SMOLT COLLECTION AND TRANSPORTATION
AT LOWER GRANITE DAM ON THE LOWER SNAKE RIVER
1985

Submitted To

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INTRODUCTION

The Corps of Engineers and Idaho Fish and Game Department entered into a cooperative agreement (Contract No. DACi'V68-82-C-0054) with Task Orders for the 1985 smolt transport season. Idaho Fish and Game provided a biologist/fish culturist to assist U.S. Army Corps of Engineers biologists with Juvenile fish collection and transportation at Lower Granite Dam.

The Idaho Fish and Game biologist is responsible for monitoring Juveniles by (1) fish sampling and handling; (2) evaluations of fish condition; (3) double checks on expanded calculations of facility collection; (4) quality control inspections of collection and transport facilities; (5) monitoring fish research being conducted at the dam; and (6) conducting a gatewell dipping program to monitor quality of Juveniles entering the collection facility. This report summarizes the activities at Lcwer Granite Dam during the 1985 Juvenile transport season in accordance with the assigned state biologist responsibilities.

1985 RIVER CONDITIONS

The average daily flow at Lower Granite Dam peaked on June 8 at 124.4 KCFS. This peak occurred 35 days after the steelhead peak and 42 days after the spring and summer chinook peaks (Figs. 1 and 2).

The flows peaked and declined four times during the 1985 collection season. The first peak occurred on April 17 at 110.2 KCFS, and declined to 62.9 KCFS on April 28. The average daily flow rose to 95.3 KCFS on May 4, and then declined to 67.7 KCFS on May 13. The high flow on May 4 coincided with the second chinook peak and the first and largest steelhead peak. The average daily flows peaked for the third time on May 26 at 117 KCFS, then declined to 89.6 KCFS on June 4. The average daily flows then reached the 1985 maximum on June 8 at 124.4 KCFS.

Water temperature remained at tolerable levels throughout most of the transport season. Snake River water temperatures were 44°F to 52°F during April, 51°F to 58°F during May, 54°F to 66°F during June, and 66°F to 75°F during July. Water temperature reached 60°F for the first time on June 15. Water temperatures exceeded 65°F for the first time on June 22. Water temperatures exceeded 70°F for the first time on July 8. Warm water in July was probably responsible for the high mortal ity rates of steelhead and chinook smolts late in the month.

The flows at Lower Granite were lower in 1985 than in 1984. Flows exceeded 100 KCFS for 7 days in April, 11 days in May, and 7 days in June. These low flows did not exceed powerhouse capacity. Few fish were spilled in 1985 and collection was maximized throughout the season.

The spi l l s that did occur were done to provide NMFS researchers with spill conditions for fish guidance efficiency and radio tracking tests. Spill occurred for the first time on May 5, and was 9 KCFS (10% of inflow). On May 6, the spill was increased to 35.6 KCFS (41.5% of inflow). On May 7, spill was decreased to 17.6 KCFS (21.8% of inflow) and was stopped at 1120 hours.

A second spill situation was requested by NMFS radio tracking researchers and occurred from May 31 to June 3. Spill averaged 5.6 KCFS on May 31 (5.4% of inflow), 20 KCFS on June 1 (20.0% of inflow), 19.2 KCFS on June 2 (19.1% of inflow), and 0.3 KCFS on June 3 (0.3% of inflow).

JUVENILE COLLECTION

A total of 4,482,333 smolts were collected at Lower Granite in 1985. The collection was composed of 49.9% hatchery steelhead (2,234,958), 39.0% yearling chinook (1,742,244), 10.0% wild steelhead (454,621) (Fig. 3), 1.0% sub-yearling chinook (44,008) and 0.1% sockeye (6,467) (Fig. 4). In addition, 35 coho smolts were collected. Wild steelhead smolts made up 16.90% of the steel head collection.

