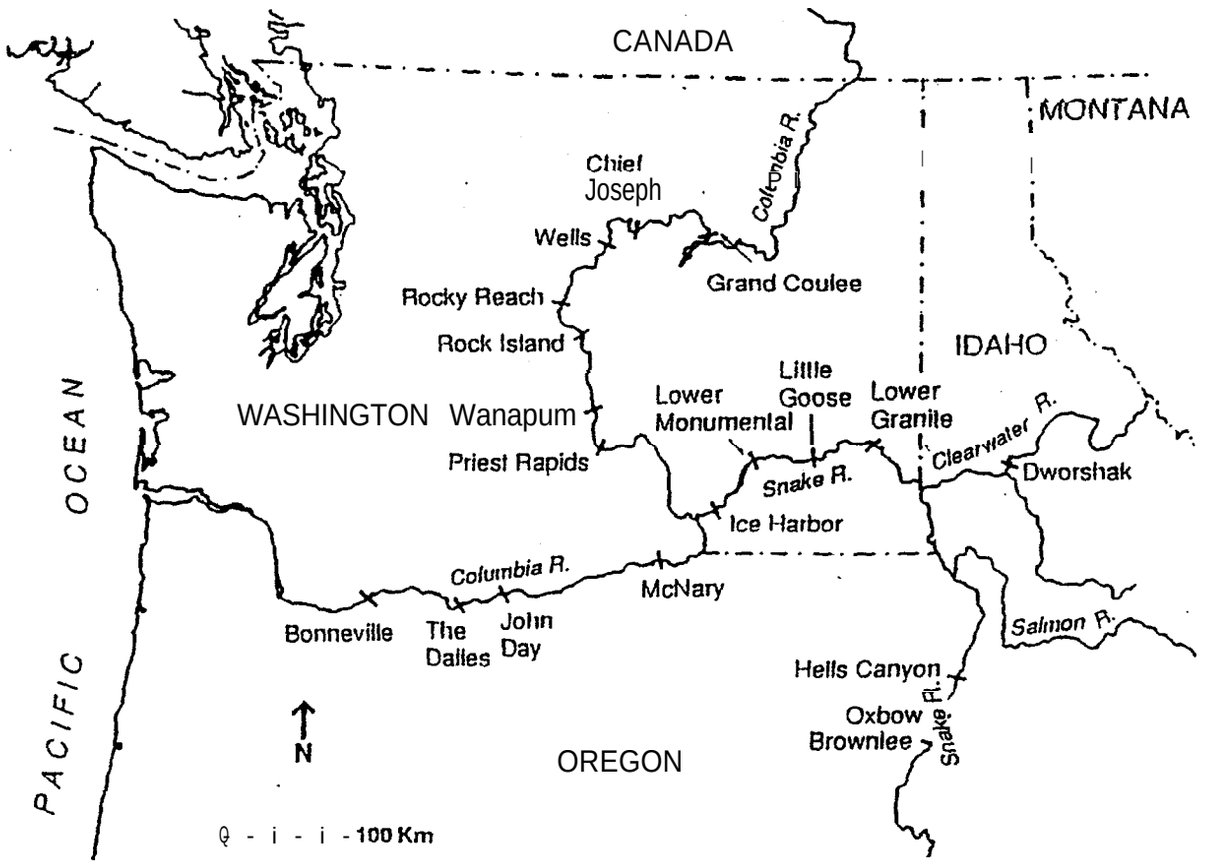

Figure 1. Hydroelectric Projects on the Snake and Columbia Rivers, including the two smolt monitoring sites operated by the National Marine Fisheries Service, Bonneville and John Day Dams. This figure is reprinted courtesy of NMFS-Northwest Fisheries Science Center-Graphics Department.

INTRODUCTION

The seaward migration of juvenile salmonids was monitored by the National Marine Fisheries Service (NMFS) at Bonneville and John Day Dams on the Columbia River in 1995 (river mile 145 and 216, respectively, Figure 1). The NMFS Smolt Monitoring Project is part of a larger Smolt Monitoring Program (SMP) coordinated by the Fish Passage Center (FPC) for the Columbia Basin Fish and Wildlife Authority. This program is carried out under the auspices of the Northwest Power Planning Council's Fish and Wildlife Program and is funded by the Bonneville Power Administration.

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 FPC with species and project specific real time data from John Day and Bonneville Dams.

METHODS AND MATERIALS

JOHN DAY DAM

One airlift pump system of the type described by Brege et al. (1990) was operated in gatewell 3B (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 from 6 April to 29 September. Fish were collected in a 1,688 liters (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" PVC pipe.

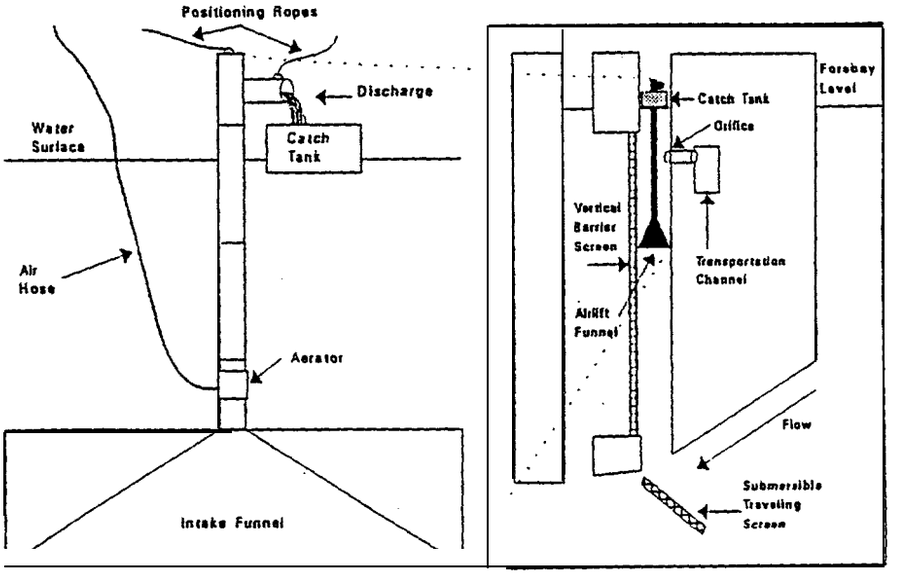

Figure 2. Components of a funnel airlift system and the operating position in the dam.

Approximately 50 fish at a time were then crowded into a 21 inch square preanesthetizing chamber. 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 contains about 38 mg/L of MS-222 to minimize stress during examination. Fish were routed through a PIT tag detector and into a recovery tank before eventually being returned to the bypass system. Ail fish holding tanks have a constant exchange of river water. Diagrams showing the location of equipment on the deck and the layout of the fish shack are presented in Figures A4 and A5, respectively.

Subsampling

To reduce the number of fish handled, subsampling was impiemented throughout the peak passage periods in 1995.

The methodology consisted of breaking the sample day into 2 hour blocks, starting at 0700, and sampling 60, 40 or 30 minutes for 50, 33, or 25% sample rates, respectively, within each 2 hour block. Sample collection began when the air was shut *off* at the beginning of each two hour 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. Once the basket was emptied and reset, (to dump the previous sample -or bypass fish) pumping resumed for the time left, according to the sample rare. Fish numbers were split between the two hours in the sample block then multiplied by the sample rate (e.g. .25 = 4x), to get the estimated collection number.

BONNEVILLE DAM

Between 11 March and 31 October, samples were collected in the bypass channels of the first and second powerhouses (PH1 & 2) using the downstream migrant traps (DSM1 & 2) at Bonneville Dam. The DSM trap operation is described by Gessel (1986) for the first powerhouse, and by McConnell and Muir (1982) and Krcma et al. (1984) for the second powerhouse.

First Powerhouse

The bypass channel of PHI was sampled 24 hours per day. Samples were collected by lowering a wedge wire flume into the bypass channel at the end of the inclined screen, diverting fish into an aluminum tank suspended at the end of the channel (Figure 3).

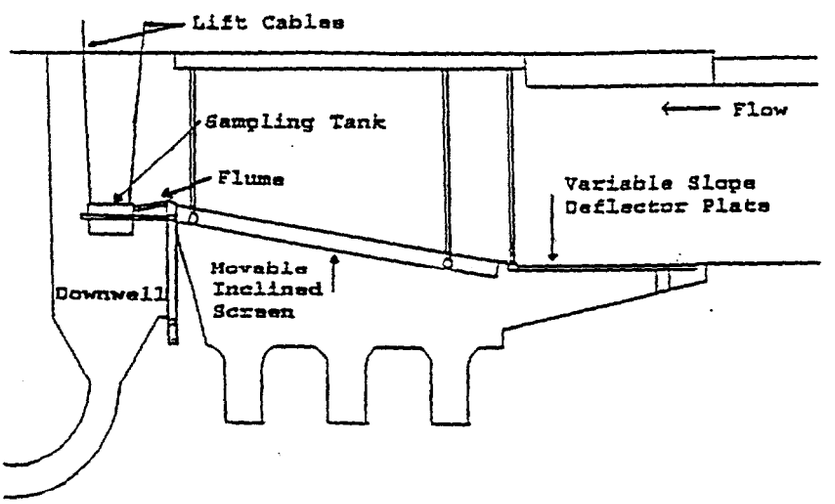

Figure 3. Inclined screen sampling system in the bypass channel of the first powerhouse at Bonneville Dam.

Samples were collected hourly, from 0700 to 0700 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%). Sample time was split into two samples of equal duration per hour. During periods of high smolt passage, the sample rate was adjusted on an hourly basis to a minimum of one minute per hour as necessary to avoid overcrowding the trap. Sampled fish passed through a PIT tag detector enroute to the recovery tank. In 1995, a diverter was added to the PIT tag detector allowing condition data to be collected on PIT tagged fish.. A diagram of the PHI sampling area is presented in Figure B4.

Second Powerhouse

In 1995, sampling in PH2 was limited to subsampling for fish condition only as in past years. The DSM2 was operated up to 24 hours per day, three days per week (M,W,F), to obtain a representative sample for monitoring fish condition. The DSM2 sampler operates at a tied 10% sample rate. These fish were routed to and held in raceways until they were examined. A diagram of the PH2 sampling area is presented in Figure B5. At both sampling locations, fish were net-transferred directly from the holding tanks to the sorting troughs, which contained about 42mg/L of Tricaine (MS-222). After examination, fish were placed in recovery tanks and eventually muted back to their respective bypass channels.

Gas Bubble Disease Subsampling

At John Day and Bonneville, naked eye examinations for gas bubble disease symptoms were conducted on sockeye, coho, and the least abundant age class of chinook. Exams using a 4X power magnifying lens were conducted on steelhead and the most abundant age class of chinook throughout the season.

Performance Monitoring

At John Day and Bonneville, as part of our quality control program, personnel are periodically tested on species ID, descaling, and data recording. Our objective is to test each person four times over the course of the season. The technique used consisted of simply netting an hour's fish out of the recovery tank and having the supervisor reprocess the fish. The results were compared to those of the person or people that processed those fish first. This approach eliminated the labor intensive and stressful technique of branding fish and "seeding" the sample collection tank used in past years.

DATA COLLECTED

Items l-5 were reported to the Fish Passage Center daily; item 6, the PIT tag data, were reported to the PTAGIS data center daily or weekly, 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
5) river, powerhouse, turbine and spill flow data
6) PIT tag detection (daily) and recapture (length, weight, condition) data (weekly)

RESULTS AND DISCUSSION

The results of the hands-on assessments of smolt movement through John Day and Bonneville Dams are summarized in Table I for the 1995 field season. Three types of fish counts are presented in the table:

1) Total Sample, actual fish counts.

2) Estimated Collection, total sample counts adjusted for sample rate.

3) Estimated Passage Indices, estimated collection counts divided by the proportion of flow passing through the sampled system to adjust for daily fluctuations in project operations.

As stated in the Fish Passage Center 1994 Annual Report, estimated 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.

Since monitoring at John Day and Bonneville generates hourly as well as daily catch data fish passage indices can be estimated by two methods.

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 passage indices for the daily total. This method is thought to be more accurate.

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

Included in this report are graphs of the diel and seasonal passage patterns and flow at John Day and Bonneville

Dams. The seasonal diel graphs for Bonneville were adjusted to eliminate the effect of first powerhouse flow fluctuations on fish passage by multiplying the hourly collection count by the percent hourly deviation from the average flow over the 24 hour period.

TABLE 1. SUMMARY OF 1995 SMOLT MONITORING AT JOHN DAY AND BONNEVILLE DAMS.

SPECIES	SITE	TOTAL SAMPLE	TOTAL PIT TAGS	TOTAL BRANDS	DAILY COLLECTION. [1]	DAILY FPI[2]	HOURLY COLLECTION	HOURLY FPI[3]
YEARLING	JOHN DAY (3B)	34,308	1564[5]	560	90,348	1,329,229	90,704	1,344,193
CHINOOK	BONNEVILLE PH#1	19,557	244[6]	181	500,804	1,776,344	496,882	1.784.3 11
	BONNEVILLE PH#2[4]	2,709	---	---				
SUBYEARLING	JOHN DAY (3B)	48,896	137	317	90,350	1,240,260	89,790	1,237,324
CHINOOK	BONNEVILLE PH#1	60,356	36	147	994,015	3,406,412	1,001,033	3,936,028
	BONNEVILLE PH#2	4,696	---	---			---	
WILD	JOHN DAY (3B)	4,043	115	---	11,584	170,993	11,799	176,102
STEELHEAD	BONNEVILLE PH#1	1,240	3	---	29,963	106,889	30,225	111,694
	BONNEVILLE PH#2	65	---	---				---
HATCHERY	JOHN DAY (3B)	18,915	1068	183	61,385	919,021	61,865	930,405
STEELHEAD	BONNEVILLE PH#1	3,737	46	77	103,508	376,571	1 02,933	394,457
	BONNEVILLE PH#2	183	---	---				---
COHO	JOHN DAY (3B)	5,908	---	---	22,135	335.902	22341	343,606
	BONNEVILLE PH# 1	11,868	---	---	301,950	1,104,471	303,527	1,159,892
	BONNEVILLE PH#2	1,075	---	---				
SOCKEYE	JOHN DAY (3B)	5,625	4	---	19,526	293,065	18,982	287,626
	BONNEVILLE PH#1	2,184	1	---	71,990	263,680	67,625	256,946
	BONNEVILLE PH#2	355	---	---				---
SEASON	JOHN DAY (3B)	117,695	2897	1060	295,328	4,288,470	295,481	4,319,256
TOTALS	BONNEVILLE PH#1	98,942	330	405	2,002,230	7,034,367	2,002,225	7,643,328
	BONNEVILLE PH#2	9,084	---	---				---

Data Source: Fish Passage Center.

[1] Daily Collection Sample # adjusted by sample rate at Bonneville Dam.

'Daily FPI= Daily collection counts divided by proportion of river flow through sample unit.

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

[4] PH#2 sampled for fish condition only.

[5] Includes 1196 detection's of unknown run type.

[6] Includes 193 detection's of unknown run type.

JOHN DAY DAM

Sampling Season

Unit 3 was out of service a total of 38.5 hours representing <1% of the 1995 sampling season. This is about one half of the time lost to unit 3 shutdown during the 1994 season and only about 17% of time lost in 1993, 69 and 221 hours respectively. No samples were lost due to airlift problems this season. The subsampling routine (see Methods section) provided opportunities for minor repairs, funnel checks, etc. without interrupting sampling. See Table A4 for details on biased sample days.

Sample Numbers, Collection Estimates and Fish Passaee Indices

The total number of fish handled at John Day in 1995 was 117,695, a 22% decline from 1994 (149,938). Species specific sample numbers expressed as a percent of 1994 numbers are as follows: Coho 52%; wild steelhead 53%; chinook O's 65%; sockeye 77%; chinook 1 101%; and hatchery steelhead 13 1%. The reductions are the result of subsampling during peak passage periods, (see Methods section).

Conversely, subsampling resulted in higher collection (estimated) numbers in 1995 for all species except chinook O's, which were 74% of 1994. Collection numbers, by species, expressed as a percent of 1994 collection numbers: hatchery steelhead 428%; chinook 1265%; sockeye 261%; coho 196%; wild steelhead 155%.

Percent composition for each species was as follows: chinook 0's 41.5%; chinook l's 29%; hatchery steelhead 19.5%; coho 5%; sockeye 5%; and wild steelhead 3.4 %.

Collection numbers are divided by the proportion of river flow through the sample unit to get a Fish Passage Index (FPI). The "daily" expansion method index total was 4,288,470, about 196% of the 1994 "daily" FPI of 2,188,198. The "hourly" method generated an index total of 4,3 19,256, again, about twice the 1994 "hourly" FPI of 2,162,65 1. Again in 1995 as in 1994, the two methods differed by only about 1%. A breakdown by species for sample, collection, brand and PIT tag totals can be found in Table 1.

Flows and Spill

The 1995 spring (April & May) river flow was much higher than in 1994, averaging 225.7 kcfs vs 182.5 kcfs last year. The spring peak river flow was also much higher at 304.5 kcfs on 20 May compared to last year's 11 April peak of 240 kcfs. For June and July, river flow averaged 244.7 kcfs vs 171.8 kcfs last year.. Flows fell gradually throughout the summer and fall averaging 123.4 kcfs for August and September, which was still higher than the same period in 1994, 81.5 kcfs, (Figure 5).

Spill was minimal throughout the passage season averaging just 2.6%, 3.8% and 1.8% of river flow during the spring, summer and fall, respectively. These levels represent the maximum spill for compliance with the 120% total dissolved gas limit imposed by the water quality departments within Washington and Oregon.

Seasonal Passage Patterns

The relative run timing among species and the duration of the middle 80% (in days) is presented in Figure 4. Additionally, median dates for 10, 50, and 90 percent passage dates for all species were calculated from the "Daily" indices provided by the Fish Passage Center for all years of airlift sampling (1985 to 1995) for all species. Wild and hatchery steelhead dates are only calculated from 1990 to 1995 data. Prior to 1990 wild and hatchery stocks were not differentiated.

Compared to historic medians, 10, 50, and 90 percent passage dates were slightly early this year for yearling chinook and hatchery steelhead. Coho did not differ this year from the historic median for 10 and 50 percent passage dates, but were more than a week early for the 90 percent passage date. The 1995 50 and 90 percent passage dates for sockeye were also several days earlier than the historical medians. The 1995 wild steelhead 10 percent passage date was about a week later than the historical median, but was slightly early for the 50 and 90 percent dates. Subyearling chinook passage dates were very early this year compared to the historic medians: 6 days for the 10% date, 19 days for the 50% date, and 23 days for the 90% date, (Figure 4).

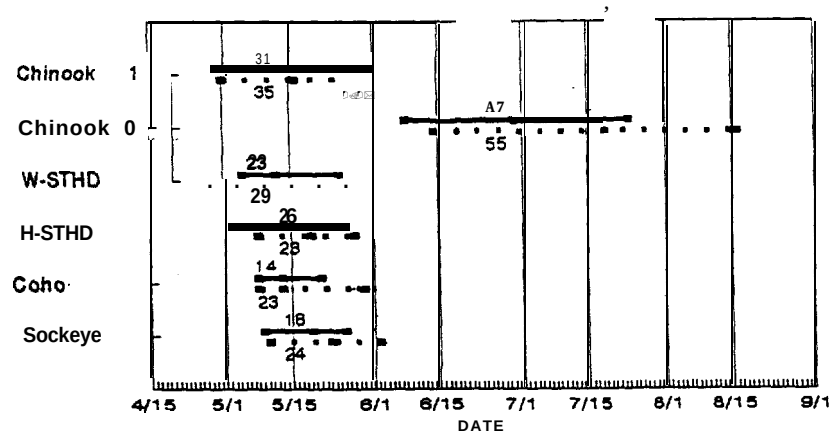

Figure 4. 10%, 50%. and 90% Passage Dates of all species for 1995 at John Day Dam. The duration between 10.90% dates (in days) is indicated for each line. Dashed lines represent the median date of passage derived from historical data

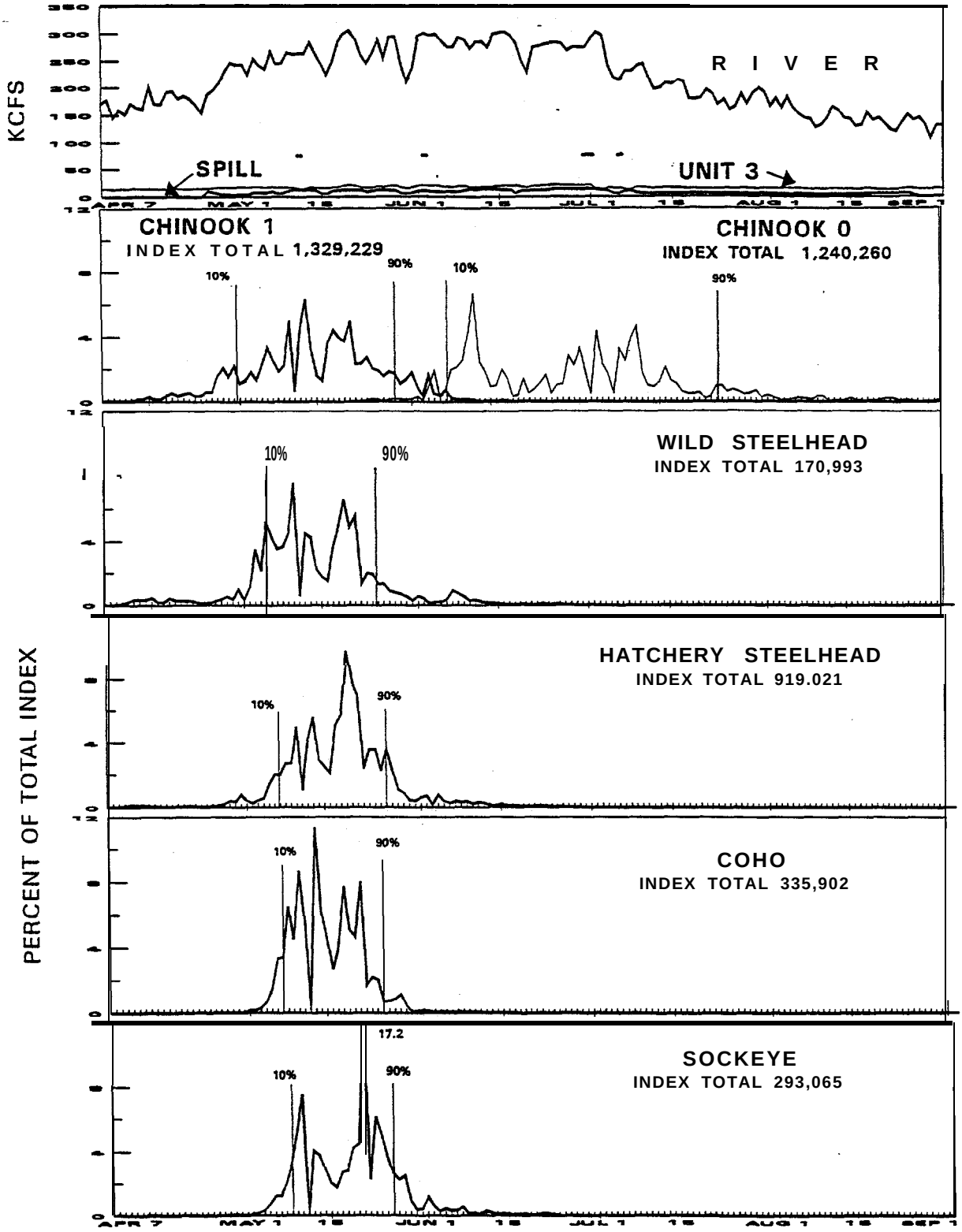

Figure 5. Seasonal passage patterns and daily average flows for John Day Dam, 1995. Based on "daily" indices from 3B.

- Indicates biased sample days.

For wild steelhead, coho and subyearling chinook, the middle 80% of the run passed John Day Dam in fewer days than any year between 1985 and 1995. For yearling chinook 3 years took fewer days (1983, 1987, and 1993), sockeye two years (1991 and 1993), and hatchery steelhead had 1 year with fewer days (1993), (Figure C6).

Presented in Figure Cl is an average seasonal passage pattern for all years of sampling for each species. Wild steelhead show the most variability aroundthe beginning and end of the migration while the other stocks showed more variance around the peak of the migration.

Diel Passage Patterns

Diel passage patterns are quite consistent over the season and with previous years in that the majority of passage (70 to 91 percent) occurs at night, between the hours of 8pm and 6am (2001-0600 PDT) as shown in Table 2.

Passage for all species increased after 2000 hours as ambient light decreased, but unlike the sustained hourly passage throughout the night in 1994, dropped off sharply at 2400 -hours. About 45% of the sockeye and 40% of the coho were collected during the 2200-2300 hour sample block. Sockeye had less than 3% and coho less than 8% of collection numbers for each hour for the remainder of the day. Yearling and subyearling chinook and wild steelhead exhibited very similar diel patterns this season. The percent of total daily collection was below 5% from 0800 - 2000 hours, rose quickly to about 12% for the 2100-2200 hour block and then decreased gradually throughout the night. Hatchery steelhead passage was different, with the percent of daily total collection numbers increasing throughout the night after a sharp, but smaller increase in numbers at 2200 hours (Figure 6).

Table 2. Percent passage for day and night

Species	% Day (0601-2000)	% Night (2001-0600)
Yearling Chinook	23 8	76.2
Subyearling Chinook	24.2	75.8
Steelhead		
-Wild	14.4	85.6
-Hatchery	25.7	74.3
Coho	9.8	91.0
Sockeye	29.2	70.8
Combined	29.1	70.9

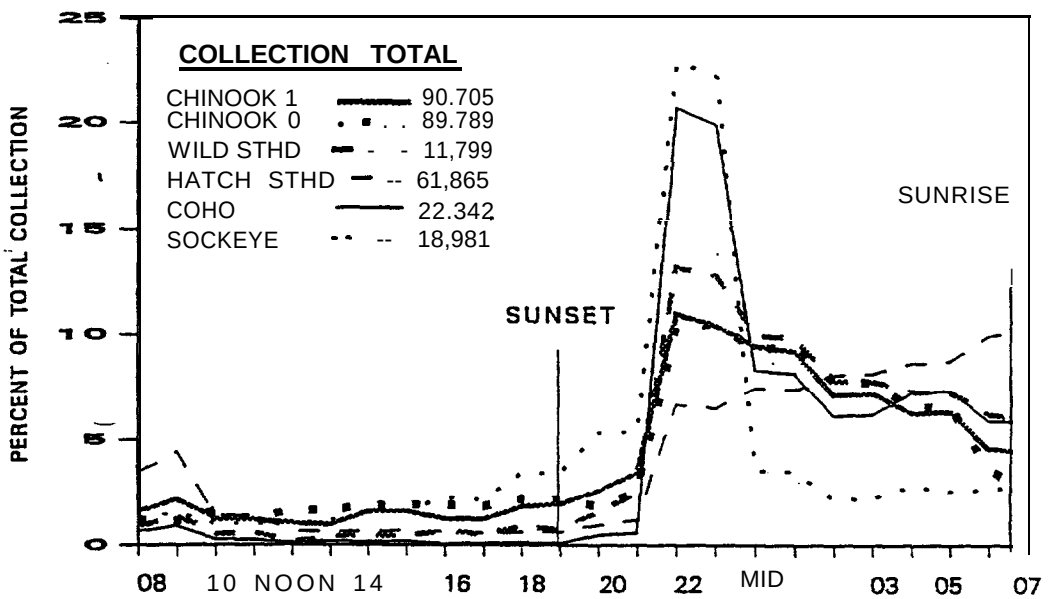

Figure 6. Seasonal diel passage pattern at John Day Dam, 1995.

When compared to the historical average diel pattern, the 1995 pattern is similar for coho, sockeye, yearling chinook and wild steelhead. The 1995 hatchery steeihead pattern is opposite the historical pattern, with increasing numbers throughout the night instead of decreasing. Just the opposite reversal occurred with subyearling chinook, with the historical trend showing increasing numbers after the 2200 hour spike and the 1995 pattern showing decreasing numbers (Figure 6 and Figure C2).

A graphic presentation of the percentage of night time passage over the season is presented in Figure A2. There can be considerable variability in the percent of night passage day to day, but the overall diel pattern is fairly consistent over the season and between years.

Fish Condition

Every fish handled was classified as either normal, descaled, or dead. To be considered descaled 20% of the scales on one side of the fish had to be missing, anything less was called "normal". Seasonal descaling and mortality percentages for 1995 are compared to 1994 and the historical average in **Figure 7.**

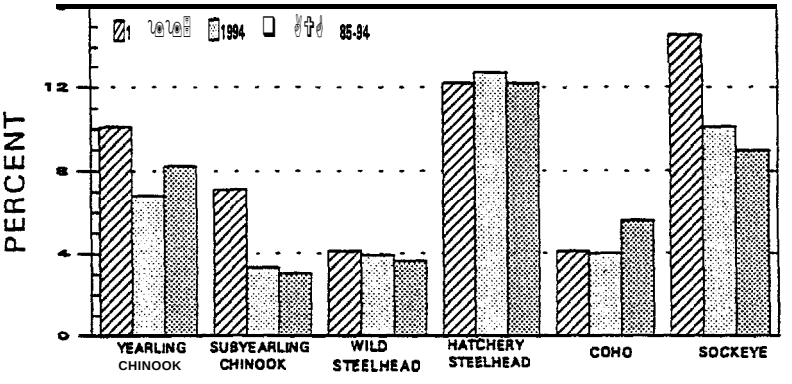

Figure 7. Total descaling for 1995, compared to 1994 and the 85-94 average at John Day Dam.

Descaling rates in 1995 were higher than in 1994 for all species except hatchery steelhead, which was about the same. They were higher than the historical average for yearling and subyearling chinook, wild steelhead and sockeye. It was lower for coho and about the same for hatchery steelhead (Figure 7).

Descaling rates increased throughout the spring migration, with the highest levels in late May and early June. Wild steelhead descaling peaked around mid May but overall was low, averaging just 4.1%. Subyearling chinook descaling peaked in mid July (Figure Al).

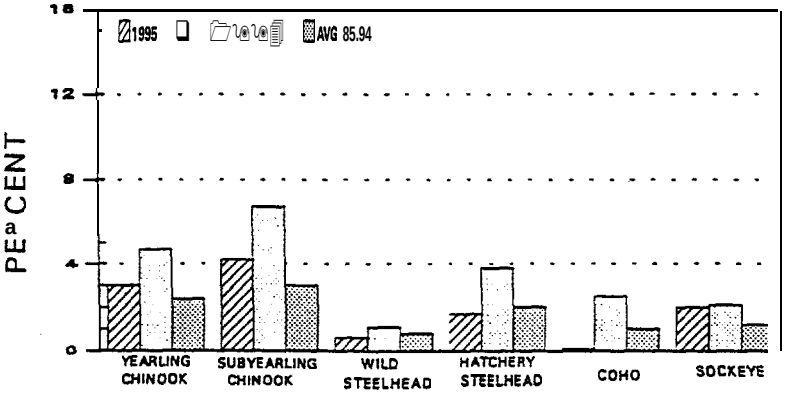

Figure 8. Total mortality for 1995, compared to 1994 and the 85-94 average at John Day Dam.

Overall descaling rates for each species and all years of sampiing are shown in Figure C4 and listed in Table Cl.

Mortality rates in 1995 were lower than 1994 for all species, but that is not surprising since 1994 levels were some of the highest ever recorded. Mortality rates were within 2% of the historical average for all species, (Figure 8). For the spring migrants, the highest mortality occurred in late May to early June, coinciding with the high descaling. For the subyearling chinook, mortality was higher during the first part of the run, during June and early July when descaling rates were relatively low. Throughout July and August mortality rates were similar to descaling rates (Figure Al).

Subsampled Fish Condition

Approximately 12,468 smolts were examined this season for partial descaling (3 to 20% loss on a side), injuries, parasites and obvious disease symptoms including gas bubble disease. The results are presented in Tables C2-7.

A more detailed examination was conducted this season (see Methods section) on chinook and steelhead, to monitor for signs of gas bubble disease. A total of 6 (Cl% of total) fish were observed with bubbles, using this technique.

Partial descaling ranged from 8% on subyearling chinook to 3 1% for hatchery steelhead. Hatchery steelhead had the highest rates of operculum/gill injuries (7%), much higher than last years rate of 1.9%, and bird marks (15%), same as last year. Wild steelhead had the highest rate of parasitic infection (15%), up from 2.2% last year. Subyearling chinook had the highest rates of columnaris infection at 3%, which is down form 8.7% last year.

Length Averages

Length averages are presented in Figure 9 to show relative size differences and trends throughout the season. Other than wild steelhead, and subyearling chinook, the patterns are mainly the result of different hatchery stocks.

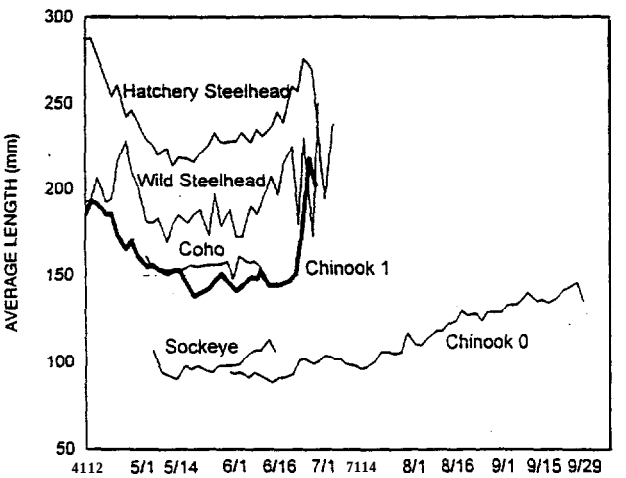

Figure 9. Average length of juvenile salmonids at John Day Dam, 1995.

Freeze Brands and PIT Tags

A total of 1,060 brands were recorded this season, about 500 fewer than last year (1,5 11). Yearling chinook had the most brands (560), followed by subyearling chinook (317) and summer steelhead (183), (Table 1). For more details on brands see Table A3.

The number of PIT tagged fish detected at the fish handling facility during the 1995 season (2,897) is about 5 times the number detected in either 1994 (516) or 1993 (632). It is likely that hundreds of tags that passed through the bypass hose (see Subsampling, Methods section) were not detected due to a faulty installation of the barrel detector on that hose. Between 28 April and 15 May, when it was fixed, the tunnel used to interrogate sample fish recorded 515 tags and the sample rate averaged about 33%. Rough calculations indicate a possible loss of about 1000 detections.

About 80% of the PIT tags detected were from hatchery fish again this year. Spring (yearling) chinook and steelhead made up the majority of detected fish (59% and 41% respectively).

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. A total of 935 smolts out of 1,025 detection's (91.6 %) were successfully handled for data collection (Table Al). Any smolts which were detected but not handled were either not diverted or the PIT tag could not be read with the wand detector at the recapture station. A summary of the PIT tags detected, including species and travel time estimates can be found in Table A2.

Performance Monitoring

Six tests were conducted to evaluate employee performance in the areas of species and brand identification, descalmg and data recording. Table 5 lists the results of these tests.

Table 3. Results of the quality control tests.

Species ID	Descalmg ID	Brand ID	#Correct/ # Possible	Overall Accuracy
93/94	85/94	1/1		
98.9%	90.5%	100%	1791189	94.7%

Only one fish was misidentified as to species. The descaling category had the greatest discrepancy with disagreements on 9 fish. This category always has the greatest discrepancy due to the subjective nature of the decision. Overall, 94.7% percent of the possible data was collected and recorded correctly (Table 3).

Fry Incidence

The number of summer/fall chinook fry (≤ 60mm) in the 3B samples this season was 507, which expanded to 1350 fry for a collection estimate. The fry total from 3B in 1994 was 47 and in 1993 was 1,317. Fry were most abundant around the end of May.

Adult Catch

A total of 137 adult salmonids were captured by our airlift system. Eighty one percent of these fish were steelhead (36% wild, 64% hatchery). For a complete listing of fallbacks by species and year, see Table C10.

Incidental Catch

A summary of the incidental catch by species and year is presented in Table C 11.

American shad (Alosa sauidissima) was by far the most common incidental species captured at John Day Dam this season. The catch of juvenile shad for 1995 (202,375) peaked in late August and was 182% of the 1994 (111,4 18) catch. In both years the sampling effort was similar and sampling ended while the juvenile shad migration was still running strongly. Studies of American shad in the Connecticut River indicate that juvenile shad migrate downstream from September through November (O'Leary and Kynard 1986). Since large numbers of juvenile shad have been sighted in November at John Day (Graves, personal observation), and the end of the juvenile shad migration in the lower Columbia River is not well documented, not too much weight should be placed on these numbers.

The total number of juvenile Pacific Lamprey (Lampetra tridentata) as classified in Systematics, Historical Ecology and North American Freshwater Fishes, edited by Richard L. Mayden, 1992, captured in gatewell 3B was down this year to 596, just 18% of the 1994 total of 3,250, and 14% of the 1993 total of 4,348. Lamprey passage peaked in the first half of May, (Figure A3).

BONNEVILLE DAM

Sampling Season

At PH1 a total of 34 hours of sampling were missed, about 0.6% of the season. Prior to the start of the season, the Corps of Engineers(COE) installed a new limit switch that greatly reduced (from 62% in 1994 to 20% in 1995) the sampling time lost to trap cable problems. See Table B3 for more details on biased sample days.

The PH2 sampler did not have any breakdowns this season. The PH2 sampler was taken out of service during the large releases of Tule fall chinook from the Spring Creek National Fish Hatchery (SCNFH).

Sample Numbers and Passage Indices

In 1995, the fourth year of 24 hour monitoring **in the First Powerhouse (PH1),** 98,942 juvenile salmon and steelhead were sampled from 11 March to 31 October. This is about 51% of the number sampled in 1994 (193,383). This resulted in an expanded (by sample rate) collection estimate of 2,002,230 using the daily method, and 2,002,225 using the hourly method These collection estimates were further expanded by the percent of river flow through PH1 to generate fish passage indices (FPI). The daily expansion method generated an index total for all species combined of 7,034,367, which is about 133% of the 1994 FPI of 5,299,898. The hourly expansion method generated an index total (all species) of 7,643,328, which is about 136% of the 1994 FPI of 5,618,235. For a breakdown of Fish Passage Indices by species see Table 1.

The two methods generated very similar indices in 1995 with the hourly method producing the larger index number for all species except sockeye. The hourly expansion method may more accurately reflect passage because it accounts for the changing flow distribution by calculating indices hourly and summing for the day.

At **the Second Powerhouse** a total of 9,084 smolts were sampled for fish condition and brand information (Table 1). 'These data were used to monitor the condition of the bypass system. No fish collection or passage indices were calculated for this site.

Flows and Soil1

Spring river flow, up to 31 May, averaged 216.7 kcfs, compared to 171.4 kcfs in 1994. From 1 June through July, river flow averaged 243.3 kcfs, considerably higher than the 174.4 kcfs for the same period in 1994. Flows for the late summer/fall period, August through October, were also higher than in 1994, averaging 126.5 kcfs versus 89.0 kcfs last year.

Spill for the 16 March release of 7.9 million tule fall chinook from SCNFH averaged about 33.1% of river flow for the period 18 March through 28 March. Spill averaged 41% of river flow between 15 - 23 April to flush the 13 April SCNFH release of 4.3 million tule fall chinook past the project. Spill remained at or near that level for the remainder of the season (Figure 11) and was governed by a Total Dissolved Gas limit of 120%. Powerhouse one would discharge as much of remaining river flow as possible, depending on available units, and powerhouse 2 would discharge the balance.

Spring (11 March to 3 1 May) discharge for PH2 averaged 39.7 kcfs. This average fell only slightly to 35.8 kcfs for the summer period 1 June to 31 July. For the late summer and fall period (1 July to 31 October) PH2 discharge averaged only 11.5 Kcfs. PH2 discharge following the first two spring Creek releases (17 March and 14 April) fell to just 7.3 and 9.7 kcfs, respectively. For the 19 May release, no reduction in PH2 discharge occurred, averaging 43.8 kcfs for the period when Spring Creek fish were expected to pass Bonneville. The second Powerhouse is operated on a "last on-first off" basis. This is to minimize passing fish into the poor passage conditions present in the tailrace. A 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.

Seasonal Passage Patterns

The middle 80% migration period at PHI was shorter in 1995 than in 1994 for all species except coho, which took 5 days longer in 1995. In general though, the timing was very similar to 1994, with 10 and 90 percent passage dates within a week of 1994 passage dams for all species (Figure D6). All migrants, except subyearling chinook, reached the 90% passage mark before 1 June (Figure 10).

Sockeye had the highest percent of total passage in a single day with almost 44% of all migrants passing the project on 21 May. Hatchery and wild steelhead passage also peaked that day with 30% and 29% of total, respectively (Figure 11).

The spring passage pattern (before June 1) for subyearling chinook mainly represents large releases of Yule" stock into the Bonneville pool from SCNPH (Table 4). For this reason 10, 50 or 90% passage dates were not calculated for these fish .

The summer passage pattern for subyearlings (after June 1) mainly represents that portion of the run which is upriver bright stock. The 10, 50, and 90 percent passage dates, and the middle 80% passage duration (64 days) are similar to previous years (Figure D6).

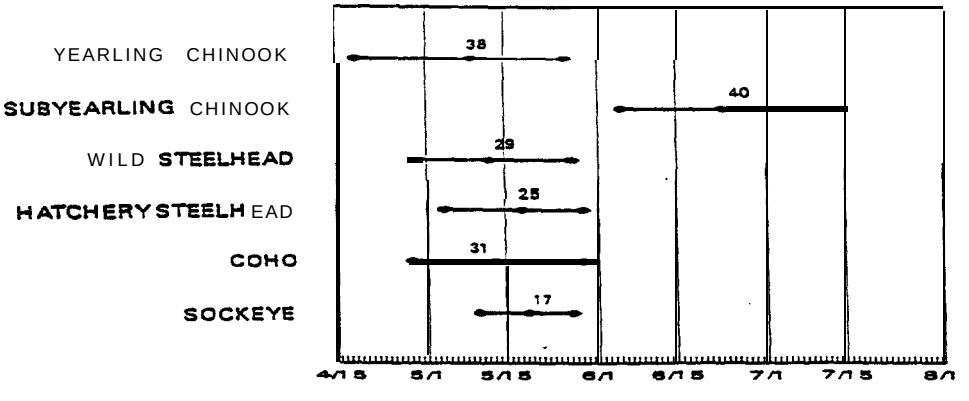

Figure 1 0. Passage dates (1 0%. 50%. and 90%) at PH1, Bonneville Dam. 1 996. Number is days between 10 and 90% dares. Subyearling chinook dates are for upriver brights.

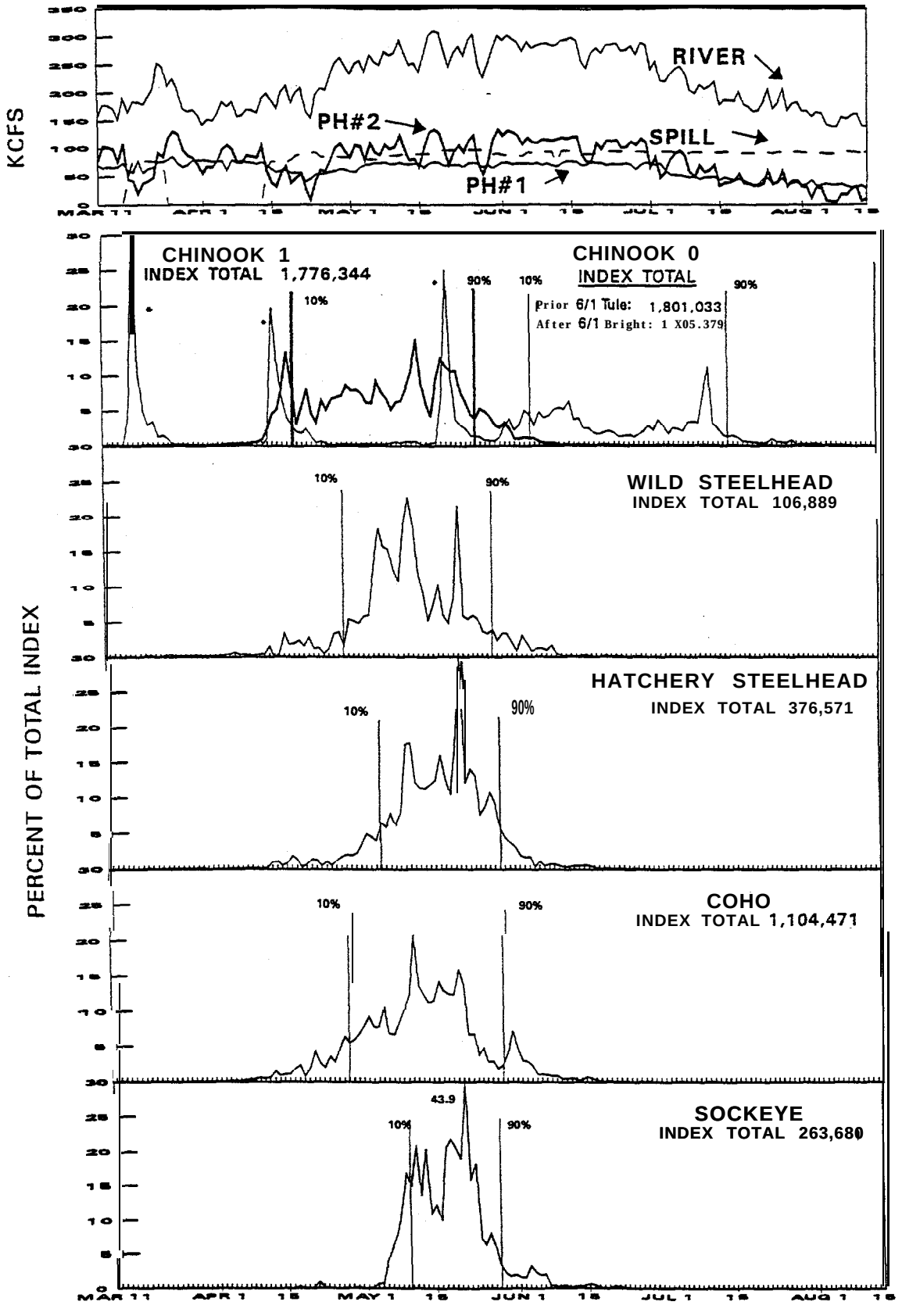

Figure 11. Seasonai passage patterns and daily average flows for PH#1 Bonneville Dam, 1995. Based on "daily" indices from PH#1. * Spring Creek Fish Hatchery releases of tule fall chinook.

Table 4. 1996 Spring Creek National Fish Hatchery releases,

RELEASE DATE	RELEASE SIZE	PEAR PH1 PASS.	AVG. RIV. FLOW (KCFS)	SPILL AS % OF RIVER
March 16	7,941,332	March 18	200.8	33.1
April 15	4,257,254	April 15	191.3	41.0
May 20-2 1	3,800,000	May 20	279.7	34.3

Diel Passage Patterns

The diel patterns observed in our fourth year of monitoring strongly confirm the patterns observed in previous years. Peak passage for all species occurred at 2200 hours. After 2200hrs, passage declined to lower levels (4 - 8% of total) but remained fairly constant until sunrise. During the day passage ranged between 2 - 6% of total for all species, (Figure 13).

The diel passage patterns of "tule" and "bright" stocks of subyearling chinook were quite different in 1995. Upriver bright stock (after Junel) is very similar to the spring migrant pattern. The tules however did not peak until 0200 hours and then at a lower level, about 11% (Figure 14).

Table 5 lists the percent total daytime (0601 - 2000 hrs) and nighttime (2001 - 0600 hrs, P.D.T.) passage for the season at PH1. All species had a greater percent of total passage during nighttime hours. Chinook and coho fry had the highest percent night passage followed by coho, steelhead and sockeye.

There is considerable daily variability in me percent of nighttime passage over the season for all species at Bonneville, as shown in Figure B2.

Table 5. Percent day and night passage at PH1, Bonneville Dam, 1995.

Species	Day (060 l-2000)	Night (200 l-0600)
Yearling Chinook	47.2	52.8
Subyearling Chinook-	35.2	65.8
Tule	45.6	54.4
Bright	23.1	76.9
Fry	27.4	72.6
Steelhead		
- Wild	31.7	68.3
- Hatchery	37.1	62.9
Coho	29.3	70.7
Fry	14.6	85.4
Sockeye	43.8	56.2
Combined	38.2	61.8

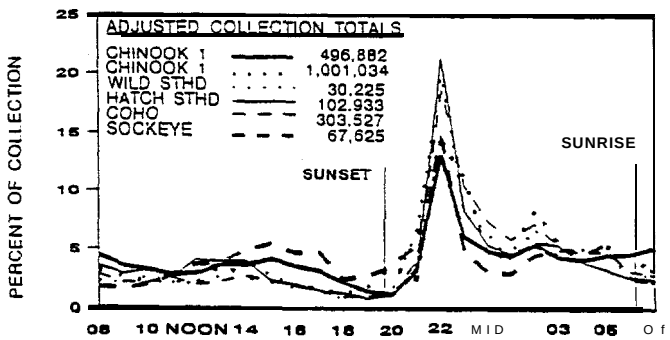

Figure 12. Seasonal dial passage patterns from PH-1 at Bonneville Dam, 1995.

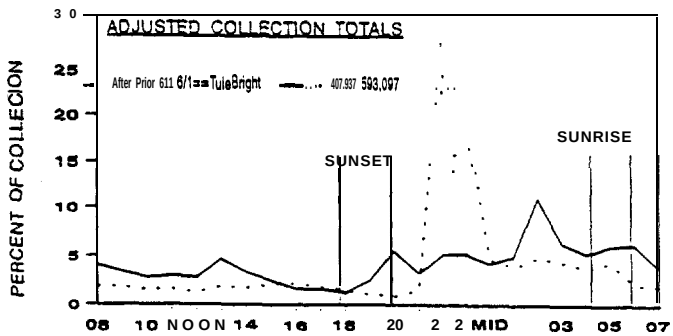

Figure 13. Seasonal diel passage patterns of subyearling chinook stocks at PH-1 at Bonneviile Dam, 1995.

Fish Condition

Descaling for all species, except yearling chinook, was lower in 1995 than the historical average but higher than 1994 levels (Figure 15).

Daily descaling rates for yearling chinook, hatchery steelhead and sockeye increased as the migration progressed, and were highest in late May and early June, frequently climbing above 10%. Maximum descaling percentages for yearling chinook, hatchery steelhead, and sockeye were 22.8% (8 June), 18.1% (28 May), and 38.4% (27 May),

respectively, (Figure B 1).

Dates with high hatchery steelhead and sockeye descaling coincided with the discovery of a broken orifice valve in 5B. A similar situation occurred last year and suggests that the orifice problem contributed to the higher than normal descaling. Wild steelhead and coho descaling remained below 5% throughout the season and averaged less than 3% for the year **(Figure** B1). Overall mortality rates for sampled fish were less than 1% for all species, (Figure 15).

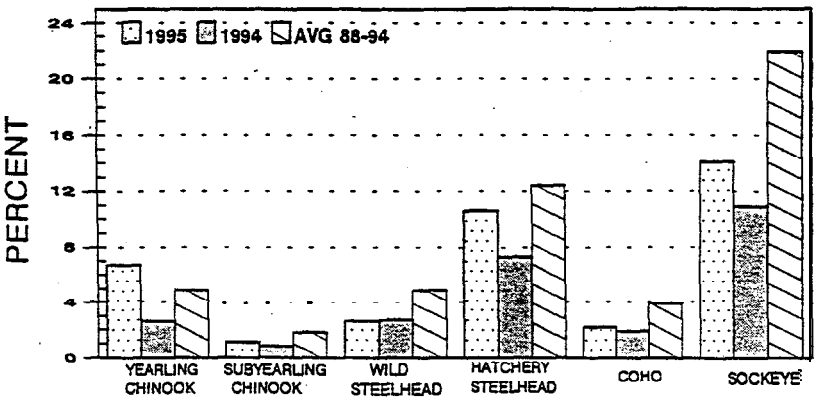

Figure 14. Total descaling for 1995, compared tp 1994 and the 88-94 average at Bonneville Dam PH#1.

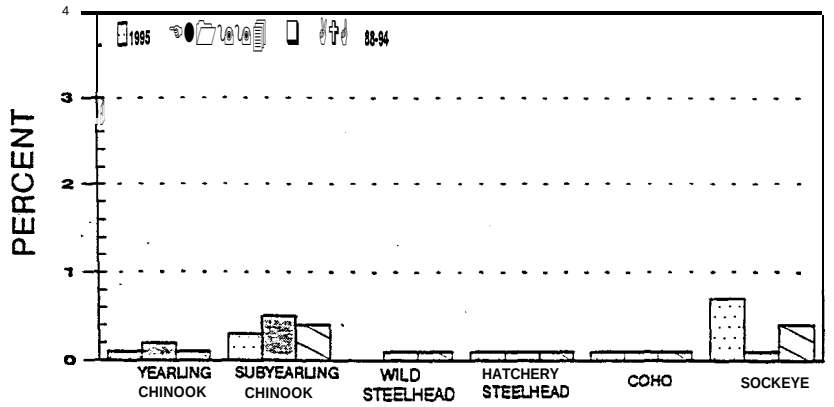

Figure 15. Total mortality for 1995, compared tp 1994 and the 88-94 average at Bonneville Dam PH#1.

Powerhouse 2 descaling and mortality percentages are presented in Table 6. As in past years, this seasons PH2 descallng and mortality rates were higher than PHI's rates. Subyearling chinook and hatchery steelhead descaimg rates were nearly twice those of PH1 (2.3% vs. 1.1% and 19.2% vs. 10.6% respectively). Overall sockeye descaling was four percentage points higher at PH2 than at PH1. Coho and yearling chinook descaling rates were about equal to PH1 rates. Descaling rates for all migrants except subyearling chinook were less than or nearly equal to the historical average. Subyearling chinook descaling (2.3%) was nearly double the 7 year average (1.3%). For a summary of descaling and mortality in PH2 see Table D 12.

This seasons percent mortality in PH2 samples ranged from 2.6% (sockeye)to 0.5% (hatchery steelhead and coho), while mortality rates at PHI were less than 1% for all species. Like descaling, overall higher mortality at PH2 is consistent with past years. It should be noted that delayed mortality may contribute to PH2's higher mortality since fish may be held for up to 24 hours before processing. For more details on PH2 descaling and mortality for the years 1988 - 95, see Table D12.

Table 6. Descaling and Mortality from PH2 at Bonneville Dam, 1995.