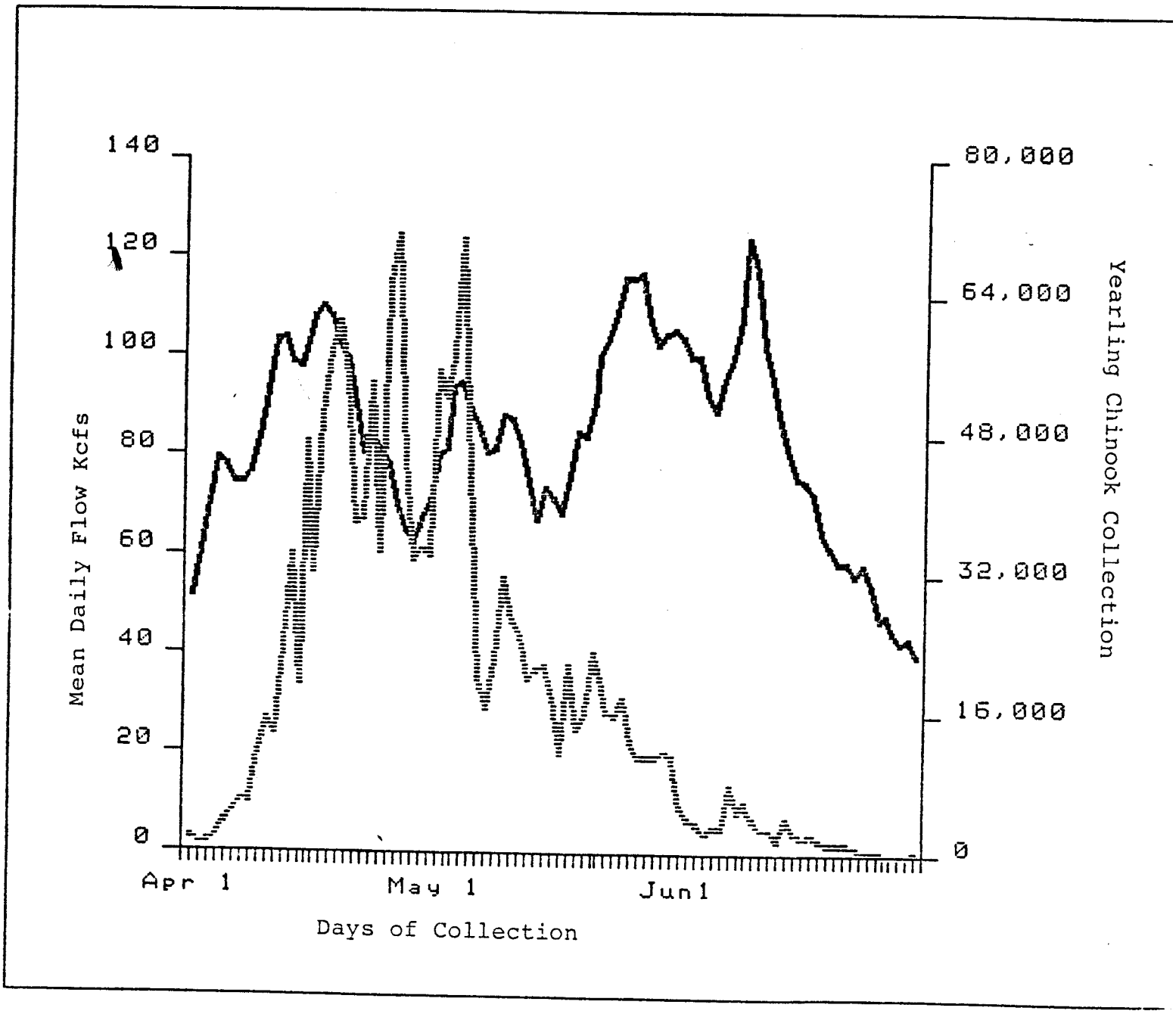

Fig. 1. Total chinook collection and mean daily flows of the 1985 collection season. Dark line is mean daily flows. Broken line is total chinook collection / da.