	CHIN-I	CHIN-O	STHD-W	STHD-H	COHO	SOCK
TOTAL SAMPLED	2,709	4,696	65	183	1,075	355
% DESCALED	6.7%	2.3%	6.3%	19.2%	2.7%	17.9%
% MORTALITY	0.6%	0.7%	1.5%	0.5%	0.5%	2.6%

Subsampled Fish Condition

A total of 12,978 juvenile salmonids from PH1 were examined for detailed condition subsampling in 1995, (Tables

D2-7). As in 1994, partial descaling was the most prevalent condition with hatchery steelhead and sockeye the highest at 26% and 24%, respectively. Body injuries comprised the second most prevalent condition for all migrants combined, totaling 3%. Bird inflicted injuries were next with a combined incidence of about 3%, elevated mostly by hatchery steelhead at 8%. Wild steelhead had a 19% incidence of external parasites, twice the 1994 rate.

Gas Bubbie Disease Symntom Monitoring

A total of 12,978 fish were examined for Gas Bubble Disease symptoms. Of those 7,643 were examined using a 4X magnifying lens. Rank 1 gas bubbles were found on 3 yearling chinook, 1 wild steelhead and 1 coho. A Rank 1 classification would have less than 25% of an unpaired fin covered with bubbles. All five of these fish had just a few bubbles amounting to very little surface area coverage, less than 5%.

Length Averages

Individual fish lengths were obtained in conjunction with the fish condition subsampling described above. The results are presented in Figure 17.

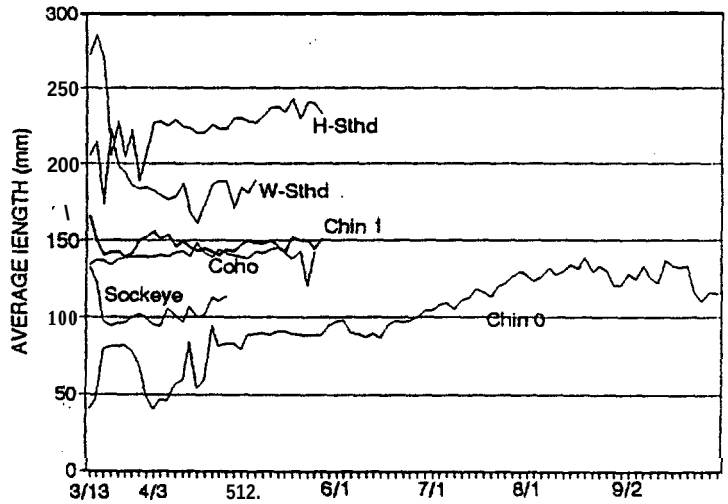

Figure 16. Average lengths of juvenile salmonids at Bonneville Dam, PH1, 1995.

Freeze Brands and PIT Taps

A total of 405 brands were detected and recorded from the PH1 samples with 8 1% of those found on yearling and subyearling chinook (Table 1). Hatchery steelhead account for the other 19%. For a complete listing of brand recoveries see Tables B4, 5, and 6.

A total of 330 PIT tags were detected in the samples at PH1 (Table 1). This is about 3 times the number detected in 1994. A summary of PIT tag recapture detail at PH1 is presented in Table B2. Table D8 summarizes PIT tag records for all years of interrogation at Bonneville Dam, PH1. For a detailed summary, including release sites, travel times and rates, see Table B 1.

Frv Incidence

In 1995 sample catches of subyearling chinook fry and coho fry (<60mm) were 1,917 and 156, respectively. When expanded by sample rate, these numbers generate a collection estimate of 35,361 chinook fry and 1,468 coho fiy. Approximately 3.5% of all subyearling chinook and 0.5% of all coho captured were fry. Eighty percent of the chinook fry were captured between 12 April and 30 May. The middle 80% of the coho fry were captured between 22 March and 2 June.

Adult Incidence

Nine adult fish were recorded as incidentals during the 1995 season. Six of these were steelhead and 3 were chinook. Additionally, 5 adult chinook and 4 adult steelhead were observed sliding across the top of the trap and returning to the channel. For a summary of fallbacks by year, see Table D10.

Incidental Catch

A summary of incidental catch for the years 1988 - 95 is presented in Table D1 1. **American Shad** (Alosa saoidissima) juvenile collection counts were present in the samples from mid August through the end of the season on 3 1 October (Figure B3). The total number sampled was 82,864, which when expanded for sample rate was over 414,000. **Pacific Lamprey** (Lampetra tridentatus) juveniles appeared in PH1 samples in low numbers from May through the end of the season but had a very distinct passage spike on July 13 (Figure B3) The total number of lamprey sampled was 365, which resulted in a collection total of 4,334. The vast majority (97.3%) of these were smolted.

ACKNOWLEDGMENTS

Support for this monitoring project comes from the region's electrical ratepayers through the Bonneville Power Administration under the Northwest Power Planning Council's Fish and Wildlife Program. The success of this program continues to involve cooperative interaction with the U.S. Army Corps of Engineers on-site biologists and deck crews, the Fish Passage Center staff, and the Environmental and Technical Services Division of the National Marine Fisheries Service.

We acknowledge the very capable efforts of our Biological technicians and laborers, including Tom Ryan, John Barton, Mary Anitis, Paul Ducommon, Tiiie Mandish, Rick Cowlishaw, Carol Morat, Bruce Pederson, Mildred Johnsen, Nancy Diana, Rick Cowlishaw, Lisa Darby, Jeff Morseman, Greg Kovalchuk, Mike Kelly, Michael Schrage, Bruce Mills, and Doug Frantum.

LITERATURE CITED

Brege, Dean A., R.C. Johnsen, and W.E. Farr, 1990. An Airlift Pump for Sampling Juvenile Salmonids at John Day Dam. North American Journal Fisheries Management 10:48 l-483.

Fish Passage Manager, 1994. 1993 Fish Passage Center Annual Report. Columbia Basin Fish and Wildlife Authority, Portland, OR. 60p plus Appendices. (Annual Report to BPA for project no. 94-033, contract DE-FC79-88BP38906).

Gessel, M.H., L.G. Gilbreath, W.D. Muir, and RF. Krcma, 1986. Evaluation of the Juvenile Collection and Bypass Systems at Bonneville Dam- 1985. U.S. Dept. Comm., NOAA, NMFS, NW&AFC, Seattle, Wa. 63p plus Appendix. (Report to U.S. Army Corps of Engineers, Contract DACW57-83-H 001).

Hawkes, L.A., RD. Martinson,, RJ. Graves, D.R Carroll and S. Killins, 1993. Monitoring of Downstream Salmon and Steelhead at Federal Hydroelectric Facilities, Annual Reports. U.S. Dept of Comm., NOAA, NMFS, ETSD, Portland, OR (Annual Reports to BPA for project no. 84-14, contract DE-AI79-85BP20733).

Martinson, RD. RJ. Graves, M.J. Langeslay, L.A. Wood, and S. Killins, 1994. Monitoring of Downstream Salmon and Steelhead at Federal Hydroelectric Facilities, Annual Reports. U.S. Dept of Comm., NOAA, NMFS, ETSD, Portland, OR (Annual Reports to BPA for project no. 84-14, contract DE-AI79-85BP20733).

Krcma, R F., M. H. Gessel, W. D. Muir, S. C. McCutcheon, L. G. Gilbreath, and B.H.Monk, 1984. Evaluation of the Juvenile Collection and Bypass System at Bonneville Dam-1983. U.S. Dept. Comm., NOAA, NMFS, NW&AFC, Seattle, Wa. 56p plus Appendix. (Report to U.S. Army Corps of Engineers, Contract ACW57-83-F-03 1 5) .

Matthews, G.M., D.L. Park, T.E. Ruehle, and J.R Harman, 1985. Evaluation of Transportation of Juvenile Salmonids and Related Research on the Columbia and Snake Rivers, 1984. U.S. Dept. of Comm., NOAA, NMFS, NW&AFC, Seattle, WA., 27p. plus Appendix. (Report to U.S. Army Corps of Engineers, March 1985, Contract DACW68-84-H-0034).

McConnell, RJ, and W.D. Muir, 1982. Preliminary Evaluation of the Bonneville Juvenile Bypass System - Second Powerhouse. U.S. Dept. of Comm., NOAA, NMFS, NW&AFC, Seattle, Wa. 8p. (Report to U.S. Army Corps of Engineers, Contract DACW57-82-F-0398).

Mayden, Richard L. 1992. Systematics, Historical Ecology and North American Freshwater Fishes. Pg. 33. Stanford University Press, Stanford, California.

O'Leary, John A. Kynard, Boyd, 1986. Behavior, Length, and Sex Ratio of Seaward -Migrating Juvenile American Shad in the Connecticut River. Transactions of the American Fisheries Society 115:529-536, 1986.

APPENDIXA
JOHN DAY DAM - 1995

FIGURES	TITLES	PAGE #
A-l	Daily Descaling and Mortality Rates	A-l
A-2	Percent Night Passage	A-2
A-3	Shad & Lamprey Passage	A-3
A-4	Equipment layout, John Day Dam intake deck	A-4
A-5	Fish shack floor plan, John Day Dam	**A-4**
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A-l	PIT Tag Data - Summary	A-5
A-2	PIT Tag Data - Detail	A-6
A-3	Freeze Brand Data	A-7
A-4.	Biased Sample Days - Detail	A-8

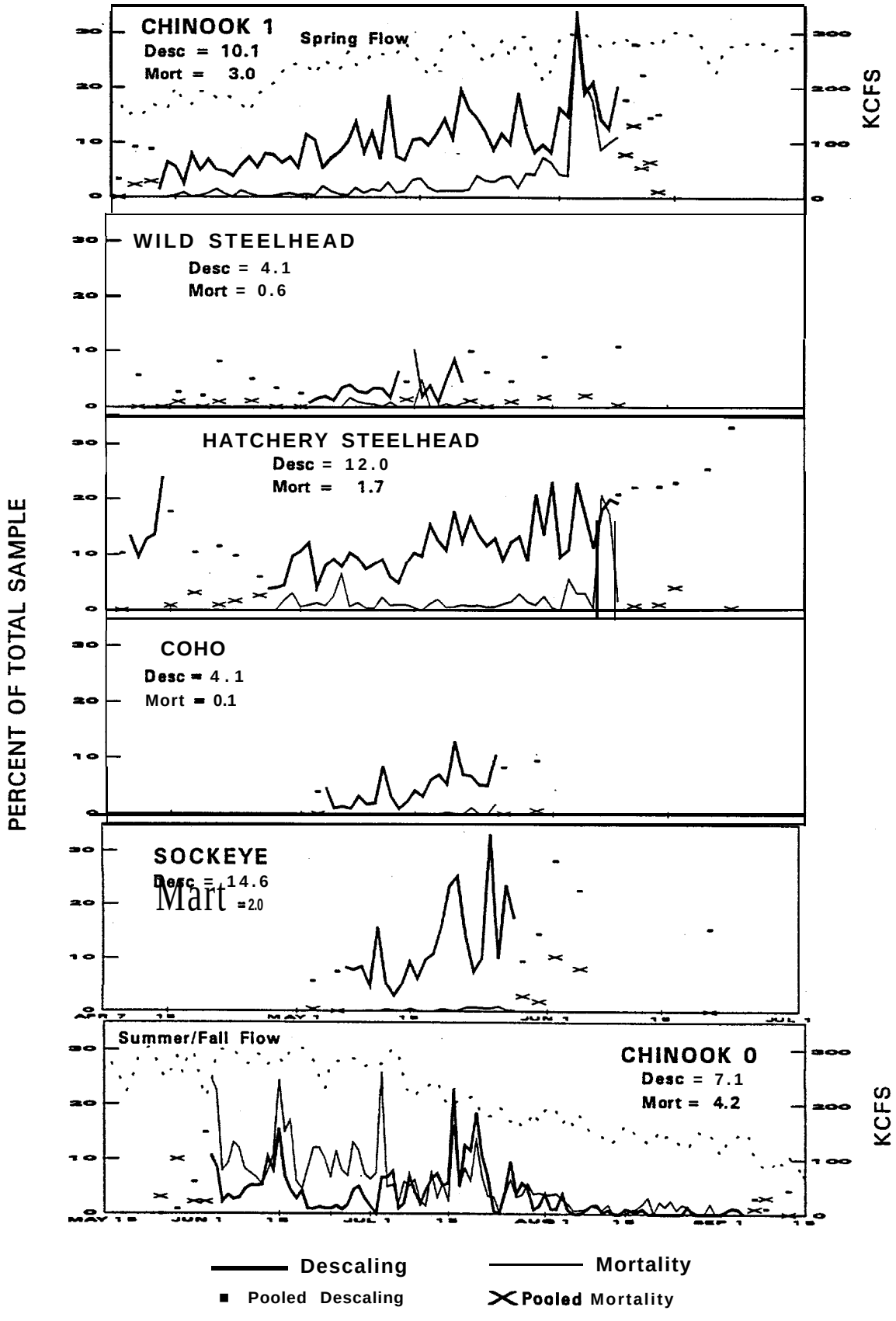

Figure A-l. Daily percent descaling and mortality with season totals at John Day Dam, 1995. Marked data points indicate midpoint of pooled samples, objective n = 100.

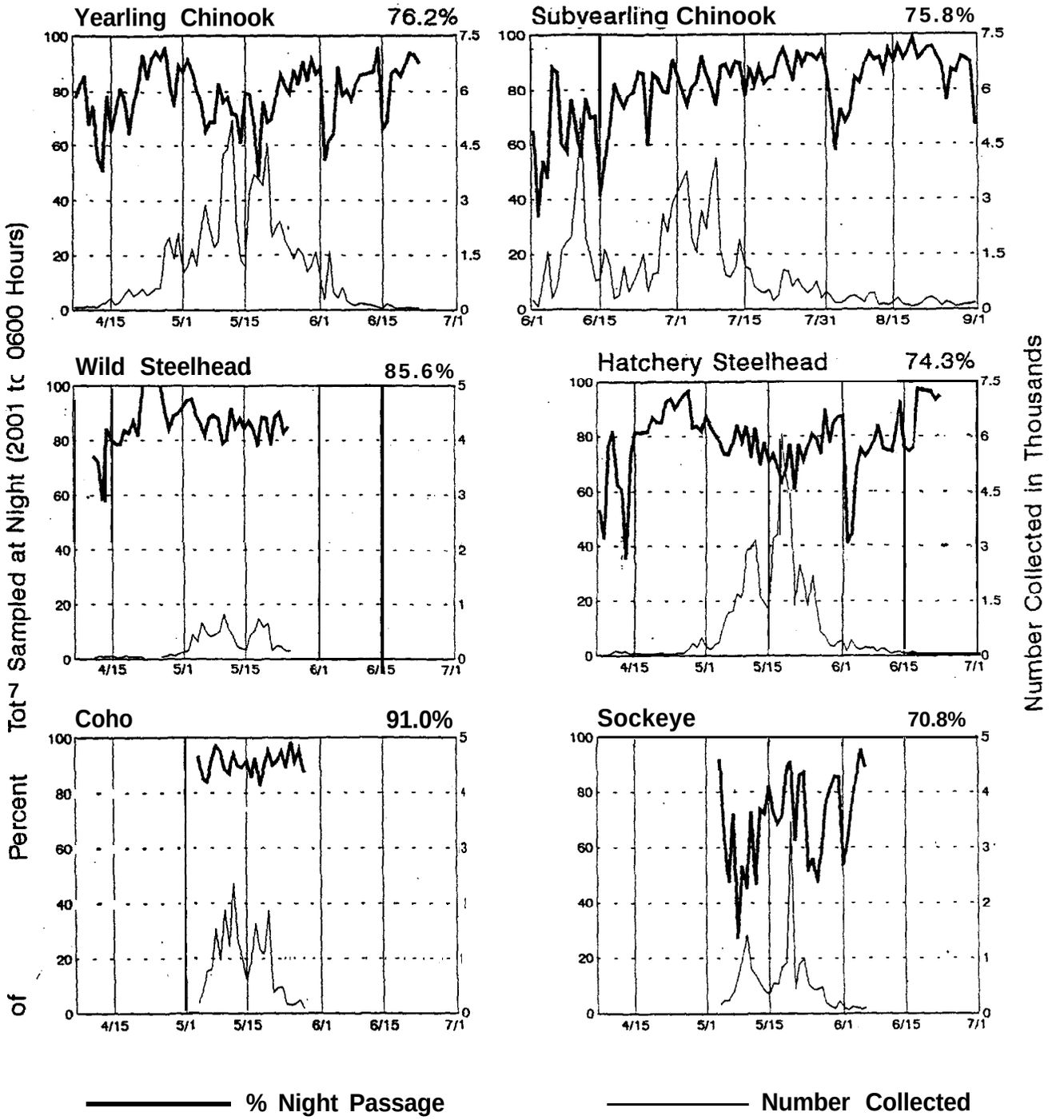

Figure A-2. Percent of daily total sampled at night, 2001-0600 hours, (P.D.T.) at John Day Dam. Daily samples <20 were excluded. The season Total Night Passage Percentage is indicated at upper right.

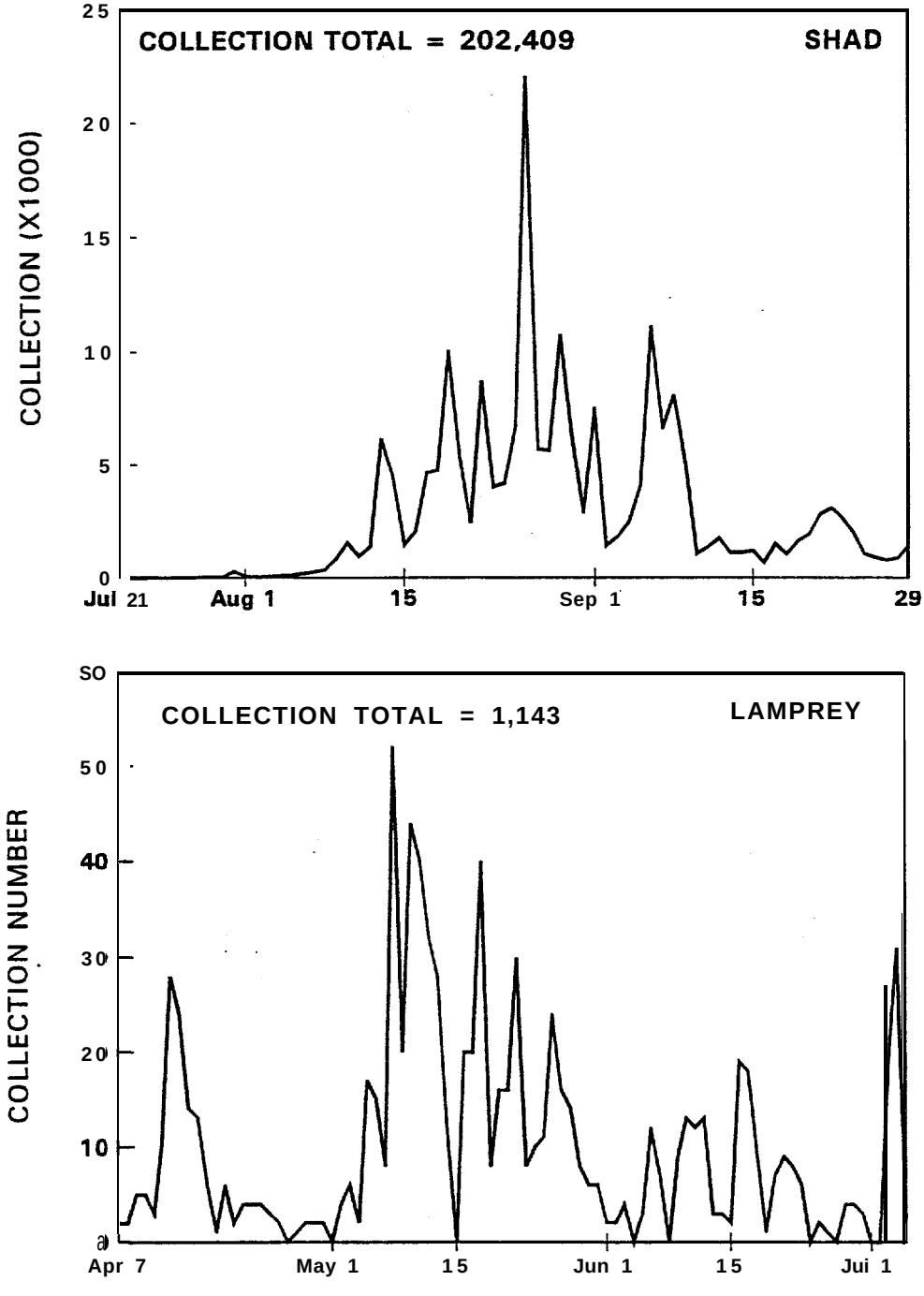

Figure A3. Seasonal juvenile shad and lamprey counts at John Day Dam, 1995

figure A4. Smolt Monitoring System at John Day Dam, 1995.

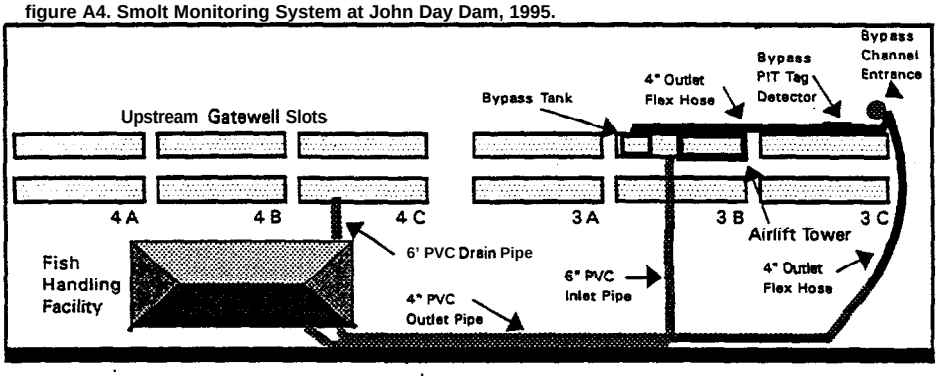

Figure A-5. Smolt Handling Facility at John Day Dam, 1995.

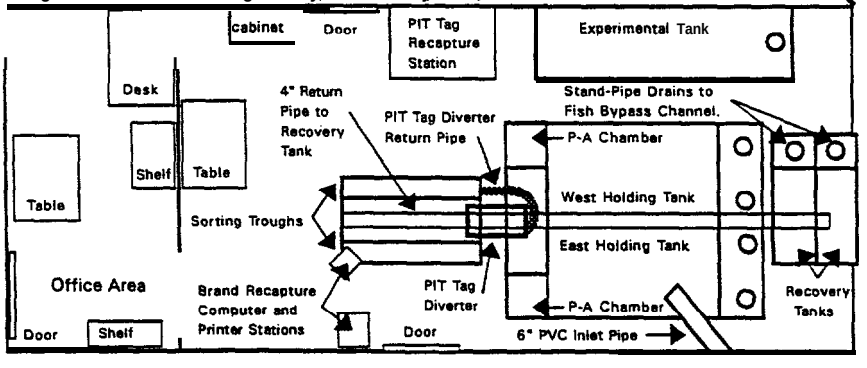

Table A-l. Summary of PIT Tag Observations at John Day Dam - 1995.

Species	Run	Rearing Type	Total # Observed	Bypass Coil	Diverter Coil	Recapture Station	Recapture Efficiency*
hinook	Spring	Hatchery	267	180	87	83	95.4%
		Wild	101	66	35	29	82.9%
		Total	368	246	122	112	91.8%
	Summer	Hatchery	52	38	14	14	100.0%
		Wild	20	10	10	5	50.0%
		Total	72	48	24	19	79.2%
	Fall	Hatchery	52	9	43	37	86.0%
		Wild	13	4	9	6	66.7%
		Total	65	13	52	43	82.7%
	Unknown	Hatchery	915	600	315	305	96.8%
		Wild	253	123	130	133	102.3%
		Unknown	28	11	17	15	88.2%
		Total	1196	734	462	453	98.1%
	Chinook Total		1701	1041	660	627	95.0%
teelhead		Hatchery	1068	751	317	273	86.1%
		Wild	115	72	43	34	79.1%
	Steelhead Total		1183	823	360	307	86.3%
ockeye	Summer	Hatchery	3	2	1	1	100.0%
		Wild	1	1	0	0	
		Total	4	3	1	1	100.0%
	Unknown	Wild	9	5	4	4	100.0%
	Sockeye Total		13	8	5	5	100.0%
'OTALS - ALL SPECIES COMBINE			2097	1872	1025	939	91.6%

*** Recapture Efficiency = (# Recaptured / # Diverter Coil) * 100**

Table A-2. PIT Tag observations at John Day Dam. 1995.

RELEASE SITE	SPP	RUN	RT	N =	TRAVEL TIME (DAYS) MEAN	MIN	MAX	RIVER KM UPSTREAM OF JDA	AVERAGE SPEED (KM/DAY)
Big Canyon Creek	Steelhead	Summer	Wild	10	18.0	11.5	28.0	456	25.3
Big Canyon Facility	Steelhead	Summer	Hatchery	20	29.3	24.7	34.6	586	20.3
Chiwawa Rearing Pond	Chinook	Spring	Hatchery	11	38.4	24.3	55.5	487	13.4
Clear Creek	Chinook	Spring	Hatchery	4	41.7	35.4	51.9	523	12.5
	Steelhead	Summer	Hatchery	19	29.0	19.4	52.5	523	18
Clearwater River	Steelhead	Summer	Hatchery	3	33.3	32.7	34.5	399	12
Clearwater River Trap	Chinook	Unknown	Hatchery	19	28.0	13.6	47.4	408	14.6
	Chinook	Unknown	Wild	3	35.0	25.6	49.7	409	11.7
	Steelhead	Summer	Hatchery	10	20.9	11.6	28.1	409	19.6
Clearwater River, S.Fork	Steelhead	Summer	Hatchery	15	28.5	20.9	34.1	519	18.2
Columbia River	Chinook	Fall	Wild	9	35.6	28.6	47.7	N / A	
Crooked Fork Creek Trap	Steelhead	Summer	Wild	3	18.1	16.4	19.2	672	37.2
Crooked River Pond	- k	Spring	Hatchery	30	38.9	24.8	61.6	628	15.8
Crooked River Trap	Chinook	Spring	Wild	4	51.4	33.0	73.2	614	11.9
Dworshak Hatchery	Chinook	Spring	Hatchery	16	37.4	22.5	53.6	464	12.4
	Steelhead	Summer	Hatchery	71	22.7	13.7	42.9	464	20.4
Entiat Hatchery	Chinook	Spring	Hatchery	9	43.4	35.6	48.9	448	10.3
Grande Ronde River	Chinook	Spring	Wild	10	23.8	13.7	37.6	446	18.7
	Steelhead	Summer	Hatchery	10	25.3	16.7	34.8	446	17.6
	Steelhead	Summer	Wild	9	22.9	16.6	27.8	446	19.5
Hazard Creek	Steelhead	Summer	Hatchery	17	29.4	19.6	41.4	649	22.1
Hells Canyon Dam	Steelhead	Summer	Hatchery	7	34.8	27.5	49.3	572	16.4
Herd Creek	Steelhead	Summer	Hatchery	4	34.0	24.5	39.5	1044	30.7
Imnaha River Trap	Chinook	Summer	Hatchery	3	37.0	19.4	48.2	490	13.2
	Chinook	Summer	Wild	6	28.6	20.7	40.3	490	17.1
	Steelhead	Summer	Hatchery	4	19.1	14.9	23.8	490	25.7
Imnaha River Weir	Chinook	Spring	Hatchery	11	44.5	31.8	50.5	557	12.5
Knox Bridge	Chinook	Summer	Hatchery	31	48.6	37.6	70.7	805	16.6
Kooskia Hatchery	Chinook	Spring	Hatchery	9	39.1	34.4	61.5	524	13.4
Leavenworth Hatchery	Chinook	Spring	Hatchery	10	32.0	27.5	42.6	453	14.2
Lemhi River	Steelhead	Summer	Hatchery	6	36.0	28.7	41.3	894	24.8
Little Goose Dam COL	Steelhead	Summer	Hatchery	66	11.1	6.5	32.7	286	26
Little Goose Dam TAL	Steelhead	Summer	Hatchery	92	11.0	6.1	24.5	286	26.2
Little Sheep Facility	Steelhead	Summer	Hatchery	10	26.7	22.5	45.5	528	18.4
Lolo Creek	Chinook	Spring	Wild	4	40.8	17.6	68.8	486	11.9
	Steelhead	Summer	Wild	5	16.3	13.5	22.7	466	28.9
Lookingglass Creek	Chinook	Spring	Hatchery	13	37.0	30.0	42.8	566	15.9
Lower Granite Dam	Chinook	Spring	Hatchery	3	48.8	46.8	50.8	348	7.1
	Steelhead	Summer	Hatchery	5	29.0	12.7	43.0	348	12
Lower Granite Dam COL	Chinook	Spring	Hatchery	4	21.0	17.9	23.1	348	16.6
	Chinook	Unknown	Hatchery	16	13.9	8.3	21.2	348	25
	Steelhead	Summer	Hatchery	87	15.5	8.8	30.5	348	22.4
Lower Granite Dam RRR	Chinook	Unknown	Hatchery	699	15.0	8.3	43.8	348	23.2
	Chinook	Unknown	Wild	191	16.4	9.3	40.5	348	21.2
Lower Granite Dam TAL	Chinook	Spring	Hatchery	7	19.9	17.3	22.7	348	17.5
	Chinook	Unknown	Hatchery	21	17.6	8.7	28.8	348	19.8
	Steelhead	Summer	Hatchery	103	15.4	8.5	35.5	348	22.6
Lower Granite Dam TRB	Chinook	Unknown	Hatchery	20	22.0	13.4	28.8	348	15.8
Lower Monumental COL	Chinook	Unknown	Hatchery	38	8.2	5.4	15.5	242	29.6
	Steelhead	Summer	Hatchery	70	9.0	4.5	24.6	242	26.9
Lower Monumental TAL	Chinook	Unknown	Hatchery	37	7.4	4.4	12.8	242	32.9
	Steelhead	Summer	Hatchery	71	8.8	4.7	19.4	242	27.6
Lyons Ferry Hatchery	Chinook	Fall	Hatchery	3	26.5	22.7	31.7	270	9.5
Methow Rearing Pond	Chinook	Summer	Hatchery	3	21.5	17.7	23.4	555	25.8
Newsome Creek	Chinook	Spring	Hatchery	9	33.7	23.7	37.7	603	17.9
Powell Rearing Pond	Chinook	Spring	Hatchery	18	36.3	32.6	49.7	669	17.5
Priest Rapids Hatchery	Chinook	Fall	Hatchery	5	14.4	8.7	19.2	292	20.3
Rapid River Hatchery	Chinook	Spring	Hatchery	9	45.3	39.4	50.2	631	13.9
Red River Trap	Chinook	Spring	Wild	3	78.4	64.3	92.3	621	7.9
Redfish Lake Creek Trap	Sockeye	Summer	Hatchery	3	43.6	33.4	39.5	1056	24.1
Ringold Hatchery	Chinook	Fall	Hatchery	7	19.6	11.7	33.0	220	11.2
Rock Island Dam	Chinook	Unknown	Hatchery	7	21.4	12.5	34.7	383	17.9
	Chinook	Unknown	Unknown	28	22.9	11.0	31.5	383	16.7
	Sockeye	Unknown	Wild	9	15.9	9.1	31.4	383	24.1
	Steelhead	Summer	Hatchery	14	12.0	8.5	16.4	383	31.9
	Steelhead	Summer	Wild	9	13.7	7.8	25.4	383	27.9
Salmon River	Steelhead	Summer	Hatchery	21	33.6	20.3	46.6	478	14.2
Salmon River Trap	Chinook	Unknown	Hatchery	27	32.2	18.7	49.6	563	17.5
	Chinook	Unknown	Wild	33	30.4	14.7	56.6	563	18.5
	Steelhead	Summer	Hatchery	35	24.3	12.9	37.2	563	23.2
	Steelhead	Summer	Wild	9	17.9	12.6	25.6	563	31.4
Salmon River, E.Fork Trap	Steelhead	Summer	Hatchery	4	25.1	20.6	32.5	1058	42.3
Salmon River, N.Fork	Steelhead	Summer	Hatchery	6	38.9	33.6	43.4	859	22.1
Sawtooth River Trap	Chinook	Spring	Wild	3	47.9	29.2	67.4	563	11.8
	Steelhead	Summer	Hatchery	11	29.0	20.8	36.6	563	19.4
Snake River	Chinook	Fall	Hatchery	35	70.0	37.2	105.1	397	5.7
	Chinook	Spring	Hatchery	74	25.4	15.5	46.2	397	15.6
	Chinook	Unknown	Wild	3	94.6	88.7	98.7	397	4.2
	Steelhead	Summer	Hatchery	228	18.4	8.8	34.7	397	21.6
Snake River Trap	Chinook	Unknown	Hatchery	28	26.0	10.5	45.4	400	15.4
	Chinook	Unknown	Wild	21	19.4	12.6	34.4	400	20.7
	Steelhead	Summer	Hatchery	37	19.8	12.5	38.6	400	20.2
	Steelhead	Summer	Wild	34	14.8	8.4	20.9	400	27
Tucannon River	Chinook	Spring	Hatchery	4	52.1	46.5	58.6	344	6.6
Wells Hatchery	Chinook	Summer	Hatchery	6	28.1	19.7	45.6	483	17.2
Winthrop Hatchery	Chinook	Spring	Hatchery	3	45.6	41.6	47.7	577	12.7
			Total =	2704					

Note: Juvenile salmonids released in 1994 (n=131), and observations < 3 fish (n=40) are excluded from this table.

Table A-3. Brand Release Totals Observed at John Day Dam, 1995.

LOC	BRAND	ROT	RUN	SPECIES	LOT ID #	RELEASE SITE	RELEASE DATE START	RELEASE DATE END	NUMBER RELEASE	SMPL	COLL	(DAILY) INDEX	%SMPL	%COLL	%INDEX	RELEASE GROUP TOTALS REL.	SMPL	COLL	INDEX	PERCENT %SMPL	PERCENT %COLL	PERCENT %INDEX	RECAPTURED TOTALS	RECAPTURED PERCENT
LA- B		-1	SP	CHINOOK	95600-01	IMEQUES	03/13	03/1:	5176	42	60	784	0.81%	1.16%	15.34%	44684	215	375	519	0.48%	0.84%	11.63%	180812	
LA- B		-2	SP	CHINOOK	95600-02	IMEQUES	03/13	03/1:	5062	29	33	423	0.57%	0.65%	8.36%								560	0.31
LA- B		-3	SP	CHINOOK	95600-03	IMEQUES	03/13	03/1:	4976	33	45	588	0.66%	0.90%	11.82%								1568	0.87
LA- B		-4	SP	CHINOOK	95600-04	IMEQUES	03/13	03/1:	5133	43	62	820	0.84%	1.21%	15.98%								23229	12.85
RA- B		-1	SP	CHINOOK	95600-05	IMEQUES	03/13	03/1:	4908	21	46	664	0.43%	0.94%	13.53%									
RA- B		-2	SP	CHINOOK	95605-01	UMATILLA R	04/21	04/2:	4878	12	44	669	0.25%	0.90%	13.71%									
RA- B		-3	SP	CHINOOK	95605-02	UMATILLA R	04/21	04/2:	5137	7	27	404	0.14%	0.53%	7.86%									
RA- B		-4	SP	CHINOOK	95600-06	IMEQUES	03/13	03/1:	4436	27	56	805	0.61%	1.26%	18.14%									
LA- P		-1	SP	CHINOOK	95500-01	BELOW LGR DA	04/09	04/1(	13056	50	154	2277	0.38%	1.18%	17.44%	50870	165	569	863	0.32%	1.12%	16.96%		
LA- P		-2	SP	CHINOOK	95500-02	BELOW LGR DA	04/18	04/2:	12590	47	169	2556	0.37%	1.34%	20.30%									
LA- P		-3	SP	CHINOOK	95500-03	BELOW LGR DA	04/21	04/2:	12852	46	159	2449	0.36%	1.24%	19.06%									
LA- P		-4	SP	CHINOOK	95500-04	BELOW LGR DA	04/25	04/2(	12372	22	87	1356	0.18%	0.70%	10.96%									
LA- Z		-1	SP	CHINOOK	95500-09	BELOW LGR DA	05/07	05/1(	13323	29	104	1548	0.22%	0.78%	11.62%	25097	52	167	248	0.21%	0.67%	9.86%		
LA- Z		-2	SP	CHINOOK	95500-10	BELOW LGR DA	05/10	05/2(	11774	23	63	932	0.20%	0.54%	7.92%									
LA- 3		-1	SP	CHINOOK	95500-05	BELOW LGR DA	04/26	04/3(	12690	34	135	2081	0.27%	1.06%	16.40%	51812	105	414	629	0.20%	0.80%	12.15%		
LA- 3		-2	SP	CHINOOK	95500-06	BELOW LGR DA	04/30	05/0:	12990	27	106	1634	0.21%	0.82%	12.58%									
LA- 3		-3	SP	CHINOOK	95500-07	BELOW LGR DA	05/05	05/0:	12953	22	86	1324	0.17%	0.66%	10.22%									
LA- 3		-4	SP	CHINOOK	95500-08	BELOW LGR DA	05/02	05/0(	13179	ZZ	85	1255	0.17%	0.64%	9.52%									
LA- 4		-1	SP	CHINOOK	95500-11	BELOW LGR DA	05/25	07/01	8349	23	43	622	0.28%	0.52%	7.45%	8349	23	43	62:	0.28%	0.52%	7.45%		
LA- B		-3	SP	CHINOOK	95600-03	IMEQUES	03/13	03/1:	4976	1	2	28	0.02%	0.04%	0.56%								TOTALS	PERCENT
LA- E		-2	FA	CHINOOK	95607-09	UMATILLA R	05/31	05/31	10374	22	54	831	0.21%	0.52%	8.01%	20813	47	123	191	0.23%	0.59%	9.18%	282402	
RA- E		-2	FA	CHINOOK	95607-10	UMATILLA R	05/31	05/31	10439	25	69	1060	0.24%	0.66%	10.35%								317	0.16
RA- H		-1	FA	CHINOOK	95018-03	RINGOLD SPRI	06/28	07/02	10778	1	1	14	0.01%	0.01%	0.13%	10778	1	1	1	0.01%	0.01%	0.13%	800	0.44
LA- L		-1	FA	CHINOOK	95607-01	UMATILLA R	05/31	05/31	10666	31	81	1264	0.29%	0.76%	11.85%	83133	239	613	948	0.29%	0.74%	11.41%	12293	6.8
LA- L		-2	FA	CHINOOK	95607-02	UMATILLA R	05/31	05/31	11104	26	69	1069	0.23%	0.62%	9.63%									
LA- L		-3	FA	CHINOOK	95607-03	UMATILLA R	05/31	05/31	10325	39	105	1621	0.38%	1.02%	15.70%									
LA- L		-4	FA	CHINOOK	95606-01	THORNHOLLO	05/31	05/31	10254	32	85	1316	0.31%	0.83%	12.83%									
RA- L		-1	FA	CHINOOK	95607-05	UMATILLA R	05/31	05/31	10172	26	61	937	0.26%	0.60%	9.21%									
RA- L		-2	FA	CHINOOK	95607-06	UMATILLA R	05/31	05/31	10250	24	61	943	0.23%	0.60%	9.20%									
RA- L		-3	FA	CHINOOK	95607-07	UMATILLA R	05/31	05/31	10163	34	86	1316	0.33%	0.84%	12.92%									
RA- L		-4	FA	CHINOOK	95606-02	THORNHOLLO	05/31	05/31	10179	27	65	1016	0.27%	0.64%	9.98%									
RA- T		-1	FA	CHINOOK	95019-01	RINGOLD SPRI	06/28	07/02	11405	2	4	57	0.02%	0.04%	0.50%	21828	3	7	10(	0.01%	0.03%	0.46%		
RA- T		-3	FA	CHINOOK	95019-02	RINGOLD SPRI	06/28	07/02	10423	1	3	43	0.01%	0.03%	0.41%									
RA- U		-1	FA	CHINOOK	95041-01	PRIEST RAPIDS	06/13	06/14	48826	16	28	384	0.03%	0.06%	0.79%	145650	27	56	78(	0.02%	0.04%	0.54%		
RA- U		-2	FA	CHINOOK	95041-03	PRIEST RAPIDS	06/23	06/24	48564	8	20	265	0.02%	0.04%	0.55%									
RA- U		-3	FA	CHINOOK	95041-02	PRIEST RAPIDS	06/19	06/20	48460	3	8	117	0.01%	0.02%	0.24%								TOTALS	PERCENT
RA- B		-1	SU	STEELHE	95604-01	MINTHORN	04/13	04/13	8134	6	17	252	0.07%	0.21%	3.10%	24813	13	40	590	0.05%	0.16%	2.38%	289781	
RA- B		-2	O U	STEELHE	95602-01	BONIFER	04/11	04/11	7771	6	19	280	0.08%	0.24%	3.60%								183	0.1
RA- B		-4	SU	STEELHE	95603-01	BONIFER	05/12	05/12	8908	1	4	58	0.01%	0.04%	0.65%								540	0.3
LA- H		-1	SU	STEELHE	95414-01	LYONS FERRY	04/20	04/20	40170	28	83	1246	0.07%	0.21%	3.10%	90470	65	174	2565	0.07%	0.19%	2.84%	8098	4.48
RA- H		-1	SU	STEELHE	95415-01	WALLA WALLA	04/18	04/18	25067	20	41	580	0.08%	0.16%	2.31%									
RA- H		-2	SU	STEELHE	95415-02	WALLA WALLA	04/18	04/18	25233	17	50	739	0.07%	0.20%	2.93%									
LA- IC		-1	SU	STEELHE	95416-01	TOUCHET R	04/05	04/30	20133	21	65	991	0.10%	0.32%	4.92%	113957	102	318	4821	0.09%	0.28%	4.23%		
LA- IC		-3	SU	STEELHE	95416-02	TOUCHET R	04/05	04/30	20041	21	73	1115	0.10%	0.36%	5.56%									
RA- [2		-1	SU	STEELHE	95416-03	TOUCHET R	04/05	04/30	20221	31	96	1465	0.15%	0.47%	7.24%									
LA- IJ		-1	SU	STEELHE	95413-01	TUCANNON R	04/11	05/18	18286	13	38	585	0.07%	0.21%	3.09%									
RA- LI		-1	SU	STEELHE	95413-02	TUCANNON R	04/11	05/18	18124	8	26	385	0.04%	0.14%	2.12%									
ΠΛ, IJ		-3	SU	STEELHE	95413-03	TUCANNON R	04/11	05/18	17150	6	20	300	0.05%	0.12%	1.75%									
LA- J		-1	SU	STEELHE	95115-01	SPRING CR CH	04/16	04/19	20088	1	1	16	0.00%	0.00%	0.08%	60541	3	8	122	0.00%	0.01%	0.20%		
RA- J		-1	SU	STEELHE	95115-02	SPRING CR CH	04/16	04/19	19902	1	4	59	0.01%	0.02%	0.30%									
RA- J		-2	SU	STEELHE	95117-01	LI SHEEP	05/01	05/02	20551	1	3	47	0.00%	0.01%	0.23%									
									752995	1060	2908	43620		TOTALS --->		752995	1060	2908	43620	0.14%	0.39%	5.79%		

Table A-4. Interruptions in the Sampling Season (175 Days or 4,200 Hours) Due to Unit 3 Shutdowns (Hours Out of Service).

End Date	Batch Number	Unit 3 Hours OOS	Reason for Interruption
5/11	95035-95036	5.0	Funnel & STS/VBS Inspection
7/01-02	95087-95088	20.0	Units l-4 Shutdown Because of Power Transformer Malfunction
7/06	05092-95093	8.0	Funnel & STS/VBS Inspection
7/28	95115	1.5	Funnel & STS/VBS Inspection
9/07	95116	4.0	Funnel & STS/VBS Inspection
Total Hours		38.5	

APPENDIX B

BONNEVILLE DAM - 1995

FIGURES	TITLES	PAGE #
B-l	Daily Descaling and Mortality Rates	B-l
B-Z	Daily Percent Night Passage	B-2
B-3	Daily Shad & Lamprey Passage	B-3
B-4	Powerhouse 1 sampling area floor plan	B-4
B-5	Powerhouse 2 sampling-area floor plan	B-5
TABLES		
B-l	PIT Tag Data – Detail	B-6
B-Z	PIT tag Data – Summary	B-7
B-3	Biased Sample Days – Detail	B-7
B-4	Freeze Brand Data – Spring Chinook	B-8
B-5	Freeze Brand Data – Fall Chinook	B-9
B-6	Freeze Brand Data – Summer Steelhead	B-10

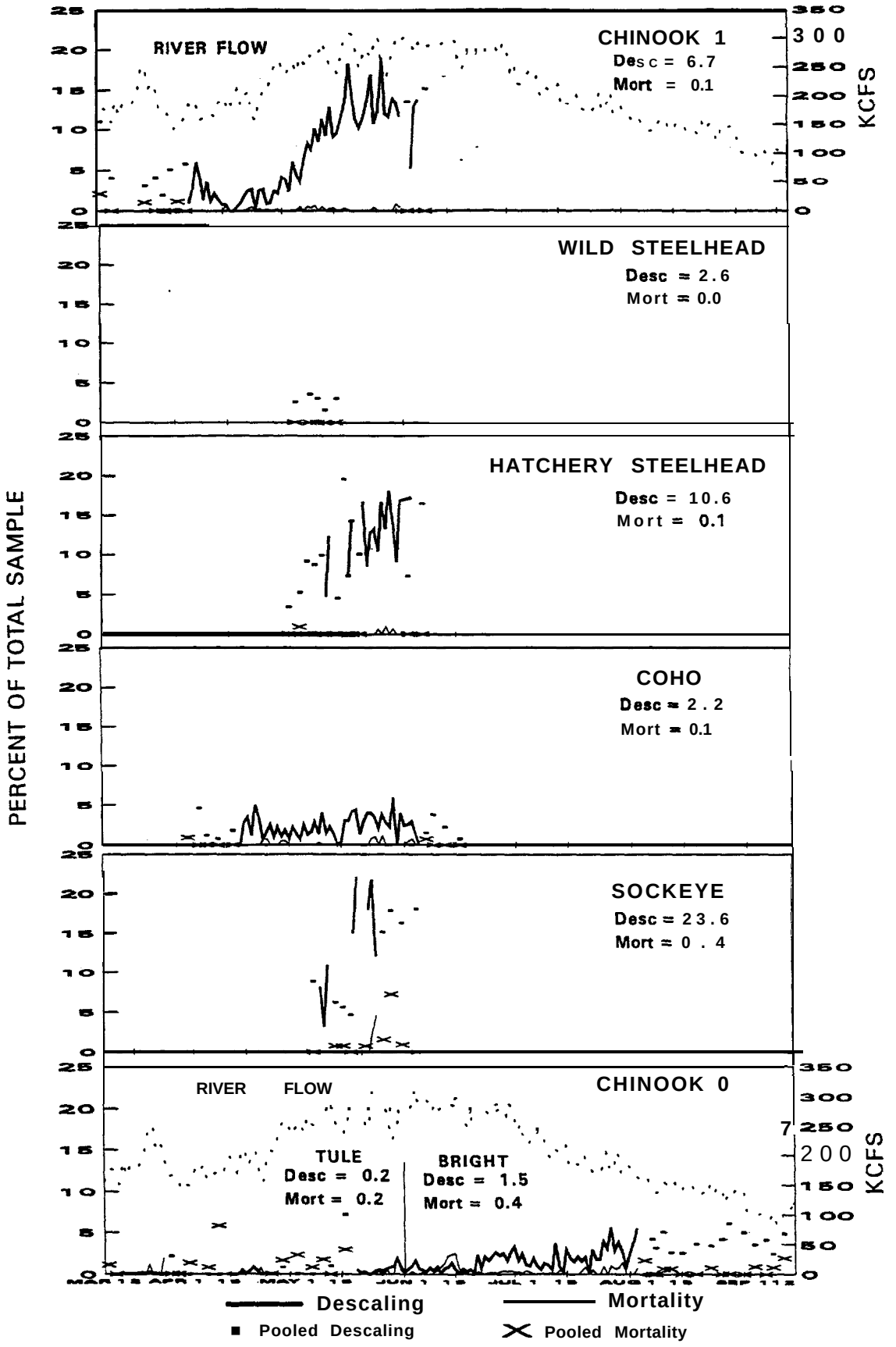

Figure B-I. Daily percent descaiing and mortality with season totals at Bonneville Dam, 1995. Marked data points indicate midpoint of pooled samples, objective n = 100.

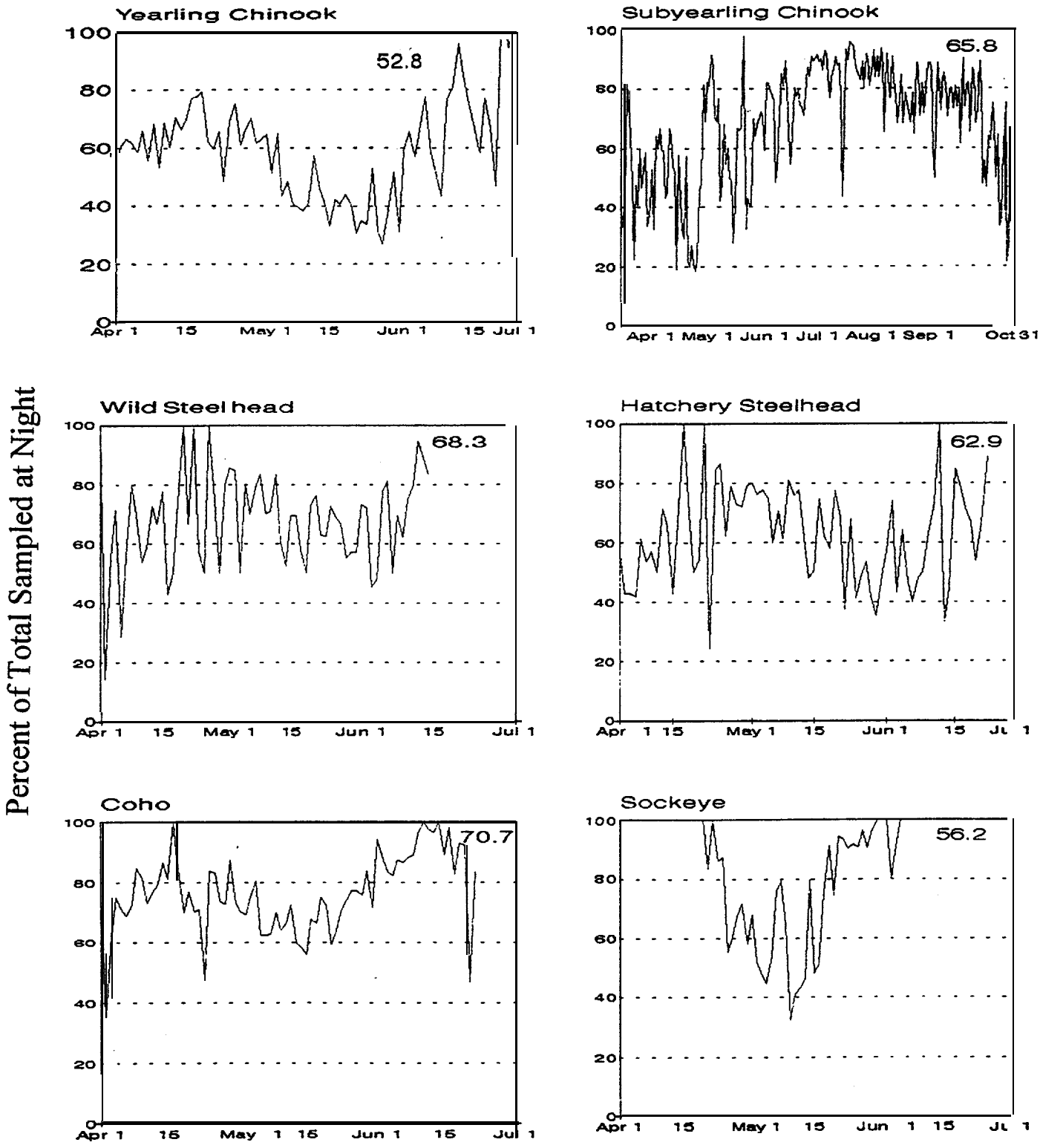

Figure B2. Percentage of daily collection sampled at night, 200 1 to 0559 hours (PDT) at Bonneville Dam. Daily samples <35 excluded, season total (%) in upper right comer of each graph.