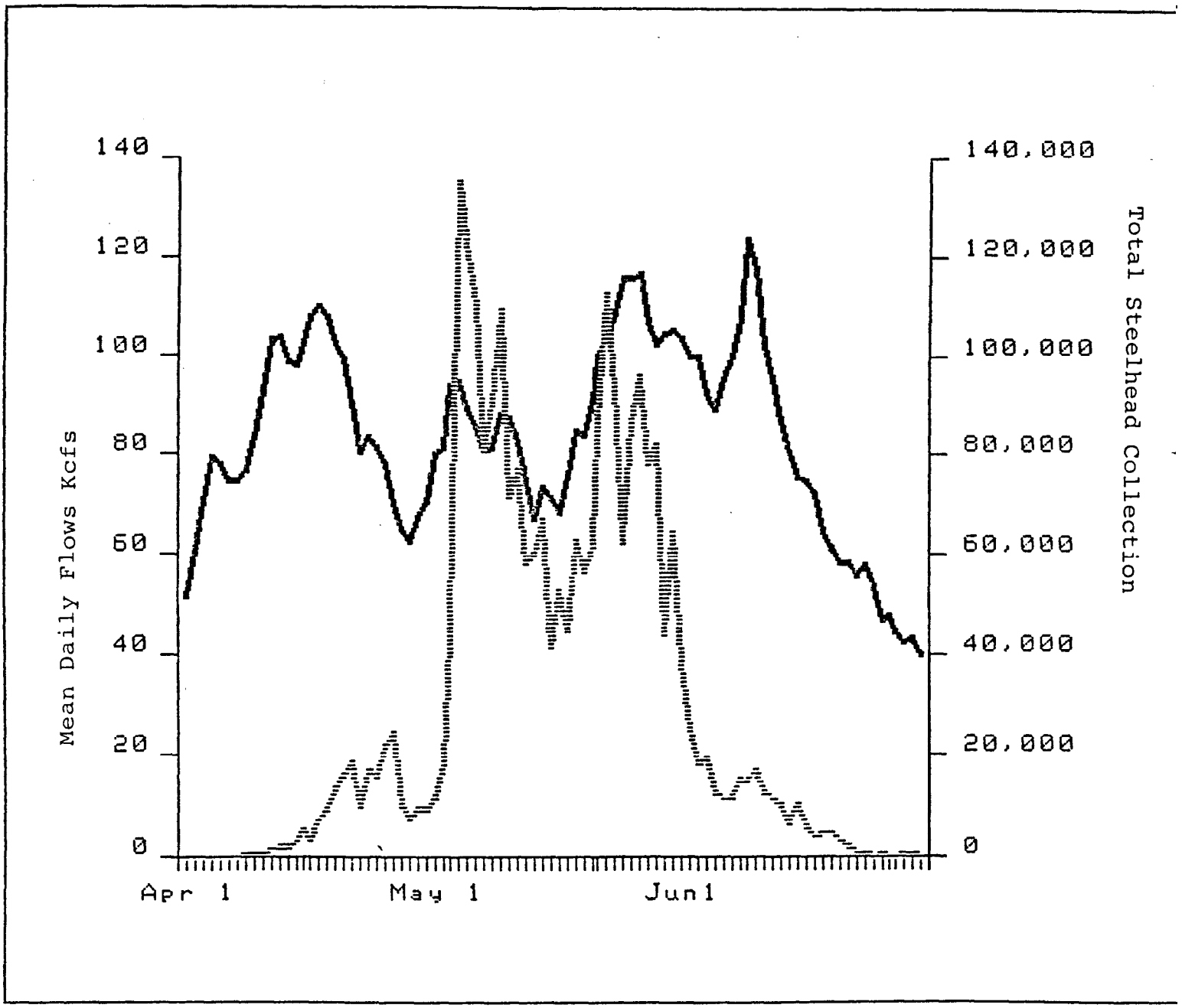

Fig. 2 . Total steelhead collection and mean daily flows of the 1985 collection season.Mean daily flows are solid line. Total steelhead collection is broken line.