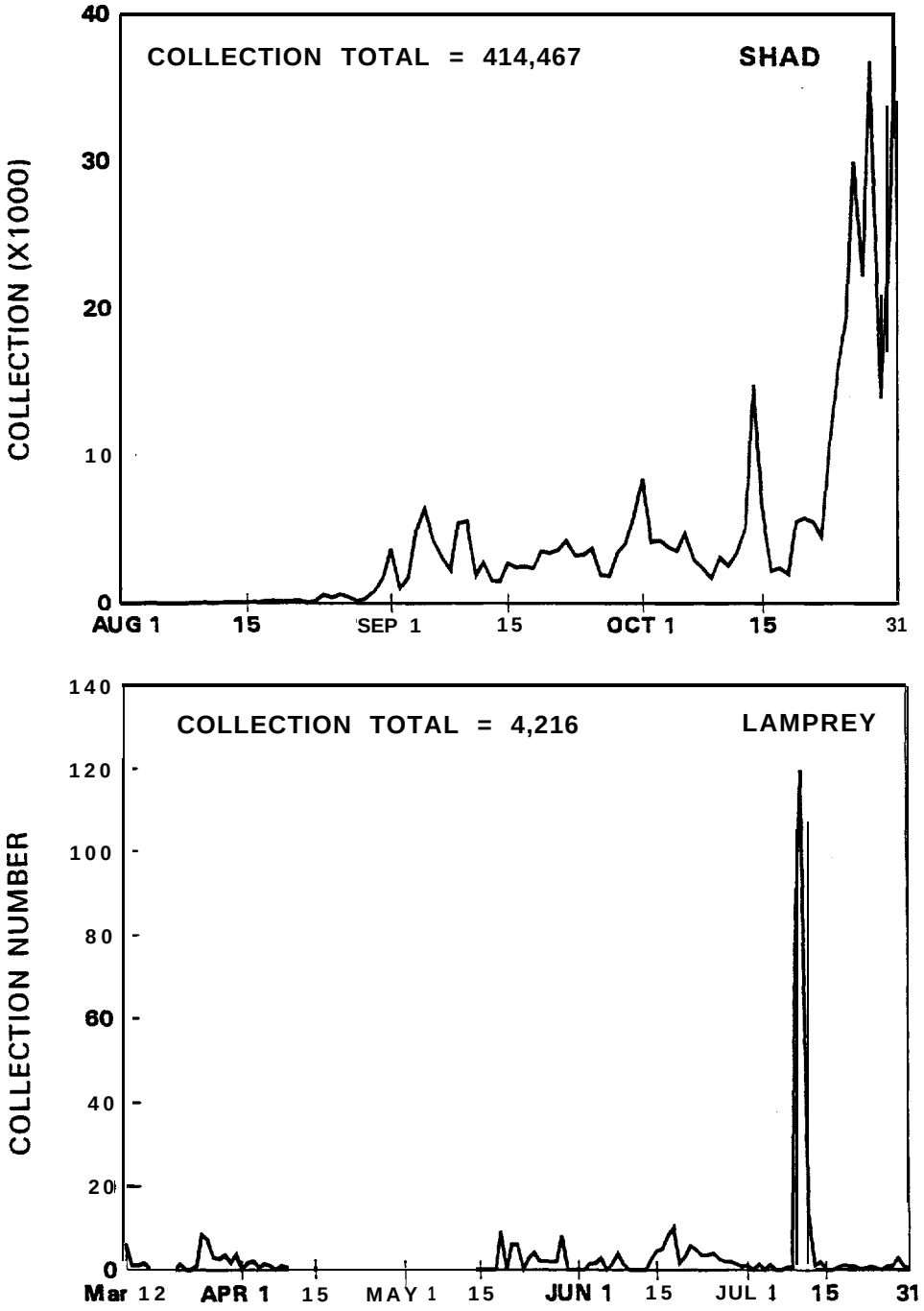

Figure B3. Seasonal juvenile shad and lamprey counts at Bonneville Dam, 1995

Figure B-4. Smolt Monitoring System at Bonneville Dam, 1995. 1 inch = 4 feet

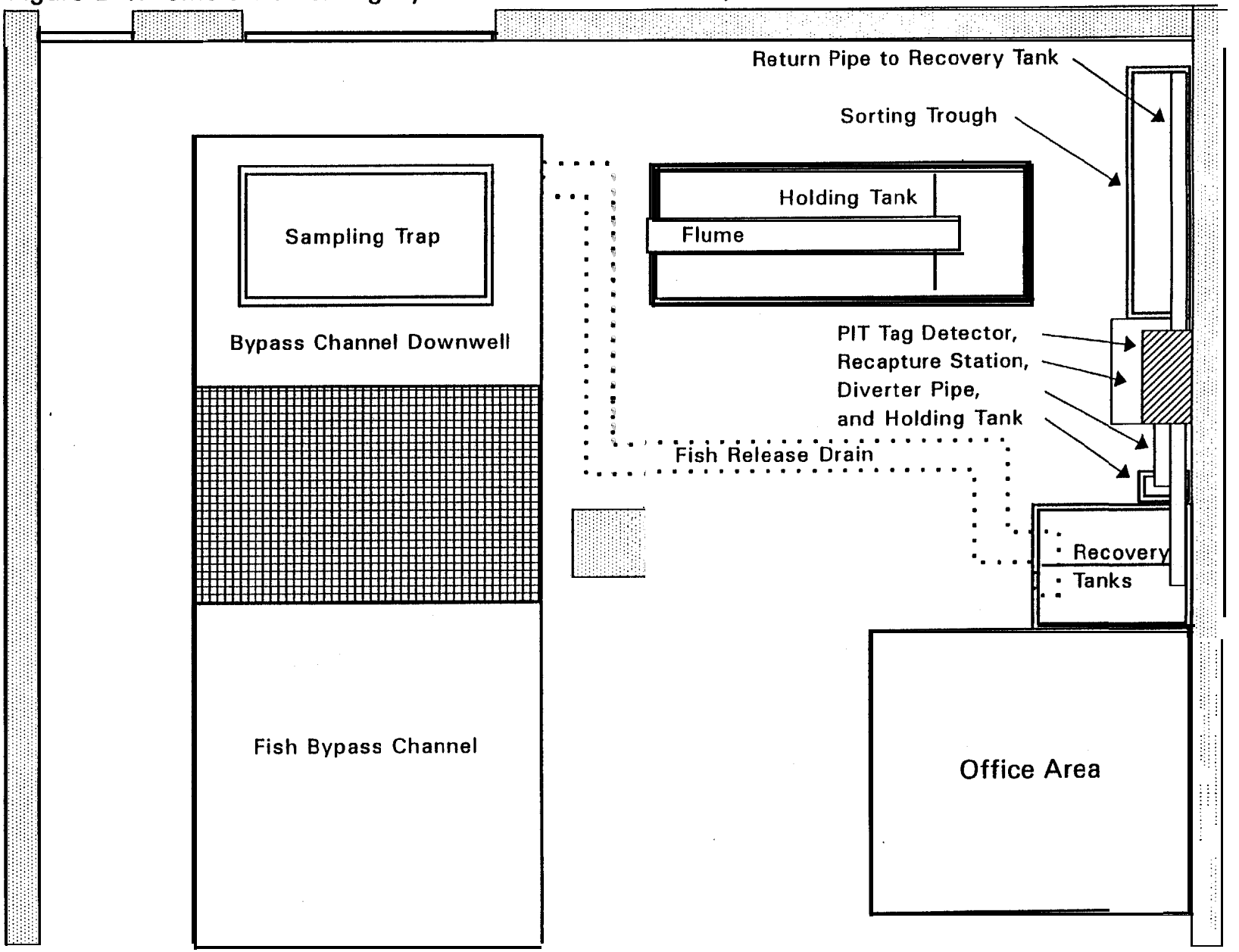

Figure B-5. Smolt Sampling System at Bonneville Dam, PH2, 1995.

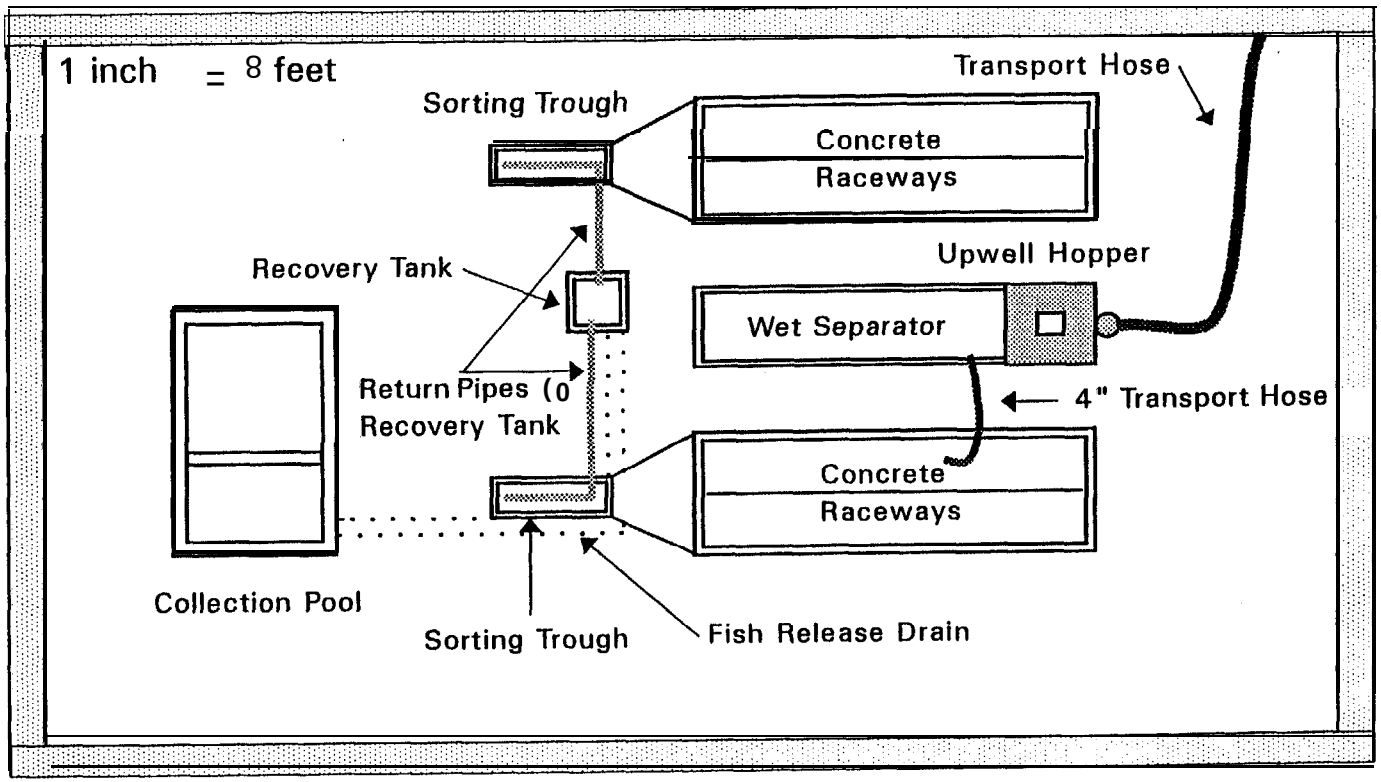

Table B-1. Bonneville Dam 1995 observations of PIT-tagged fish released in 1995.

RELEASE SITE	SPP	RUN	RT	N	TRAVEL TIME (DAYS) MEAN	MIN	MAX	RIVER KM UPSTREAM OF BON	AVERAGE SPEED (KM/DAY)
American River	Chinook	Spring	Hatchery	1	39.7			733	16.6
Big Canyon Fac.	Steelhead	Summer	Hatchery	1	37.7			709	16.6
Big C.	Chinook	Spring	Wild	1	280.8			939	3.6
Big Canyon c.	Steelhead	Summer	Wild	1	15.6			569	36.4
Methow Rearing P.	Chinook	Summer	Hatchery	1	NA			668	
Chiwawa Rearing P.	Chinook	Spring	Hatchery	3	32.6	29.4	36.2	600	16.3
Clear c.	Chinook	Spring	Hatchery	1	39.7			636	16.0
Clearwater T.	Chinook	Unknown	Hatchery	3	a . 2	25.2	63.1	522	16.5
	Chinook	Unknown	Wild	1	35.0			522	14.9
Columbia R.	Chinook	Fall	Wild	2	34.4	31.5	37.2	381	10.5
Crooked River Pond	Chinook	Spring	Hatchery	5	42.9	34.3	51.4	741	17.3
Dryden Acclimation P.	Chinook	Summer	Hatchery	1	32.4			546	16.9
Dworshak H.	Chinook	Spring	Hatchery	3	36.5	31.5	41.3	677	16.6
	Steelhead	Summer	Hatchery	4	25.2	20.9	34.0	577	22.0
Grand Ronde R.	Chinook	spring	Wild	3	23.5	16.6	27.1	559	23.8
Hazard c.	Steelhead	Summer	Hatchery	1	46.9			762	16.6
Herd c.	Steelhead	Summer	Hatchery	1	322			1157	36.0
Knox Bridge	Chinook	Summer	Hatchery	3	53.6	49.7	58.3	918	17.1
Leavenworth H.	Chinook	Spring	Hatchery	2	a . 7	23.9	33.5	5 %	19.7
Lower Granite D.	Chinook	Fall	Hatchery	1	70.6			461	6.5
Lower Granite Collection	Chinook	Spring	Hatchery	2	2 2 4	22.0	227	461	20.6
	Chinook	Unknown	Hatchery	1	17.9			461	25.8
	Steelhead	Summer	Hatchery	3	16.2	9.9	20.2	461	28.5
Lower Granite Dam A.	Chinook	Unknown	Hatchery	104	16.0	11.2	41.6	461	25.6
	Chinook	Unknown	Wild	46	10.5	11.4	30.6	461	23.6
Lower Granite Tailrace	Chinook	Spring	Hatchery	2	222	22.0	22.3	461	20.8
	Chinook	Unknown	Hatchery	5	21.6	15.3	28.6	461	21.3
	Steelhead	Summer	Hatchery	1	29.4			461	15.7
Lower Granite Turbine	Chinook	Unknown	Hatchery	3	21.2	19.4	23.1	461	21.7
Little Goose Collection	Steelhead	s u m	Hatchery	3	19.7	11.3	265	401	20.4
Little Goose Tailrace	Steelhead	Summer	Hatchery	6	15.3	11.1	25.6	401	28.2
L. Monumental Collection	Chinook	Fall	Hatchery	1	33.4			355	10.6
	Chinook	Unknown	Hatchery	7	13.7	6.4	25.6	355	25.9
	Steelhead	Summer	Hatchery	3	11.7	a.4	17.4	355	30.4
Lower Monumental Tailrace	Chinook	Fall	Hatchery	1	39.5			355	9.0
	Chinook	Unknown	Hatchery	2	7.0	6.6	7.2	355	50.6
	Steelhead	Summer	Hatchery	4	9.5	9.5	14.3	355	37.5
Lolo c.	Chinook	Spring	Wild	1	24.6			5 %	24.4
Lookingglass H.	Chinook	Spring	Hatchery	2	40.1	36.3	420	699	17.4
Lyons Ferry H.	Chinook	Fall	Hatchery	1	33.5			383	11.4
Meadow Creek S.	Chinook	Spring	Hatchery	1	48.5			670	13.6
Meadow c.	Chinook	Spring	Hatchery	1	61.1			700	13.7
Newsome C.	Chinook	Spring	Hatchery	1	33.1			716	21.6
Pahsimeroi P.	Chinook	Summer	Wild	1	66.4			1091	16.4
Pahsimeroi Aim T.	Chinook	Summer	Wild	1	33.1			1631	329
Powell Rearing P.	Chinook	Spring	Hatchery	1	36.2			762	20.5
Ringold H.	Chinook	Fall	Hatchery	1	10.6			333	30.7
Rock Island 0.	Chinook	Unknown	Hatchery	2	15.5	123	16.6	4 %	320
	Chinook	Unknown	Unknown	2	25.8	14.1	37.6	4 %	19.2
	Steelhead	Summer	Wild	1	16.4			4 %	26.9
	Sockeye	Unknown	Wild	1	21.4			4 %	23.1
Salmon R. E. FK. T.	Steelhead	Summer	Hatchery	2	30.8	28.9	32.7	1172	38.1
Salmon R. E. FK. W.	Chinook	Spring	Wild	1	64.2			1173	16.3
Salmon R.	Steelhead	Summer	Hatchery	2	324	27.0	36.0	1164	35.9
Salmon R. N. FK.	Steelhead	Summer	Hatchery	1	44.6			972	21.6
Salmon T.	Chinook	Unknown	Hatchery	2	53.7	53.1	54.3	676	126
	Chinook	Unknown	Wild	8	35.9	27.6	50.9	676	16.6
	Steelhead	Unknown	Hatchery	1	17.6			676	36.5
Similkameen P/H	Chinook	Summer	Hatchery	1	47.0			636	17.6
Snake A.	Chinook	Spring	Hatchery	11	27.7	16.5	41.4	510	16.4
	Chinook	Fall	Hatchery	15	78.3	46.1	95.5	551	7.0
	Chinook	Unknown	Wild	1	61.5			546	6.0
	Steelhead	Summer	Hatchery	11	21.7	13.4	27.4	510	23.5
Snake T.	Chinook	Unknown	Hatchery	2	26.1	26.1	30.1	613	16.3
	Chinook	Unknown	Wild	4	26.1	22.3	26.9	513	19.7
	Steelhead	Summer	Hatchery	1	23.5			513	21.8
Wells H.	Chinook	Summer	Hatchery	3	26.5	25.4	26.5	6 %	225
			Total=	316					

Bonneville Dam 1995 observations of PIT-tagged fish released In 1994.

RELEASE SITE	SPP	RUN	RT	N	TRAVEL TIME (DAYS) MEAN	MIN	MAX	RIVER KM UPSTREAM OF BON	AVERAGE SPEED KM/DAY
Crooked River P.	Chinook	Spring	Hatchery	2	244.0	243.1	244.9	741	3.0
Crooked R.	Chinook	Spring	Wild	3	283.5	275.3	294.3	728	2 6
Crooked River T.	Chinook	Spring	wlkl	1	367.3			727	2 0
Fish c.	Steelhead	Summer	Wild	1	334.6			706	21
Imnaha T.	Chinook	Summer	Wild	1	1625			603	3.7
	Steelhead	Summer	H a -	I	300.0			603	2 0
Lemhi R.	Chinook	Spring	Wild	1	176.5			1007	5.7
Lookingglass c.	Chinook	Spring	Wild	1	2221			696	3.1
Pahsimeroi P.	Chinook	Summer	Wild	1	170.2			1091	6.4
Salmon R. E. FK. W.	Chinook	Spring	Wild	1	263.1			1173	5.6
Salmon A. S. FK. T.	Chinook	Summer	Wild	1	219.0			917	4.2
			Total	14					

Table B-2. Summary of PIT tag detections at Bonneville Dam, 1995.

Species	Run	Rearing Type	Diverter Coil .	Recapture Station	Recapture Efficiency (%)
Chinook	Spring	Hatchery	38	29	76.3
		Wild	12	11	91.7
		Total	SO	40	80.0
	Summer	Hatchery	9	6	66.7
		Wild	5	3	60.0
		Total	14	9	64.3
	Fall	(Hatchery	20	20	100.0
		Wild	2	2	100.0
		Total	22	22	100.0
	Unknown	Hatchery	131	116	88.5
		Wild	60	53	88.3
		Unknown	2	2	100.0
		Total	193	171	88.6
	Chinook Total		279	242	86.7
Steelhead	Summer	Hatchery	45	38	84.4
		Wild	3	3	100.0
	Steelhead Total		**48**	**41**	**85.4**
Sockeye	Unknown	Wild	1	1	100.0
	Sockeye Total		**1**	**1**	**100.0**
TOTALS - ALL SPECIES COMBINED			**328**	**284**	**86.6**

- Detections are for 'migration year 95" fish only.
- * Table XX does not include two 'migration year 94" fish. These fish were detactad before the diverter was operational. They include one wild spring chinook and one hatchery summer steelhead.

Table B-3. PH-1 sampling interruptions at Bonneville Dam, 1995.

End Date	Reason for Outage	Hours Missed
April 11	Trap flume adjustments	1
April 19	Trash sweep repairs	4
May 2	Trap cable adjustment	1
May 3	Trap cable replacement	2
May 19	Excessive fish passage	4
May 20	Excessive fish paesage	1
May 25	General power failure	1
June 11	Trash sweep repair	3
June 17	Trash sweep repair	3
June 21	Trap repair	1
August 13	Trap block replacement	4
September 2	Trap cable replacement	4
September 20	PIT tag detector testing	4
September 24	Power outage	1
	Total hours missed	**34**

Table B-4. Spring chinook freeze brand recoveries in 1995 at Bonneville Dam, PH1

Release Site	Brand	n Recap	n Released	% Recaptured			Rel. Date	Recapture Date	
				Samp.	Coll.	Index		Range	Median[1]
Imeques	LA-B-l	3	5,176	0.06	1.45	5.00	3/13	5/06-5/07	5/07
	LA-B-2	4	5,062	0.08	1.07	3.63	3/13	4/05-5/09	5/01
	LA-B-3	8	4,976	0.16	2.57	8.98	3/13	4/11-5/08	5/04
	LA-B-4	7	5,133	0.14	2.28	7.91	3/13	4/04-5/09	5/05
	RA-B-1	4	4,908	0.08	1.08	3.89	3/13	3/31-5/02	4/30
	RA-B-4	5	4,438	0.11	1.58	5.52	3/13	4/10-5/05	5/04
Umatilla R	RA-B-2	3	4,878	0.06	2.46	9.78	4/21	5/17-5/20	5/20
	RA-B-3	6	5,137	0.12	3.21	11.60	4/21	5/08-5/31	5/16
Below LGR Dam	LA-P-l	5	13,056	0.13	3.55	12.50	4/09-4/18	5/04-5/13	5/09
	LA-P-2	16	12,590	0.13	4.52	16.01	4/18-4/21	5/07-5/19	5/13
	LA-P-3	18	12,852	0.14	5.85	21.34	4/21-4/25	5/08-5/26	5/13
	LA-P-4	12	12,372	0.10	4.38	15.59	4/25-4/28	5/11-5/19	5/14
	LA-z-1	9	13,323	0.07	2.87	10.86	5/07-5/10	5/20-5/26	5/22
	LA-z-2	7	11,774	0.06	1.28	4.88	5/10-5/20	5/23-6/07	5/27
	LA-3-l	13	12,690	0.10	5.07	18.05	4/28-4/30	5/12-5/19	5/14
	LA-3-2	19	12,990	0.15	6.25	23.60	4/30-5/02	5/14-5/28	5/19
	LA-3-3	14	12,953	0.11	4.50	16.83	5/05-5/07	5/16-6/01	5/21
	LA-3-4	4	13,179	0.03	1.43	5.63	5/02-5/04	5/18-5/21	5/19
	LA-4-1	6	8,349	0.07	0.68	2.59	5/25-7/01	6/10-7/01	6/18

'Median recapture dates are days when cumulative passage indices reach 50%.

Table B-5. Fall chinook freeze brand recoveries in 1995 at Bonneville Dam, PH1.

Release Site	Brand	n Recap	n Released	% Recaptured			Rel. Date	Recapture Date	
				Samp.	Coll.	Index		Range	Median'
Umatilla R.	LA-E-2	9	10,374	0.09	1.37	5.42	5/31	6/10-6/14	6/12
	RA-E-2	8	10,439	0.08	1.20	4.69	5/31	6/11-6/14	6/13
	LA-L-l	10	10,666	0.09	1.37	5.32	5/31	6/10-6/19	6/14
	LA-L-2	12	11,104	0.11	1.41	5.41	5/31	6/10-6/21	6/13
	LA-L-3	23	10,325	0.22	3.91	15.25	5/31	6/10-6/20	6/13
	LA-L-4	9	10,254	0.09	1.25	4.88	5/31	6/09-6/13	6/11
	RA-L-1	12	10,172	0.12	1.76	6.94	5/31	6/05-6/27	6/12
	RA-L-2	14	10,250	0.14	1.93	7.45	5/31	6/11-6/16	6/13
	RA-L-3	18	10,183	0.18	2.49	9.72	5/31	6/10-6/22	6/13
Thornhollow	RA-L-4	13	10,179	0.13	1.80	6.98	5/31	6/09-6/20	6/12
Ringold Springs	RA-T-1	1	11,405	0.01	0.08	0.31	6/28-7/02	7/11	7/11
	RA-H-2	1	12,081	0.01	0.07	0.27	6/28-7/02	7/10	7/10
Priest Rapids	RA-u-1	4	48,826	0.01	0.07	0.23	6/13-6/14	6/29-7/02	7/02
	m-u-2	3	48,564	0.01	0.05	0.20	6/23-6/24	7/03-7/10	7/06
	m-u-3	3	48,460	0.01	0.05	0.20	6/19-6/20	7/03-7/09	7/05

'Median recapture dates are days when cumulative passage indices reach 50%.

Table B-6. Summer steelhead freeze brand recoveries in 1995 at Bonneville Dam, PH1.

Release Site	Brand	n Recap	n Released	% Recaptured			Rel. Date	Recapture Date	
				Samp.	Coll.	Index		Range	Median'
Minthorn	RA-B-l	1	8,134	0.01	0.25	0.96	4/13	5/01	5/01
Bonifer	RA-B-2	4	7,771	0.05	1.12	4.14	4/11	4/29-5/06	5/05
	RA-B-4	1	8,908	0.01	0.18	0.76	5/12	6/01	6/01
Lyons Ferry	LA-H-l	15	40,170	0.04	0.94	3.37	4/20	5/15-6/15	5/18
Walla Walla R.	RA-H-1	15	25,067	0.06	1.46	5.51	4/18	4/30-5/12	5/05
	RA-H-2	11	25,233	0.04	1.10	4.08	4/18	5/01-5/19	5/09
Touchet R.	LA-IC-1	10	20,133	0.05	1.63	6.15	4/05-4/30	5/10-5/31	5/16
	LA-IC-3	6	20,041	0.03	1.20	4.47	4/05-4/30	5/12-5/29	5/13
	RA-IC-1	5	20,221	0.02	0.58	2.22	4/05-4/30	5/08-6/01	5/19
Tucannon R.	LA-IJ-1	1	18,288	0.01	0.11	0.42	4/11-5/18	5/25	5/25
	RA-IJ-3	2	17,150	0.01	0.47	1.74	4/11-5/18	5/21-5/28	5/21
Spring Cr. Chnl.	LA-J-l	2	20,088	0.01	0.33	1.15	4/16-4/19	5/16-5/24	5/16
	RA-J-1	1	19,902	0.01	0.07	0.27	4/16-4/19	6/13	6/13
Kooskia	LD-7P-3	1	10,000	0.01	0.46	1.76	4/17-4/20	5/12	5/12

'Median recapture dates are days when cumulative passage indices reach 50%.