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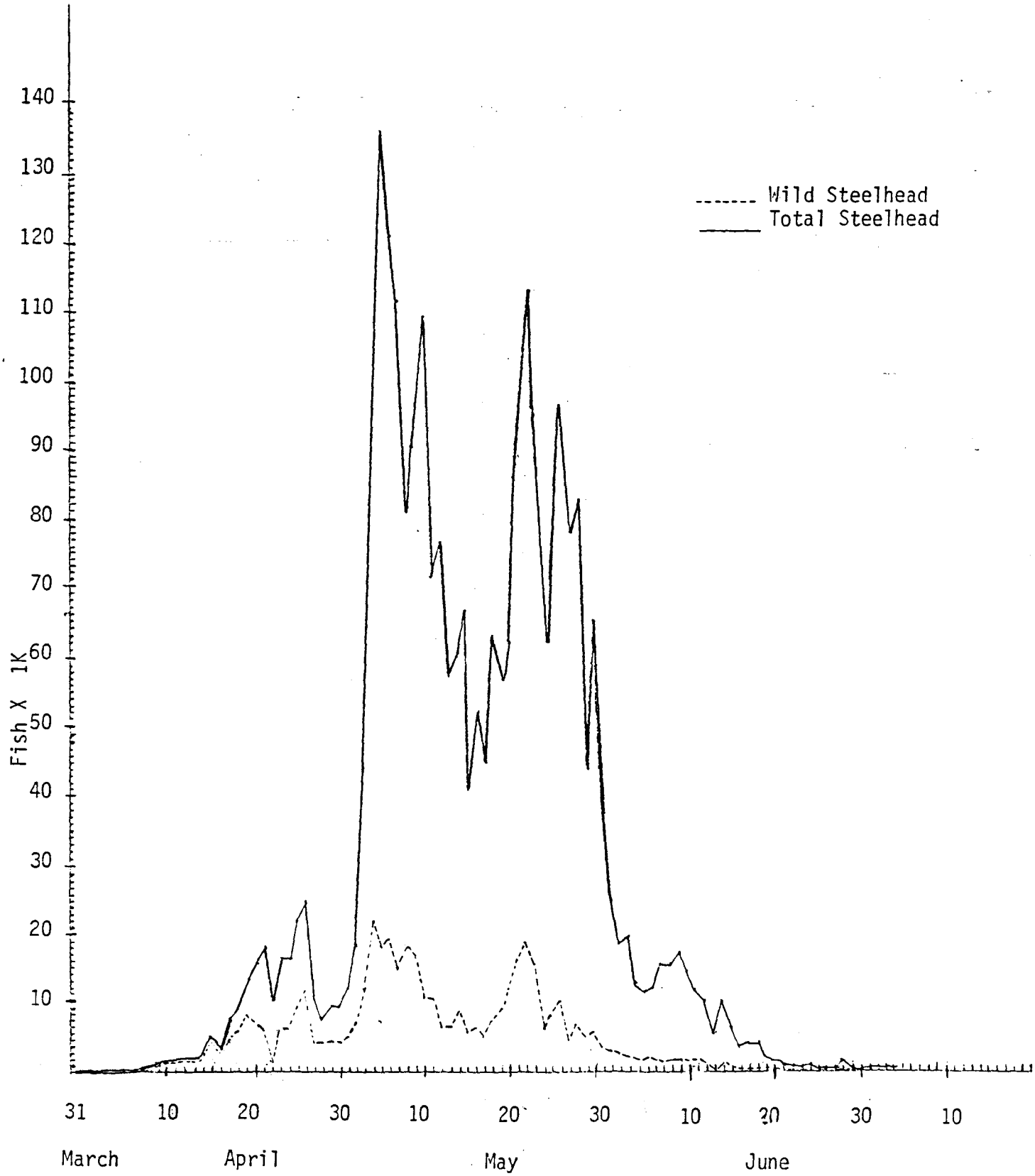

Fig. 3. Wild steelhead collection compared to total steelhead collection at Lower Granite Dam 1985.