APPENDIX C
HISTORICAL DATA

JOHN DAY DAM

FIGURES	TITLES	PAGE #
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C-6	Passage Dates and 80% duration in days	C-6
c-7	Shad and Lamprey, yearly totals	c-7

TABLES

C-l	Descaling and Mortality, yearly totals/species	C-8
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c-9	Brands, yearly totals/species	c-12
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c-11	Incidental catch	c-13

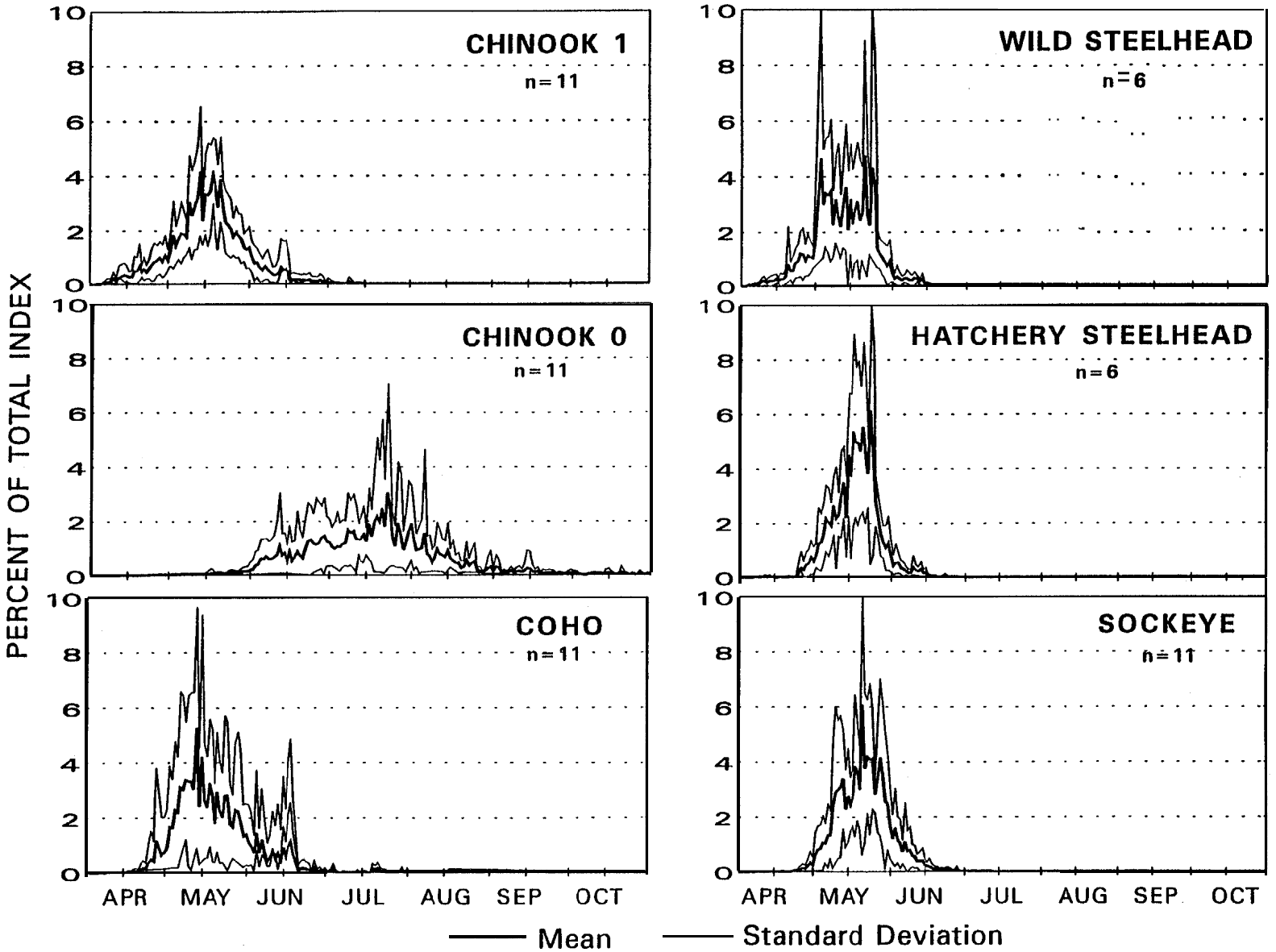
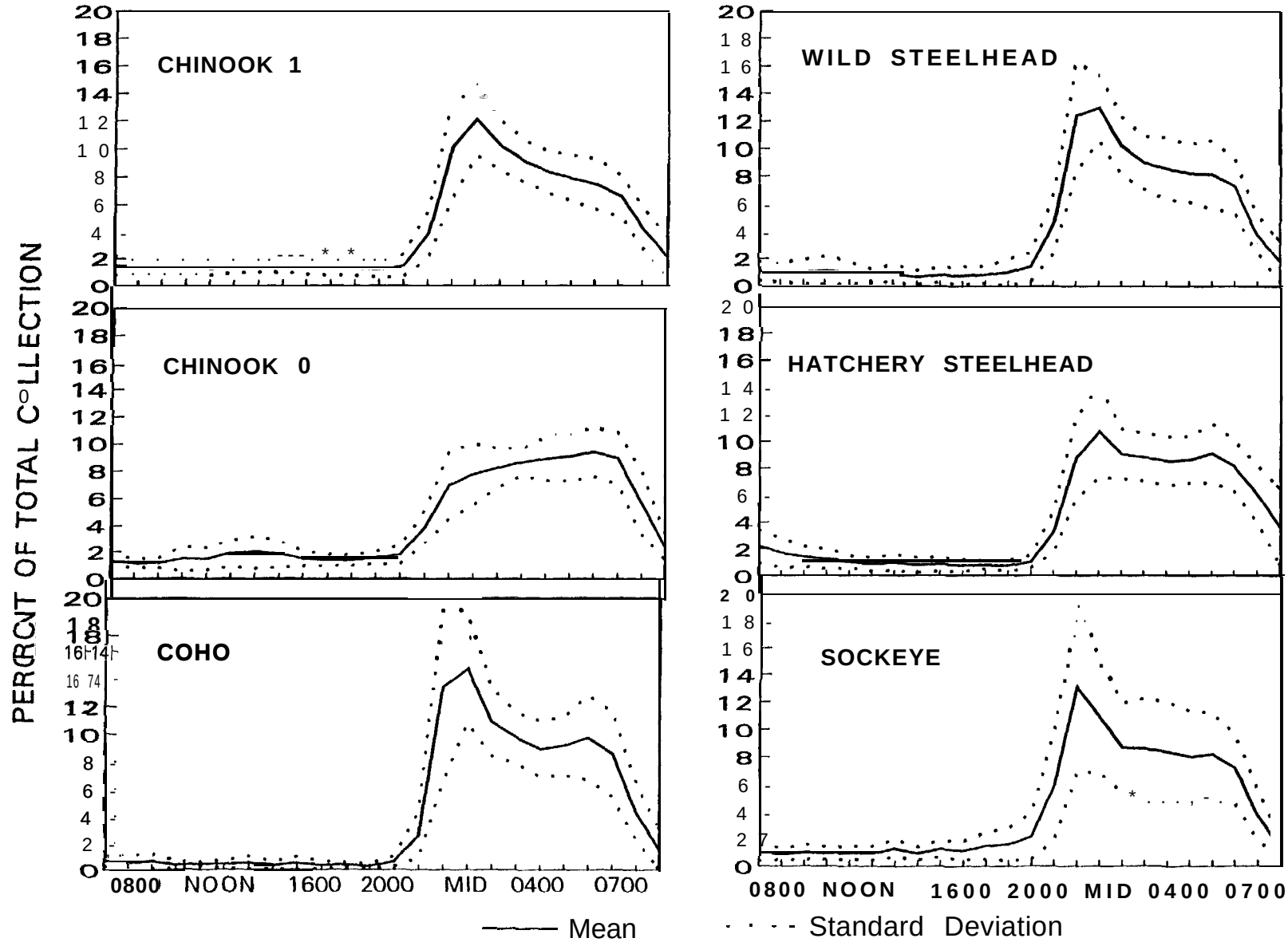


Figure C Seasonal passage pattern, John Day Dam, 1985 - 1995.



C2

Figure C2. Average diel passage, John Day Dam, 1985 - 1995.

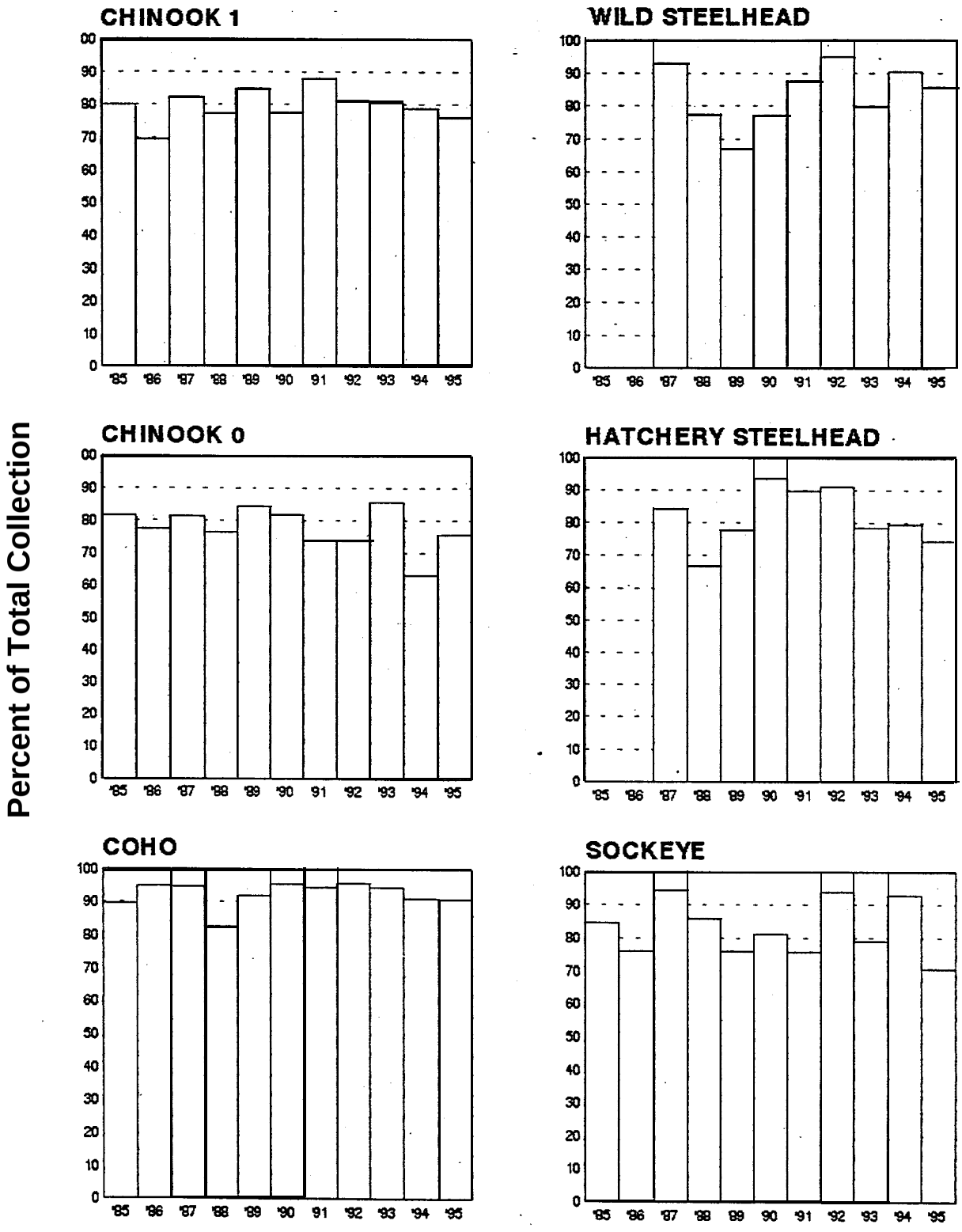


Figure C-3. Percent night passage (2001-0600) for each season at John Day Dam, by species, 1985-1995.

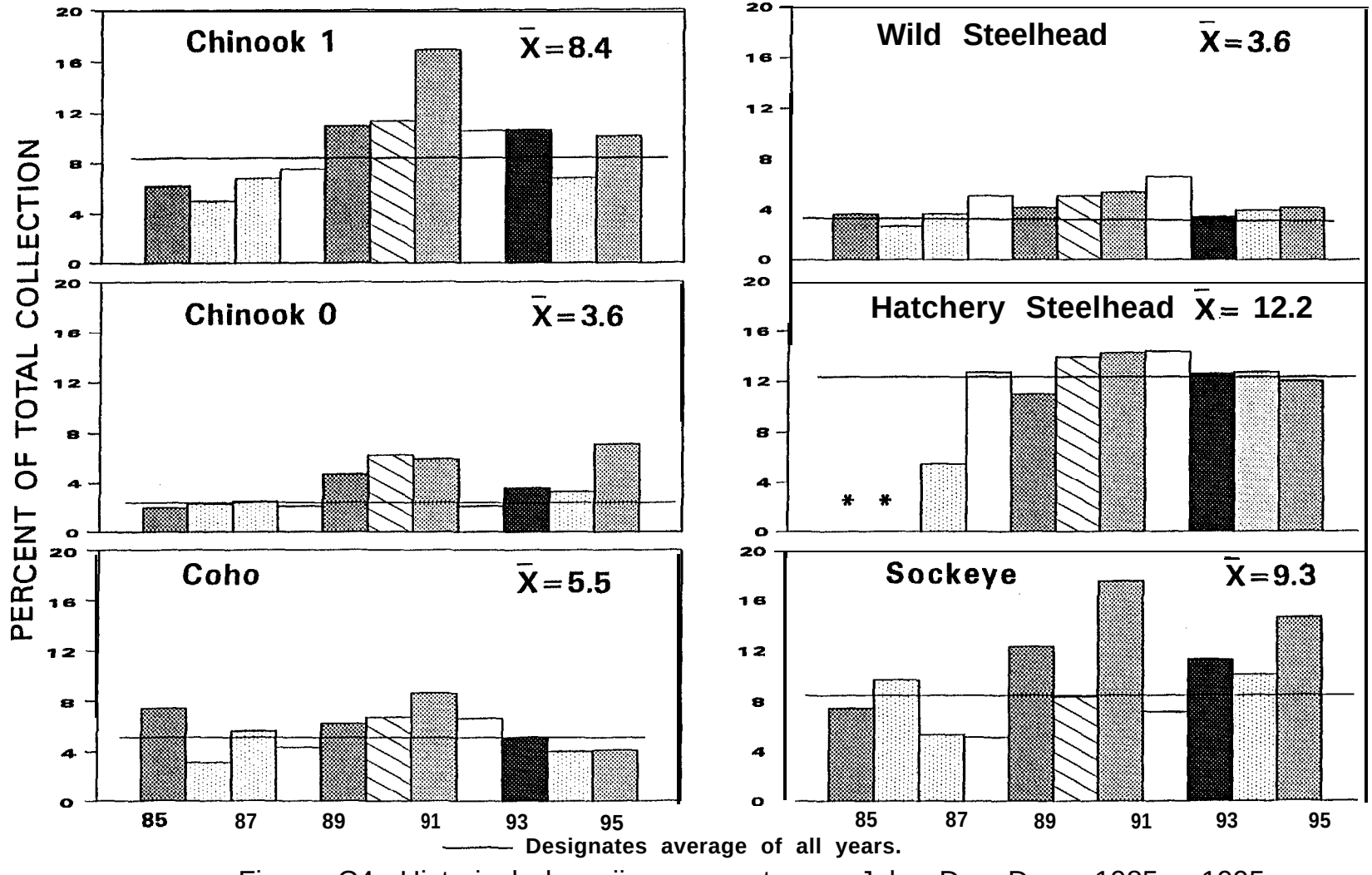


Figure C4. Historical descaiing percentages, John Day Dam, 1985 - 1995.

*'Hatchery and wild shown as Wild Steelhead.

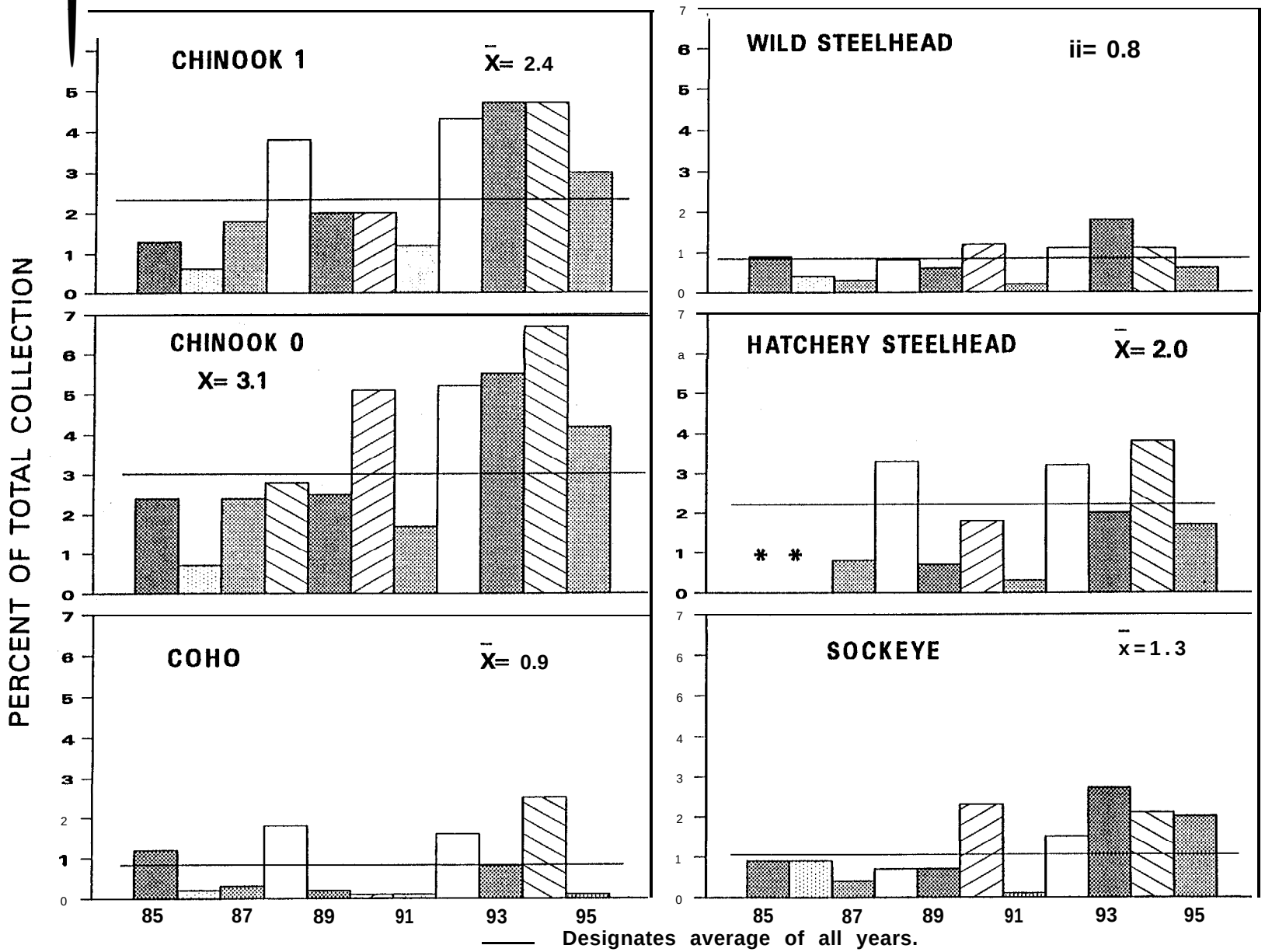


Figure C5. Historical mortality percentages, John Day Dam, 1985 - 1995.

*** Hatchery and wild shown as Wild Steelhead.**

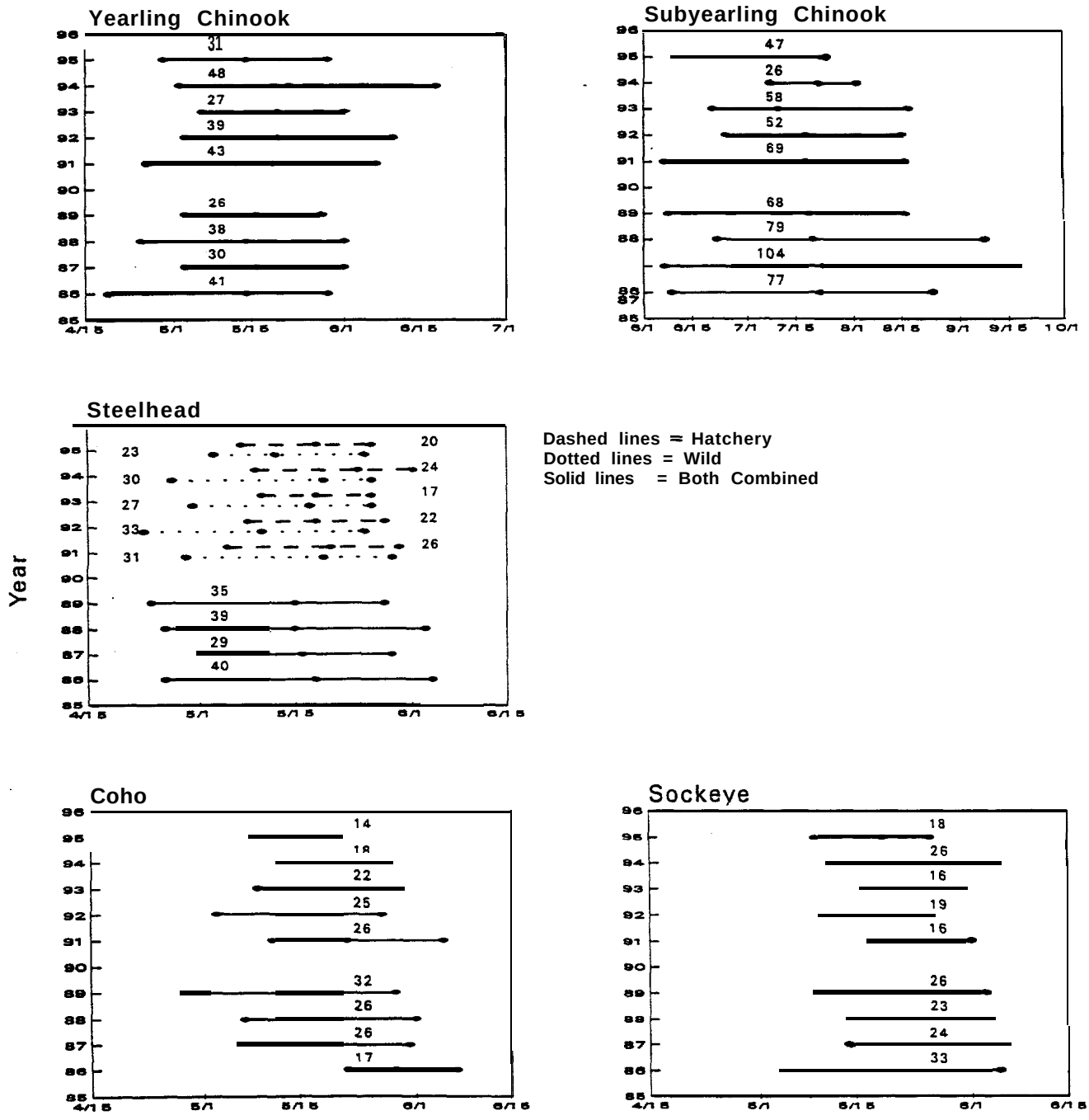


Figure C-6. 10%, 50%, and 90% Passage Dates for each season at John Day Dam, by species, 1986-1995. The duration between 10-90% dates (in days) are indicated above each line. (No passage dates were calculated for 1990 due to biased sample season.)

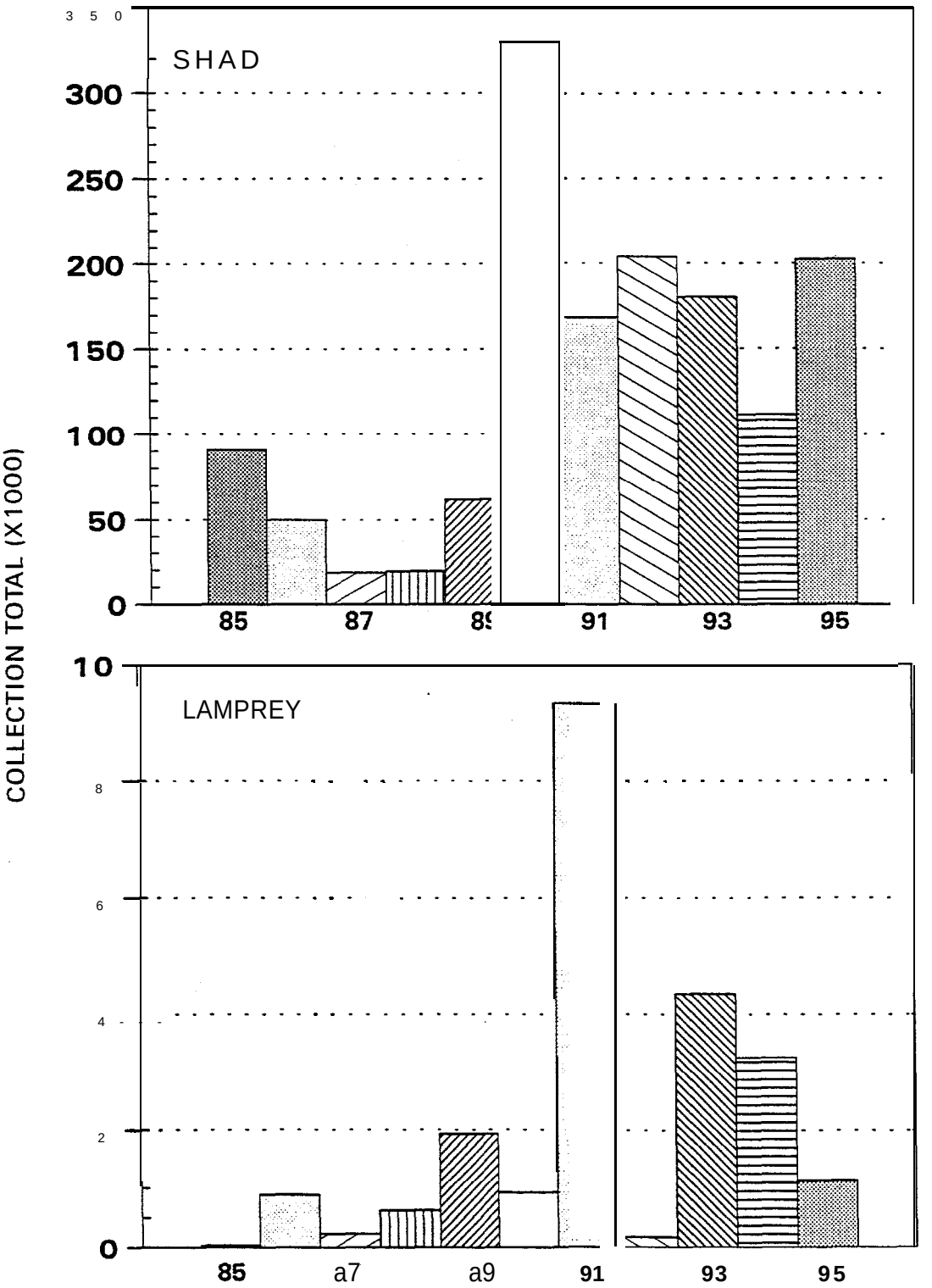


Figure C7. Historical juvenile shad and lamprey counts, John Day Dam, 1985 - 1995.

TABLE Cl. Descaling and mortality data from John Day Dam, 1985 - 1995.