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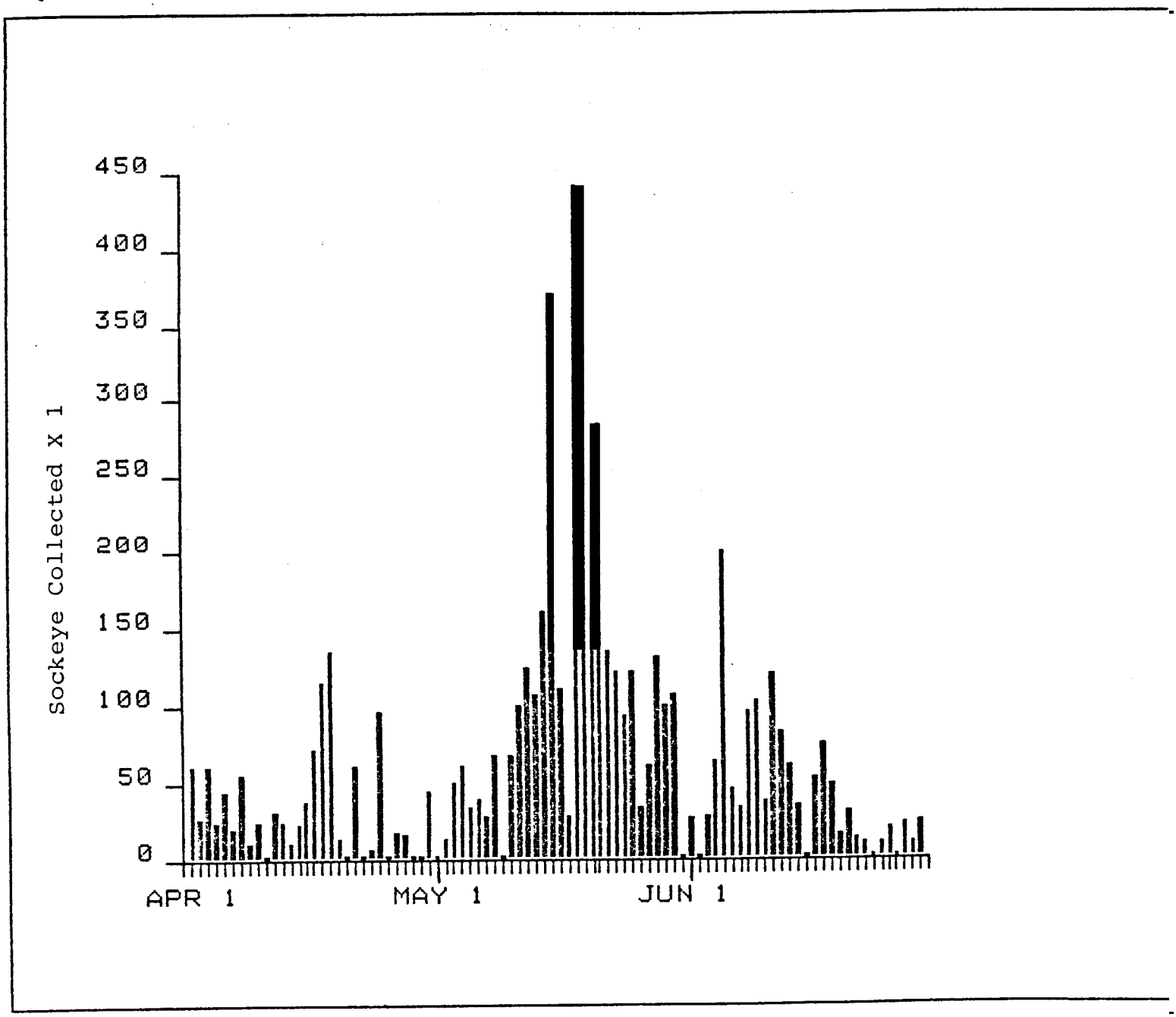

Fig. 4. Sockeye collection at Lower Granite Dam 1985.

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Of the total fish collected, 67.0% were collected during May. The two steelhead peaks and the second yearling chinook peak occurred during May. Sockeye collection peaked on May 18, and sub-yearling chinook peaked on July 10. The fall chinook were from the Hagerman National Fish Hatchery plant at Heller Bar and Asotin Creek (see Tables 1-4).

TRANSPORTATION SUMMARY

A record total of 4,459,438 smolts were transported from Lower Granite during the 1985 transport season. The smolts transported were 38.8% yearling chinook, 1.0% sub-yearling chinook, 49.9% hatchery steel head, 10.2% wild steelhead, and 0.1% sockeye. There were only 35 coho smolts transported in 1985.

Barge Transportation

Barge transportation of smolts began on April 11 and ended on June 17. The barges were in operation for a total of 67 days. The second barge of the year left four days after the first barge on April 15. After April 15, a barge left Lower Granite every other day until May 1. Fran May 1 to May 27, a loaded barge left Lower Granite every day (see Table 5). During this period, the total smolt collection for each day exceeded 55,000, with the largest barge load occurring on May 4 at 206,808 smolts (see Table 6).

From May 27 until June 17, a barge left the Lower Granite facility every other day (see Table 7). The last barge load contained 14,594 smolts. The total number of smolts transported by barge was 4,356,122.

Each day, a pound count was taken from the fish in the sample roan. These pound counts were used to correct the pounds of fish in the barge that was loaded during the previous 24 hours. The poundage of fish placed in the barge during the previous 24 hours was estimated while being loaded using the previous day's pound count.

On May 8, the pound count was 9.5 fish/pound. Fish were loaded into the barge using 9.5 fish/pound as the pound count from noon on May 8 to noon on May 9. The pound count taken the morning of May 9 dropped to 6.3 fish/pound. The barge poundage increased dramatically when the number of fish in the barge was divided by the new pound count.

This poundage was further increased when the May 9 correction factor was determined. The hand count in the sample roan was 15% higher than the count of the electronic counters. The 24-hour fish from noon to noon had to be multiplied by 1.15 to get the correct count.