	CHINOOK 1					CHINOOK 0				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	82790	3846	6.2	809	1.3	228211	4567	2.0	5425	2.4
1986	92856	4630	5.0	547	0.6	181857	4135	2.3	1231	0.7
1987	64312	5617	6.8	1505	1.6	95693	2290	2.5	2313	2.4
1988	34071	2470	7.5	1292	3.8	109435	2186	2.1	3050	2.8
1989	34935	3749	10.9	694	2.0	129957	5922	4.7	3273	2.5
1990	26907	2968	11.3	541	2.0	39280	2316	6.2	2009	5.1
1991	26879	4487	16.9	320	1.2	46785	2696	5.9	775	1.7
1992	42231	4256	10.5	1823	4.3	59783	1216	2.1	3096	5.2
1993	52821	5342	10.6	2464	4.7	116804	3954	3.6	6413	5.5
1994	34071	2219	6.8	1606	4.7	75164	2309	3.3	5004	6.7
1995	34308	3361	10.1	lo32	3.0	48896	3325	7.1	2029	4.2
Total 85-95	526181	42945	8.4	12633	2.4	1131865	34916	3.2	34618	3.1

	WILD STEELHEAD					HATCHERY STEELHEAD				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	36355	1292	3.6	320	0.9					
1986	37858	962	2.6	156	0.4					
1987	12374	447	3.6	41	0.3	11622	634	5.5	94	0.8
1988	6810	335	5.0	56	0.8	8227	1012	12.7	268	3.3
1989	8565	348	4.1	53	0.6	11229	1225	11.0	a4	0.7
1990	6104	303	5.0	76	1.2	4867	665	13.9	90	1.8
1991	5455	287	5.3	10	0.2	11171	1593	14.3	30	0.3
1992	5141	332	6.5	54	1.1	11970	1663	14.4	389	3.2
1993	16042	530	3.4	294	1.8	52936	6562	12.6	1049	2.0
1994	7604	290	3.9	85	1.1	14454	1761	12.7	554	3.8
1995	4043	166	4.1	26	0.6	18915	2236	12.0	325	1.7
Total 85-95	146371	5292	3.6	1171	0.8	145391	17351	12.2	2883	2.0

	COHO					SOCKEYE				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SAMPLE	DESC	%DESC	MORT	%MORT
1985	598	44	7 . 4	7	1.2	17246	1258	7.4	157	0.9
1986	1990	62	3.1	4	0.2	17539	1688	9.7	151	0.9
1987	13213	741	5.6	36	0.3	11923	624	5.3	48	0.4
1988	8680	363	4.3	153	1.8	6336	320	5.1	45	0.7
1989	6934	431	6.2	12	0.2	5497	672	12.3	41	0.7
1990	6261	418	6.7	7	0.1	1769	144	a.3	41	2.3
1991	5104	437	6.6	3	0.1	3447	604	17.5	4	0.1
1992	9604	636	6.6	158	1.6	2608	183	7.1	39	1.5
1993	13164	669	5.1	110	0.8	14885	1630	11.3	397	2.7
1994	11385	446	4.0	281	2.5	7270	719	10.1	155	2.1
1995	5908	244	4.1	8	0.1	5625	807	14.6	112	2.0
Total 85-95	83041	4491	5.5	779	0.9	94145	8649	9.30	1190	1.3

TABLE C-2. Yearling Chinook condition subsampiing data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD	3-19%
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD	PRED	DESC
1985	981	N/A	0.92	N/A	1.94	N/A	0.00	N/A	N/A	N/A	10.19
1986	950	N/A	1.37	N/A	2.11	N/A	0.00	N/A	N/A	N/A	20.11
1987	1957	N/A	0.36	N/A	1.07	N/A	0.00	N/A	N/A	N/A	15.94
1988	1870	N/A	0.75	0.48	1.34	0.11	0.00	0.80	0.00	0.37	12.03
1989	1313	N/A	1.68	1.07	3.12	0.53	0.00	0.76	0.38	0.63	13.02
1990	1143	N/A	0.26	1.05	0.70	0.09	0.00	0.96	0.61	0.35	20.65
1991	1959	N/A	0.71	0.26	0.46	0.20	0.00	0.66	0.71	1.58	14.34
1992	1507	N/A	0.60	0.13	0.33	0.07	0.00	1.33	0.86	1.39	10.95
1993	3995	0.03	N/A	0.80	2.95	0.36	0.33	0.38	N/A	1.05	15.52
1994	3879	0.00	N/A	0.18	6.21	0.03	0.75	0.85	N/A	1.47	14.54
1995	2573	0.04	2.18	1.63	2.91	1.52	0.31	1.67	2.64	2.37	21.46
	MEAN										

TABLE C-3. Subyearling Chinook condition subsampling data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD	3-19%
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD	PRED	DESC
1985	2707	N/A	1.81	N/A	1.55	0.04	0.00	0.92	N/A	N/A	7.35
1986	3517	N/A	0.65	N/A	3.18	0.00	0.00	0.77	N/A	N/A	9.01
1987	4407	N/A	0.34	N/A	3.36	N/A	0.00	N/A	N/A	N/A	11.64
1988	4710	N/A	0.25	0.23	0.98	0.00	0.00	12.85	0.00	0.08	8.79
1989	2997	N/A	0.17	0.20	0.33	0.23	0.00	3.77	0.13	0.30	9.68
1990	2340	N/A	0.26	0.38	0.81	0.26	0.00	4.32	0.68	0.00	14.98
1991	3106	N/A	0.35	0.08	0.58	0.19	0.00	4.15	0.06	0.03	9.01
1992	2520	N/A	0.04	0.08	0.75	0.56	0.00	10.79	0.36	0.36	4.09
1993	5869	0.02	N/A	0.15	3.14	0.34	8.62	2.25	N/A	0.12	10.36
1994	4579	0.00	N/A	0.07	3.78	0.31	8.69	1.53	N/A	0.15	8.08
1995	4392	0.00	0.30	0.30	2.44	0.84	2.87	0.34	0.93	0.43	8.06
	MEAN										

TABLE C-4. Coho condition subsampling data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD	3-19%
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD	PRED	DESC
1985	96	N/A	2.08	N/A	2.08	N/A	0.00	N/A	N/A	N/A	7.29
1986	230	N/A	1.30	N/A	3.48	N/A	0.00	N/A	N/A	N/A	8.26
1987	750	N/A	0.13	N/A	0.93	N/A	0.00	N/A	N/A	N/A	11.87
1988	1080	N/A	0.09	0.00	0.28	0.09	0.00	0.46	0.00	0.37	5.93
1989	1159	N/A	0.09	0.26	1.04	0.17	0.00	0.17	0.00	0.69	6.47
1990	849	N/A	0.00	0.00	1.30	0.00	0.00	1.18	0.00	1.06	13.43
1991	844	N/A	0.00	0.24	0.36	0.12	0.00	0.12	0.12	0.47	14.34
1992	834	N/A	0.36	0.00	0.48	0.00	0.00	0.72	0.00	0.96	9.11
1993	2166	0.05	N/A	0.51	0.88	0.14	0.18	0.05	N/A	1.39	8.36
1994	1450	0.00	N/A	0.07	2.69	0.14	0.14	0.28	N/A	2.69	9.66
1995	1026	0.00	0.39	0.10	0.39	0.29	0.00	0.19	0.00	3.80	10.23
	MEAN										

TABLE C-5. Wild Steelhead condition subsampling data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD PRED	3-19% DESC
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985											
1986											
1987											
1966											
1969											
1990	476	WA	0.42	0.84	0.21	2.10	0.00	1.47	0.00	1.26	14.71
1991	899	N/A	0.44	1.oo	0.67	7.45	0.00	0.00	0.33	1.67	7.56
1992	863	N/A	0.12	0.58	1.16	3.01	0.00	0.56	0.23	1.74	6.60
1993	2265	0.00	N/A	0.75	1.41	2.65	0.49	0.26	N/A	1.81	10.95
1994	1605	0.00	N/A	0.19	2.87	2.24	0.00	1.43	N/A	2.55	8.86
1995	1131	0.27	2.4%	1.33	1.86	15.21	0.18	2.21	0.18	3.45	11.41
	MEAN										

TABLE C-6. Hatchery Steelhead condition subsampling data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD PRED	3-19% DESC
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	635	N/A	1.73	N/A	5.67	N/A	0.00	N/A	N/A	N/A	10.87
1986	1022	N/A	1.86	N/A	3.42	N/A	0.00	N/A	N/A	N/A	21.33
1987.	1603	N/A	0.75	N/A	2.87	N/A	0.00	N/A	N/A	N/A	13.79
1988	1758	N/A	1.54	0.85	3.47	1.59	0.00	1.99	0.00	1.37	12.34
1989	1391	N/A	0.93	1.51	5.18	3.67	0.00	2.73	0.00	3.45	13.59
1990	507	N/A	0.99	1.18	3.55	1.18	0.00	1.78	0.00	3.16	24.46
1991	1063	N/A	1.03	1.22	1.51	0.38	0.00	0.47	0.09	4.81	25.68
1992	938	N/A	0.32	1.71	3.62	0.32	0.00	2.99	0.00	6.08	14.61
1993	2371	0.46	N/A	3.58	5.65	0.89	0.55	1.98	N/A	6.45	36.95
1994	1812	0.00	N/A	1.88	9.93	0.06	0.06	3.92	N/A	15.07	24.17
1995	2243	0.04	4.55	6.55	4.90	7.13	0.13	4.50	0.13	15.07	30.58
	MEAN										

TABLE C-7. Sockeye condition subsampling data from John Day Dam, 1985 - 1995.

YEAR	NO. SMPLD	GBT	INJURY			DISEASE				BIRD PRED	3-19% DESC
			HEAD	OPERC.	BODY	PAR.	COLUMN.	FUNGUS	BKD		
1985	553	N/A	0.18	N/A	0.18	N/A	0.00	N/A	N/A	N/A	9.40
1986	588	N/A	1.02	N/A	2.55	N/A	0.00	N/A	N/A	N/A	17.18
1987	740	N/A	0.41	N/A	0.81	N/A	0.00	N/A	N/A	N/A	17.30
1988	1004	N/A	0.20	0.40	0.10	0.00	0.00	0.40	0.00	0.00	6.08
1989	1013	N/A	0.59	0.59	0.39	0.00	0.00	0.39	0.20	0.00	10.37
1990	361	N/A	0.00	0.28	0.00	0.00	0.00	0.83	0.00	0.00	10.25
1991	549	N/A	1.46	0.91	0.18	0.00	0.00	0.18	0.18	0.55	9.47
1992	291	N/A	1.03	0.34	0.69	0.00	0.00	0.00	0.00	0.00	12.71
1993	1765	0.00	N/A	1.42	2.10	0.06	0.00	0.45	N/A	0.17	14.84
1994	1656	0.00	N/A	0.48	2.05	0.00	0.06	0.18	N/A	0.54	16.00
1995	1103	0.09	0.91	1.90	1.18	0.00	0.00	0.27	0.27	1.00	16.41
	MEAN										

Cable C-8. PIT Tag recaptures from John Day Dam, 1993 - 1995.
(Sample units indicated).

Species	Run	Rearing Type	1993 (3B & 3C)	1994 (3B)	1995 (3B)
Chinook	Spring	Hatchery	199	205	267
		Wild	23	10	101
		Total	222	215	368
	Sumner	Hatchery	24	16	52
		Wild	4		20
		Total	28	16	72
	Fall	Hatchery	4	3	52
		Wild	9	4	13
		Total	13	7	65
	Unknown	Hatchery	44	19	915
		Wild	17	4	253
		Unknown	15	14	28
		Total	76	37	1196
	Chinook	Totals =	339	275	1701
Steelhead	Sumner	Hatchery	195	210	1068
		Wild	62	26	115
	Steelhead	Totals =	257	236	1183
Sockeye	Spring - Sumner	Hatchery	17		3
		Wild		5	1
	Unknown	Wild	19		9
	Sockeye	Totals =	36	5	13
TOTALS - ALL DETECTIONS COMBINED =			632	516	2897

Table C-9. Brand Recaptures at John Day Dam, 1985 to 1995.

Year	Chin-l	Chin-O	W-sthd	H-sthd	Coho	Sock	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	5 7 6	773	@	1,134	0	85	2,568
1992*	1,420	945	66	546	0	0	2,977
1993*	1,069	1,920	24	1,463	0	39	4,515
1994	265	830	0	416	0	0	1,511
1995	560	317	0	183	0	0	1,060
TOTALS	19,025	11,535	90	15,431	14	994	47,089

Samples from gatewells 3B and 3C combined.
@ Brands were not differentiated between wild and hatchery steelhead in these years.

Table C-10. Adult **Salmonid** Fallbacks in **Gatewell** 3B at John Day Dam, 1985 - 1995.

Year	Chinook Adults	Chinook Jacks	Wild Steelhead	Hatchery Steelhead	Coho	Sockeye
1985	28	85	?	50	1	12
1986	78	80	?	134	3	4
1987	25	4	?	58	0	1
1988	7	2	?	47	2	0
1989	18	7	?	80	1	22
1990	14	6	?	35	0	3
1991	10	0	?	34	0	6
1992	12	0	?	42	1	4
1993	12	2	?	145	1	8
1994	5	10	?	52	2	5
1995	11	12	40	71	1	2
TOTALS	220	208	40	748	12	77

Table C-11. The Most Numerous Incidental Species Collected in Unit 3B at John Day Dam, 1985 - 1995.

Year	American Shad Juvenile	Adult	Pacific L&prey Juvenile	Adult	Crappie Species	Sculpin Species	Mtn. W.Fish
1985*	90,904	233	35	15	6,174	675	236
1986	49,916	516	890	24	279	201	675
1987	18,606	176	229	58	1,016	581	499
1988	39,474	312	629	52	293	481	236
1989	61,832	451	1,928	7	a7	113	269
1990**	330,177	213	923	4	96	48	253
1991	168,602	179	9,337	44	99	59	383
1992	203,782	175	178	6	38	4,827	444
1993	180,088	615	4,348	7	58	256	582
1994	111,418	460	3,250	28	28	479	353
1995^	202,409	772	1,143	36	81	29	294
TOTALS	1,457,208	4,102	22,890	281	8,249	7,749	4,224

Year	Sucker Species	Walleye	S-Mouth Bass	Blue-gill @	Squaw-fish	Pea-mouth	Chisel-mouth
1985*	571	161	789	18	89	24	195
1986	501	308	191	35	250	42	137
1987	372	677	283	22	63	27	86
1988	178	70	163	16	37	65	27
1989	222	101	74	14	53	108	40
1990**	92	24	60	1,054	17	25	25
1991	162	12	79	159	646	14	16
1992	64	813	119	44	9	32	14
1993	295	133	93	237	56	26	11
1994	234	167	68	a	16	104	25
1995^	142	88	115	102	41	200	34
TOTALS	2,833	2,554	2,034	1,709	1,277	667	610

Unit 3B was out of service from April 2-26 for STS installations and testing in 1985.
**Sampling was done in Gatewell 5B during the 1990 season, and an electrical fire shut down the unit from 29 May to 10 June.
^1995 data are collection numbers based on sample numbers expanded to account for flow.
@ Bluegill and Pumpkinseeds are not differentiated.
Sample Seasons: (1985) 27 APR-29 OCT, (1986) 6 APR-26 OCT, (1987) 1 APR-30 NOV, (1988) 30 MAR-31 OCT, (1989) 28 MAR-31 OCT, (1990) 27 MAR-31 OCT, (1991) 7 APR-31 OCT, (1992) 25 MAR-13 OCT, (1993) 6 APR-29 OCT, (1994) 5 APR-30 SEP, (1995) 6 APR-29 SEP.

APPENDIX D
HISTORICAL DATA

BONNEVILLE DAM

FIGURES	TITLES	PAGE #
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D-5	Mortality, yearly totals, w/ avg.	D-5
D-6	Passage Dates and 80% duration in days	D-6
D-7	Shad and Lamprey, yearly totals	D-7

TABLES

D-l	PH1-Descaling and Mortality, yrly tots/species	D-8
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D-12	PH2-Descaling and Mortality, yrly tots/species	D-14

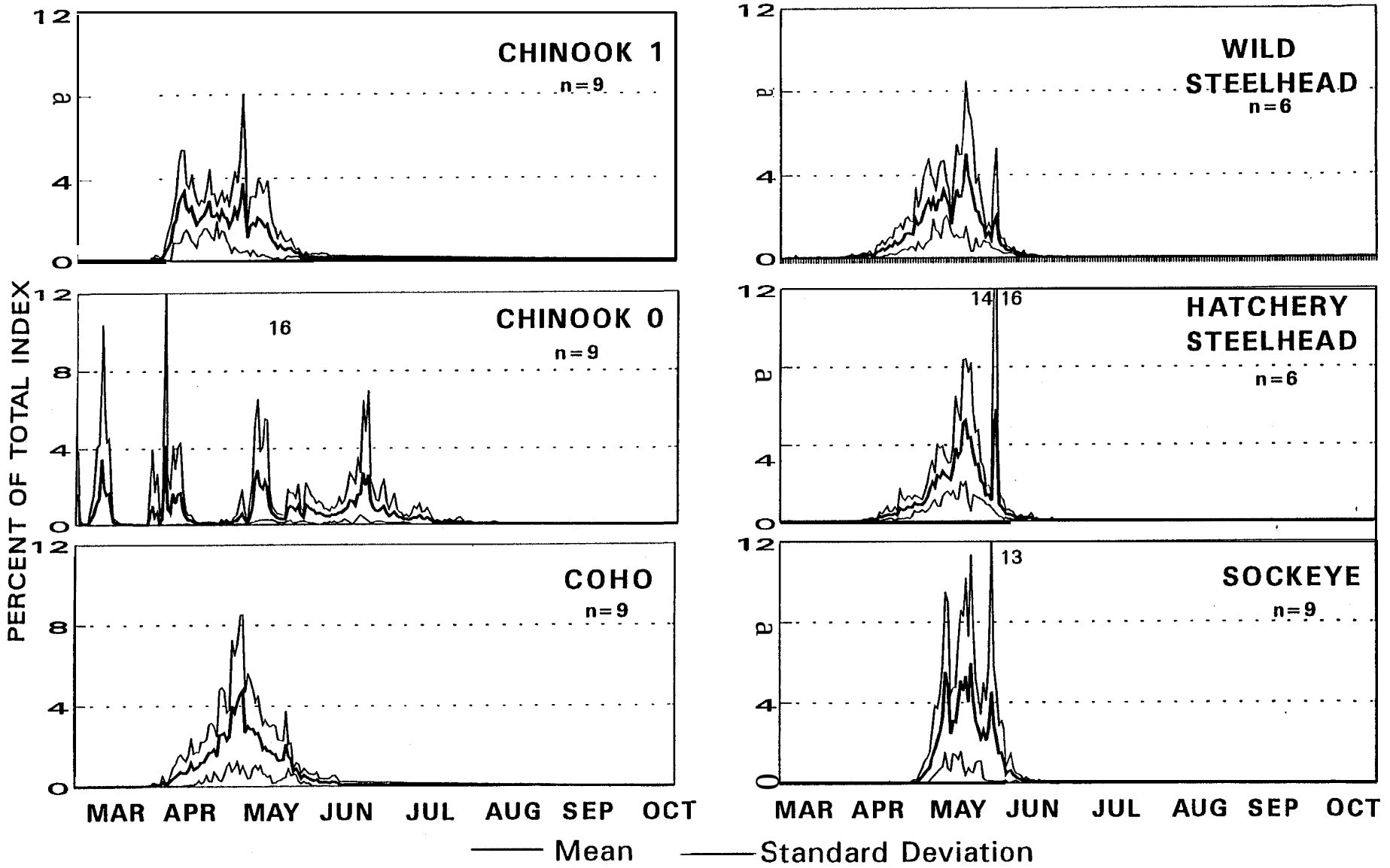

Figure D1. Seasonal passage pattern, PH1 Bonneville Dam, 1988 - 1995.

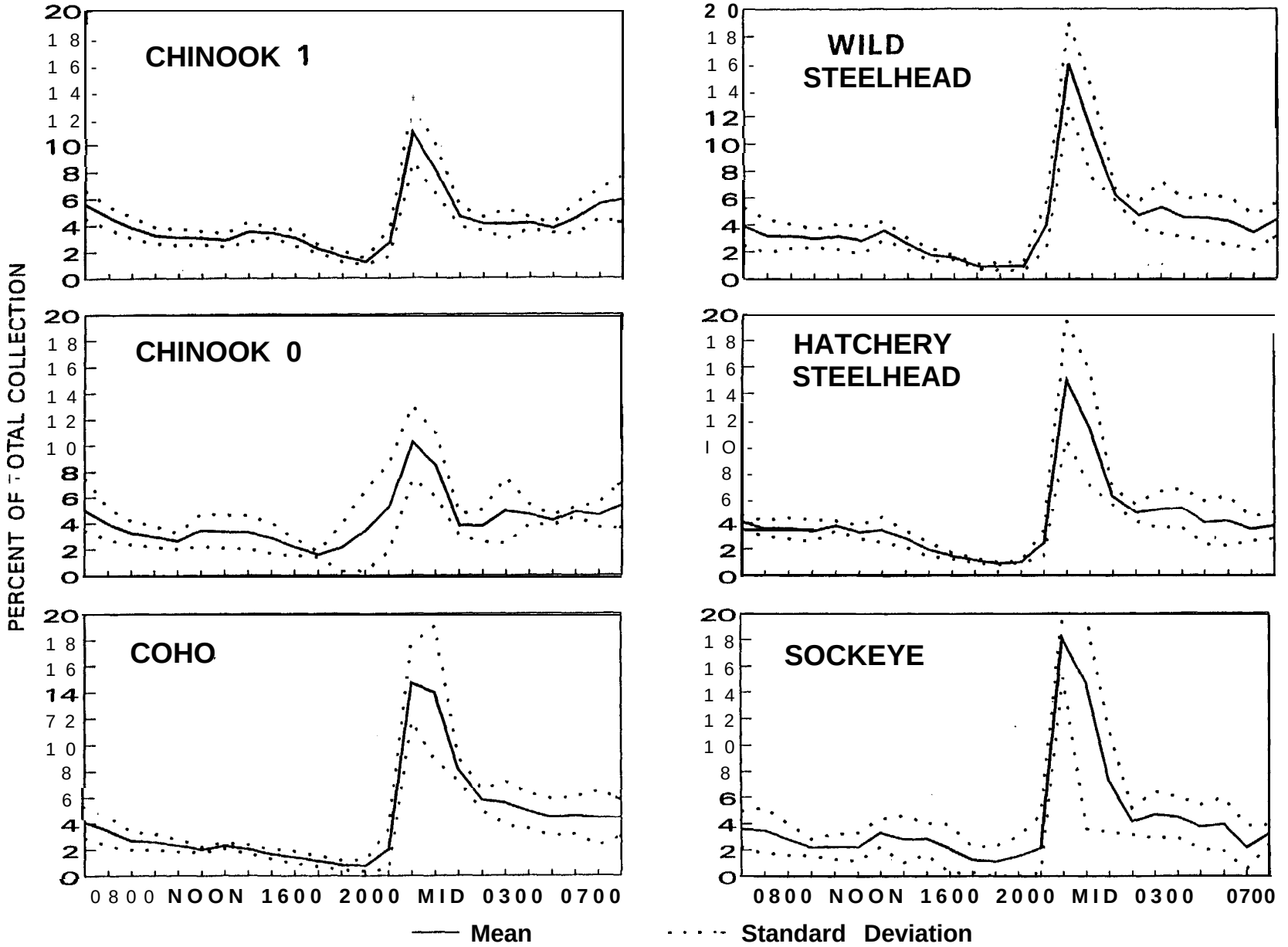

Figure D2. Diel passage pattern, PHI Bonneville Dam, 1992 - 1995.

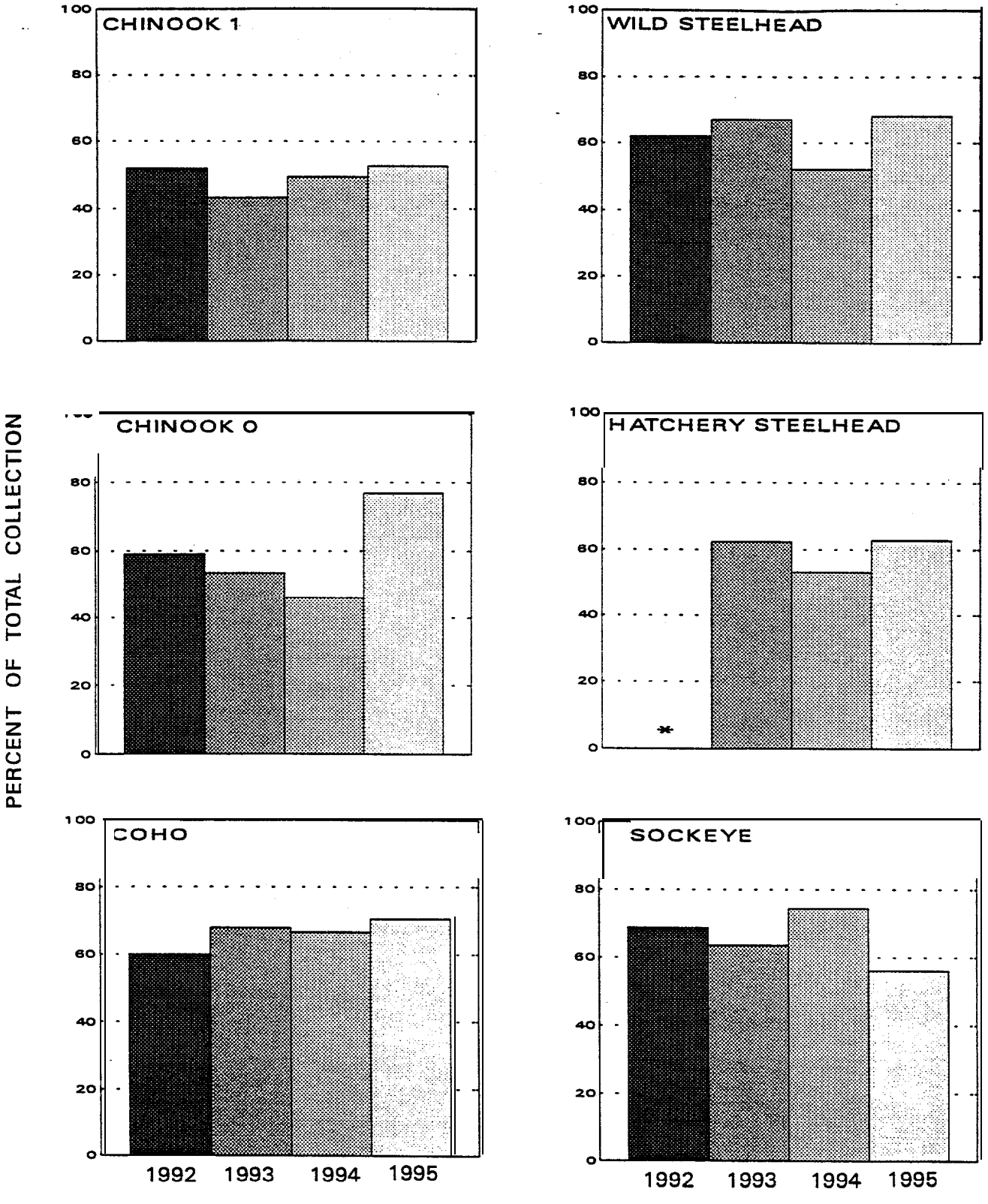

Figure D3. Percent night passage (2000-0500) for each season of 24 hour monitoring at Bonneville Dam, by species, 1992-l 995. * Hatchery and wild shown as wild steelhead.

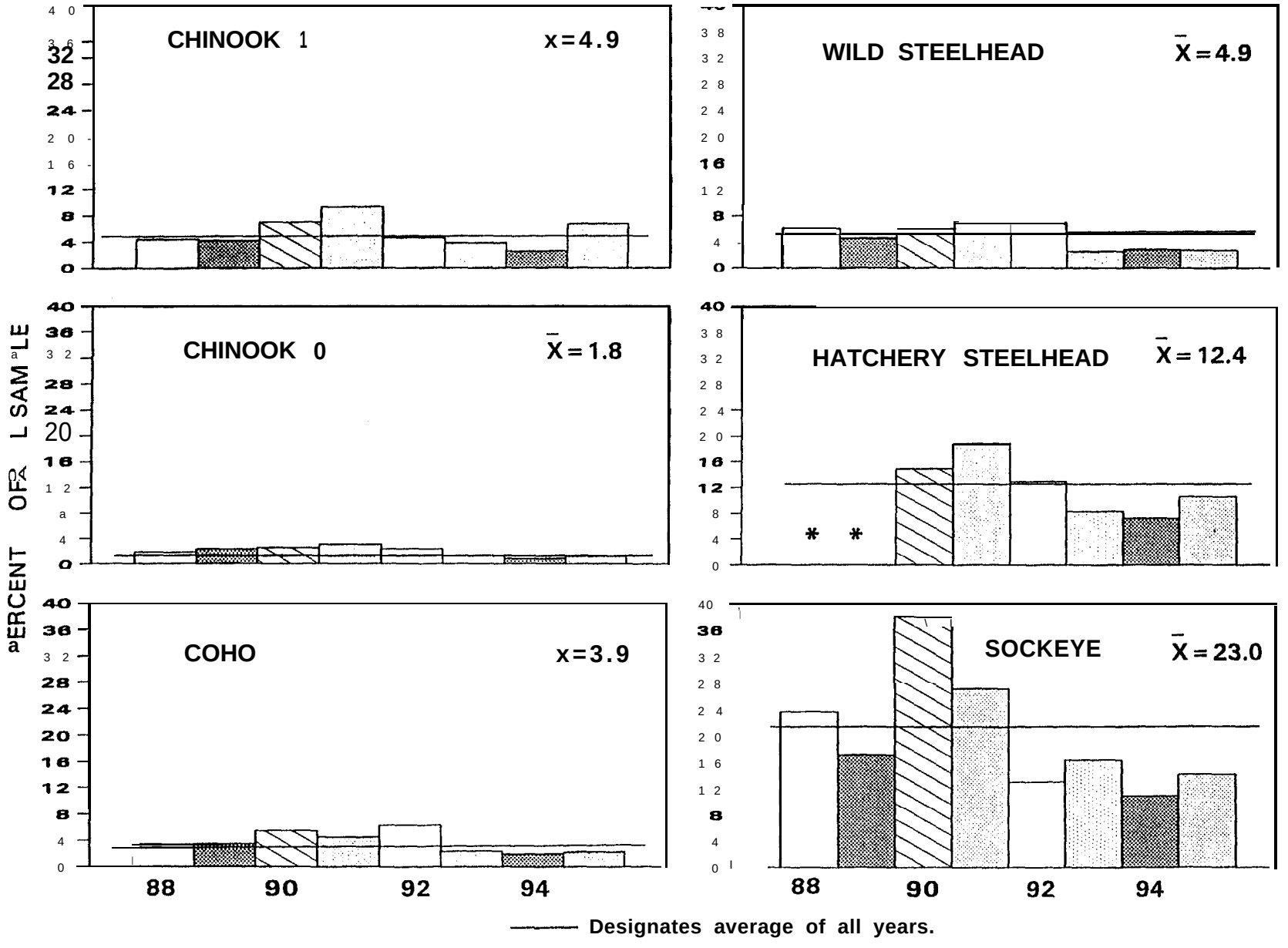

Figure D4. Historical descaling percentages, PHI, Bonneville Dam, 1988 - 1995.
*Hatchery and Wild shown as Wild Steelhead.

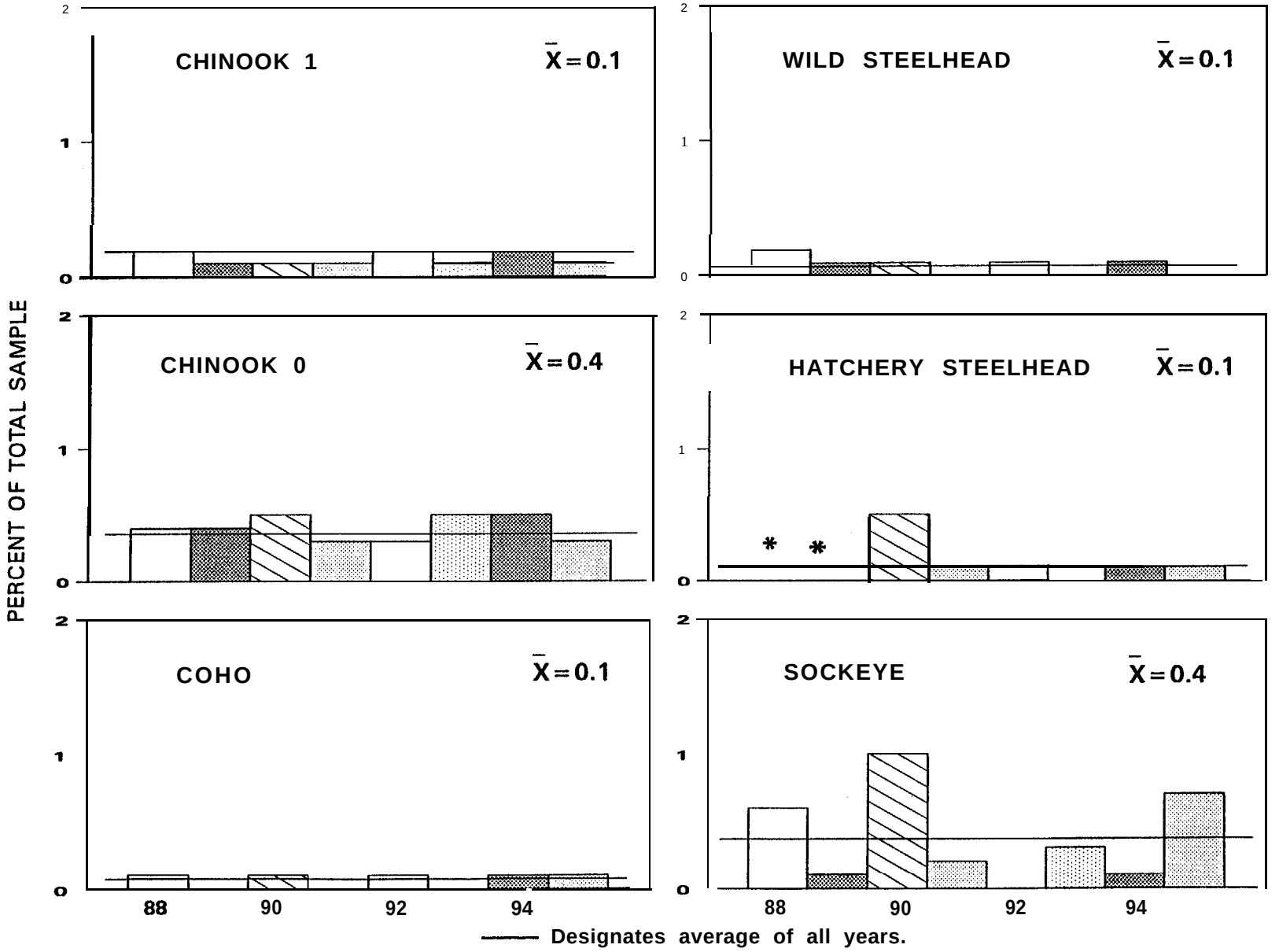

Figure D5. Historical mortality percentages, Bonneville Dam, 1988 - 1995.
*** Hatchery and wild shown as Wild Steelead.**

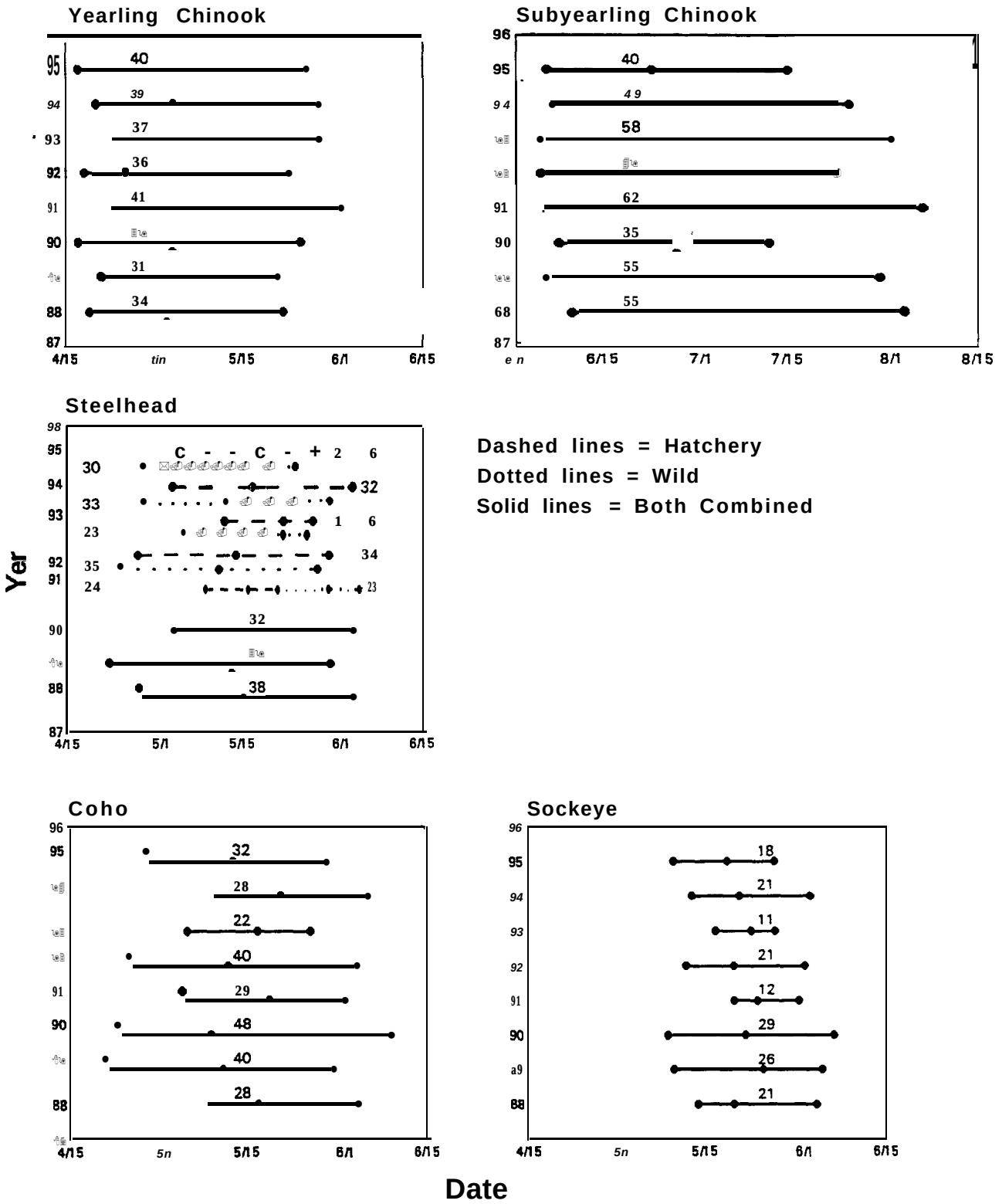

Figure D-6. 10%, 50%, and 90% Passage Dates for each season at Bonneville Dam, by species, 1987-1995. The duration between 10/90% dates (in days) is indicated above each line.

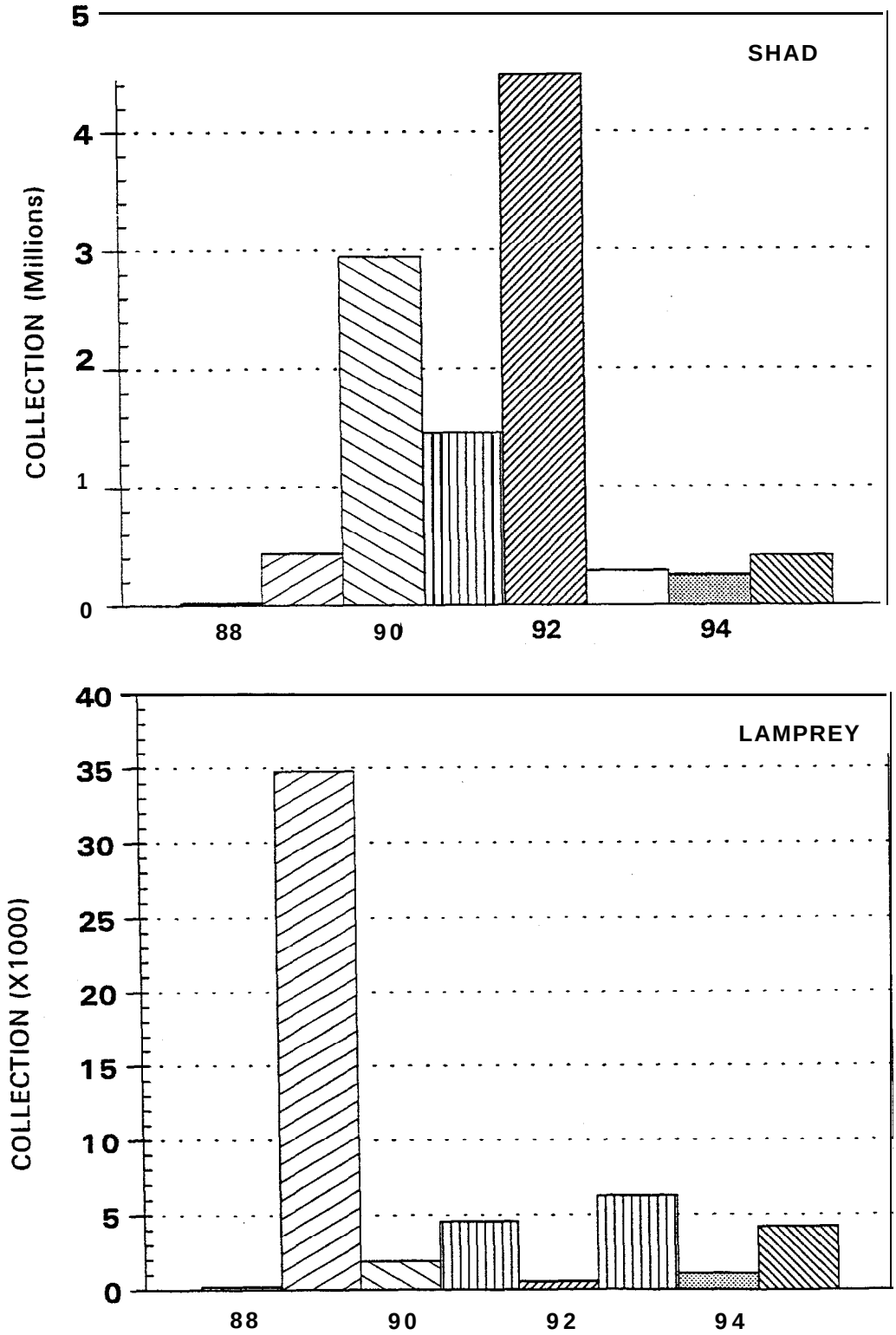

Figure D7. Historical juvenile shad and lamprey counts at Bonneville Dam, 1988 - 1995.

TABLE DI . Descaiing and mortality data from Bonneville Dam, 1988 - 1995.

CHINOOK 1						CHINOOK 0				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SMPLD	DESC	%DESC	MORT	%MORT
1988	28958	1265	4.4	67	0.2	96415	1659	1.7	337	0.4
1989	27934	1164	4.2	22	0.1	98571	2119	2.2	361	0.4
1990	23821	1675	7.0	34	0.1	80446	1956	2.4	358	0.5
1991	29409	2741	9.3	24	0.1	83240	2383	2.9	257	0.3
1992	42523	1952	4.6	62	0.2	112037	2517	2.3	301	0.3
1993	52623	2050	3.9	51	0.1	130615	1557	1.2	611	0.5
1994	34361	896	2.6	58	0.2	125967	999	0.8	600	0.5
1995	19557	1310	6.7	27	0.1	60356	651	1.1	189	0.3
Total 88-95	259186	13053	5.0	345	0.1	787647	13841	1.8	3014	0.4

WILD STEELHEAD						HATCHERY STEELHEAD				
YEAR	SAMPLE	DESC	%DESC	MORT	%MORT	SMPLD	DESC	%DESC	MORT	%MORT
1988	7478	452	6.1	18	0.2					
1989	12240	536	4.4	13	0.1					
1990	3894	232	6.0	5	0.1	5521	818	14.9	25	0.5
1991	2772	194	7.0	0	0.0	5502	1036	18.8	4	0.1
1992	2837	194	6.8	3	0.1	3767	487	12.9	2	0.1
1993	4025	96	2.4	2	0.0	7456	622	8.3	2	0.0
1994	3730	102	2.7	2	0.1	3981	290	7.3	2	0.1
1995	1240	32	2.6	0	0.0	3737	397	10.6	5	0.1
Total 88-95	38216	1838	4.8	43	0.1	29964	3650	12.2	40	0.1

COHO						SOCKEYE				
DATE	SMPLD	DESC	%DESC	MORT	%MORT	SMPLD	DESC	%DESC	MORT	%MORT
1988	40776	1340	3.3	24	0.1	4588	1077	23.6	28	0.6
1989	29747	998	3.4	5	0.0	7723	1319	17.1	11	0.1
1990	43032	2325	5.4	30	0.1	4537	1710	38.1	45	1.0
1991	23842	1059	4.4	5	0.0	4462	1205	27.1	9	0.2
1992	23971	1485	6.2	24	0.1	638	83	13	0	0.0
1993	28243	649	2.3	6	0.0	4939	803	16.3	15	0.3
1994	22378	430	1.9	27	0.1	2965	322	10.9	2	0.1
1995	11868	258	2.2	16	0.1	2184	305	14.1	15	0.7
Total 88-95	223857	8544	3.8	137	0.1	32036	6824	21.4	125	0.4

Table D2. Yearling chinook condition subsampling data from Bonneville Dam, 1988-95. Expressed as percent of total.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD	3-I 9%
			HD	OPERC	BODY	PAR	FUNG	BKD	PRED	DESC
1988	1856	NA	0.27	0.05	0.59	0.05	0.11	0.00	0.16	4.20
1989	2327	NA	0.39	0.39	1.12	0.21	0.34	0.17	0.43	8.04
1990	3111	NA	0.10	0.13	0.84	0.13	0.51	0.23	0.58	9.84
1991	2158	NA	0.42	0.32	0.65	0.00	0.23	0.23	0.42	5.38
1992	2190	NA	0.41	0.23	0.73	0.27	0.37	0.87	0.50	6.39
1993	2934	0.17	0.00	0.65	3.03	0.55	0.85	0.00	0.55	14.25
1994	4018	0.00	0.00	0.37	7.64	0.20	0.77	0.00	1.14	9.98
1995	2648	0.11	1.44	1.36	4.80	0.98	0.87	1.13	0.98	14.31

Table D3. Subyearling chinook condition subsampling data from Bonneviile Dam, 1988-95. Expressed as percent of total.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD	3-I 9%
			HD	OPERC	BODY	PAR	FUNG	BKD	PRED	DESC
1988	3451	NA	0.09	0.03	0.67	0.03	0.09	0.00	0.12	2.98
7989	8487	NA	0.15	0.09	1.29	0.15	0.05	0.12	0.04	4.55
1990	6929	NA	0.10	0.14	0.64	0.76	0.07	0.32	0.27	7.93
7991	4404	NA	0.23	0.17	0.43	0.30	0.05	0.52	0.09	2.45
1992	4422	NA	0.09	0.25	0.34	0.41	0.05	0.79	0.47	3.55
7993	6343	0.07	0.00	0.36	3.12	0.31	0.08	0.00	0.11	7.76
1994	77 49	0.00	0.00	0.29	0.92	0.10	0.10	0.00	0.08	4.00
7995	5230	0.00	0.33	0.44	1.97	0.23	0.73	0.77	0.13	5.35

Table D4. Coho condition subsampling data from Bonneville Dam, 7 988-95. Expressed as percent of total.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD	3-19%
			HD	OPERC	BODY	PAR	FUNG	BKD	PRED	DESC
7988	2148	NA	0.09	0.05	0.28	0.05	0.61	0.00	0.05	3.77
1989	2626	NA	0.42	0.23	0.42	0.19	0.30	0.00	0.19	6.28
1990	3468	NA	0.09	0.09	0.43	0.09	0.40	0.06	0.46	7.73
1991	7967	NA	0.20	0.20	0.36	0.20	0.15	0.70	0.37	7.83
7 992	7883	NA	0.27	0.37	0.32	0.16	0.64	0.00	0.32	5.47
7993	2227	0.09	0.00	0.45	7.93	0.27	0.90	0.00	0.37	5.34
1994	2725	0.00	0.00	0.22	7.10	0.11	1.70	0.00	0.33	6.68
1995	2574	0.04	0.62	0.35	3.17	0.85	1.09	0.72	0.47	7.58

Table D5. Wild steelhead condition subsampling data from Bonneville Dam, 1988-95. Expressed as percent of total. Wild and hatchery are combined for 1988-89.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD PRED	3-19% DESC
			HD	OPERC	BODY	PAR	FUNG	BKD		
1988	1403	NA	0.78	0.29	0.78	1.50	0.50	0.00	3.85	7.48
1989	2319	NA	0.43	0.73	7.27	3.32	1.03	0.04	2.50	10.48
7990	7042	NA	0.38	0.19	7.44	4.03	7.25	0.00	2.11	70.06
1991	706	NA	0.65	0.71	7.56	8.22	0.77	0.00	7.56	2.55
1992	590	NA	0.17	0.77	0.68	5.59	0.34	0.00	2.20	5.59
1993	1250	7.92	0.00	0.24	7.60	6.64	0.72	0.00	5.84	6.56
1994	1429	0.49	0.00	0.49	2.59	8.33	0.49	0.00	2.80	9.24
1995	419	0.24	1.67	1.19	2.86	19.33	0.24	0.00	3.70	9.79

Table D6. Hatchery steelhead condition subsampling data from Bonneville Dam, 1990-95. Expressed as percent of total.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD PRED	3-19% DESC
			HD	OPERC	BODY	PAR	FUNG	BKD		
1990	1366	NA	0.88	0.73	1.46	0.15	3.07	0.00	6.75	21.52
1991	1024	NA	0.29	4.39	0.88	0.20	0.78	0.20	3.81	9.67
1992	735	NA	0.41	2.99	1.09	0.41	1.22	0.00	4.76	11.02
1993	1869	0.78	0.00	1.86	3.18	2.22	1.44	0.00	0.00	16.12
7994	7 595	0.06	0.00	3.13	3.64	0.94	0.56	0.00	8.40	27.63
1995	1278	0.00	1.88	3.36	5.71	2.77	3.05	0.08	8.29	25.67

Table D7. Sockeye condition subsampling data from Bonneville Dam, 1988-95. Expressed as percent of total.

YEAR	NO. SAMPL	GBT	INJURY			DISEASE			BIRD PRED	3-19% DESC
			HD	OPERC	BODY	PAR	FUNG	BKD		
1988	686	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.62
1989	1397	NA	0.50	0.50	0.36	0.00	0.07	0.07	0.07	76.71
1990	1425	NA	1.26	0.77	0.49	0.07	0.14	0.07	0.14	14.88
1991	627	NA	0.97	2.25	0.81	0.00	0.32	0.00	0.32	77.27
1992	731	NA	0.76	2.29	0.76	0.00	0.00	0.00	0.00	17.56
1993	940	0.00	0.71	2.34	3.09	0.32	0.43	0.00	0.27	23.63
1994	1047	0.00	0.00	7.91	7.43	0.00	0.29	0.00	0.19	26.65
1995	829	0.00	0.97	2.41	1.09	0.00	0.72	0.00	0.24	23.88

Table D8. Summary of PIT tag detections at Bonneville Dam, 1992-95.

Species	Run	Rearing Type	1992	1993	1994	1995
Chinook	Spring	Hatchery	1	70	40	38
		Wild	1	13	5	13
		Unknown	4	0	0	0
		Total	6	83	53	51
	Summer	Hatchery	0	6	6	9
		Wild	0	1	2	5
		Total	0	7	8	14
	Fall	Hatchery	0	1	0	20
		Wild	0	2	3	2
		Unknown	2	0	0	0
		Total	2	3	3	22
	Unknown	Hatchery	4	15	7	131
		Wild	0	6	2	60
		Unknown	5	9	4	2
		Total	9	30	13	193
	Chinook Total		17	123	77	280
Steelhead	Summer	Hatchery	0	16	19	46
		Wild	0	5	4	3
		Unknown	0	1	0	0
	Steelhead Total		0	22	23	49
Coho	Spring	Unknown	6	0	0	0
Sockeye	Spring	Hatchery	0	6	0	0
	Unknown	Hatchery	2	0	1	0
		Wild	0	4	4	1
		Total	2	0	5	1
	Sockeye Total		2	10	5	1
TOTALS - ALL SPECIES COMBINED			25	155	105	330

Table D-9 Brand recaptures at Bonneville Dam, PH-1, 1988-95.

Year	Chin-l	Chin-O	W-sthd	H-sthd	Coho	Sock	Total
1988	425	165	1/	157	2	55	804
1989	521	364	1/	443		16	1,344
1990	286	189	1/	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

1/ Wild and hatchery steelhead are combined.

Table D-10. Adult fallbacks captured at PH-1, Bonneville Dam, 1988-1995.

Year	Chinook	Steelhead	Coho	Sockeye
1988	1	1	0	0
1989	4	1	1	1
1990	1	0	0	0
1991	3	5	0	7
1992	1	0	0	0
1993	4	0	0	0
1994	2	1	0	0
1995	1	a	0	0
Total	17	14	1	8

Table D11. Incidental species collected[1] at PH-1, Bonneville Dam, 1988-1995.

	American Shad		Pac. Lamprey								
Year	Juvenile	Adult	Juv.	Adult	SM Bass	Squaw-fish	Stickle-back	Pea-mouth	Redside Shiner	White-fish	Sculpin
1988	2,361	17	204	37	228	243	11,017	754	264	33	177
1989	435,653	39	34,756	63	5	698	2,473	1,413	384	34	193
1990	2,939,363	0	1,909	0	88	520	4,527	224	56	58	47
1991	1,454,524	8	4,567	4	31	889	1,862	849	224	121	12
1992	4,479,820	96	531	86	162	672	6,581	1,053	67	41	136
1993	288,463	148	6,269	78	251	264	6,583	1,603	377	75	268
1994	252,474	85	1,074	47	122	311	78,799	9,669	269	65	56
1995	414,487	1,130	4,329	213	567	979	5,931	2,227	677	665	233

1/ collection numbers for 1992-95 represent 24 hour estimates; 1988-91 are 8 hour (1600-2400) estimates.

Table D-i 2. Descaling and Mortality at Bonneville Dam, PH-2, 1988-95.

	CHINOOK 1					CHINOOK 0				
Year	SMPLD	DESC	%DESC	MORT	%MORT	SMPL	DESC	%DESC	MORT	%MORT
1966	7076	361	5.2	147	2.1	9711	la5	2.0	390	4.0
1989	15579	671	4.4	476	3.1	12144	74	0.6	176	1.4
1990	5267	276	5.3	36	0.7	2669	a	0.3	10	0.4
1991	17943	1780	10.0	143	0.8	7646	140	1.8	39	0.5
1992	358	36	10.2	5	1.4	1452	42	2.9	6	0.4
1993	5468	393	7.2	36	0.7	5545	a5	1.2	36	0.6
1994	4172	208	5.1	54	1.3	5703	80	1.4	138	2.4
1995	2709	180	6.7	16	0.6	4696	108	2.3	31	0.7
1996										
TOTAL	55863	3727	6.8	a99	1.6	45070	594	1.3	795	1.0

	WILD STEELHEAD					HATCHERY STEELHEAD				
Year	SMPLD	DESC	%DESC	MORT	%MORT	SMPL	DESC	%DESC	MORT	%MORT
1988	762	43	5.7	12	1.6					
1989	2049	a4	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	1614	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	85	4	6.3	1	1.5	la4	35	19.1	1	0.5
1996										
TOTAL	4475	267	6.0	54	1.2	2474	430	17.6	36	1.5

	COHO					SOCKEYE				
Year	SMPLD	DESC	%DESC	MORT	%MORT	SMPL	DESC	%DESC	MORT	%MORT
1988	5556	195	3.5	61	1.1	237	33	16.4	36	15.2
1989	9192	262	3.1	207	2.3	2247	343	19.1	451	20.1
1990	54Qa	204	3.7	16	0.3	137	25	1 a.5	2	1.5
1991	7284	448	6.2	33	0.5	2575	761	30.3	60	2.3
1992	119	9	7.6	0	0.0	1	1	100.0	0	0.0
1993	3621	162	4.5	7	0.2	623	126	20.4	4	0.6
1994	2678	69	2.6	la	0.7	400	75	18.9	4	1.0
1995	1075	29	2.7	5	0.5	348	61	16.0	9	2.6
1996										
TOTAL	33948	1369	4.1	342	1.0	6220	1364	24.1	557	9.0

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