The poundage in the bow compartment increased from 6,700 pounds to 11,404 pounds. The density was less than 0.5 pounds/gallon (0.4025), so the FTOT committee recommended that the barge be allowed to travel downriver.

I believe that the number of pounds needed to reach a statistically significant pound count should be determined before the 1986 juvenile transport season. Caution should be used when loading barges during the transition

Table 1. Daily collection counts for all species at Lower Granite Juvenile collection facility, April 1985.

Date	Chinook Yearling	Chinook Sub-Year) in	Steel head Hatcher	Steel head Wild	Coho	Sockeye	Daily Total
04/01/85	1,591	0	0	0	0	63	1,654
04/02/85	834	0	0	13	0	27	874
04/03/85	1,393	0	0	24	0	61	1,478
04/04/85	2,086	0	0	81	0	26	2,193
04/05/85	3,451	0	0	200	0	44	3,695
04/06/85	4,937	0	12	443	0	21	5,413
04/07/85	6,376	13	35	502	0	56	6,982
04/08/85	5,922	0	33	792	0	13	6,760
04/09/85	11,648	0	42	1,042	0	26	12,758
04/10/85	15,813	0	123	1,057	0	0	16,993
04/1 1/85	13,875	0	170	1,744	0	32	15,821
04/12/85	24,052	0	214	2,123	0	24	26,413
04/13/85	34,397	0	310	1,875	0	11	36,593
04/14/85	19,729	0	631	3,076	0	23	23,459
04/15/85	47,427	9	641	5,262	0	38	53,377
04/16/85	32,515	10	704	3,039	0	73	36,341
04/17/85	50,349	0	2,235	5,239	0	116	57,939
04/18/85	57,831	0	3,165	6,665	0	136	67,797
04/19/85	61,425	0	5,811	8,025	0	15	75,276
04/20/85	54,474	17	8,462	7,576	0	0	70,529
04/21/85	38,116	0	12,105	6,776	0	63	57,060
04/22/85	38,822	0	8,304	1,774	0	0	48,900
04/23/85	54,327	0	10,784	6,553	0	7	71,671
04/24/84	34,990	0	9,373	6,710	0	97	51,170
04/25/85	65,649	0	13,126	9,179	0	0	87,954
04/26/85	71,274	0	13,934	11,259	0	19	96,486
04/27/85	45,276	0	5,911	4,153	0	17	55,357
04/28/85	34,076	0	3,265	4,261	0	0	41,602
04/29/85	35,084	0	5,597	4,281	0	0	44,962
04/30/85	34,303	0	5,544	4,200	0	44	44,091
Total	902,042	49	110,531	107,924	0	1,052	1,121,598

Table 2. Daily collection counts for all species at Lower Granite Juvenile collection facility, May 1985.

Date	Chinook Yearlinq	Chinook Sub-Yearlinq	Steelhead Hatchery	Steelhead Wild	Coho	Sockeye	Daily Totals
05/01/85	55.555	0	6.790	5.488	0	0	67.833
05/02/85	52,473	0	11,837	6,922	0	14	71,246
05/03/85	57,179	0	31,961	12,245	0	51	101,436
05/04/85	70,998	0	113,796	22,194	0	62	207,050
05/05/85	44,389	0	101,882	18,404	0	33	164,708
05/06/85	20,401	0	91,646	19,535	0	40	131,622
05/07/85	16,904	0	65,624	15,154,	0	29	97,711
05/08/85	22,290	0	71,526	18,865	0	68	112;749
05/09/85	31,943	0	93,266	16,446	0	0	141,655
05/10/85	26,764	0	60,414	11,294	0	69	98,541
05/11/85	25,449	0	65,651	11,044	0	102	102,246
05/12/85	20,257	0	51,212	6,891	0	126	78,486
05/13/85	21,133	0	53,427	7,189	0	107	81,856
05/14/85	22,080	0	57,874	9,421	0	161	89,536
05/15/85	18,279	16	35,210	6,262	0	373	60,140
05/16/85	22,095	0	46,266	6,731	0	113	75,205
05/17/85	11,539	0	40,137	5,083	0	29	56,788
05/18/85	21,759	0	55,034	7,826	0	442	85,061
05/19/85	14,255	86	47,260	9,873	0	337	71,811
05/20/85	16,570	32	49,640	12,317	0	157	78,716
05/21/85	23,511	19	69,222	16,661	0	285	109,698
05/22/85	21,709	0	93,997	18,331	0	135	134,672
05/23/85	16,585	0	77,982	16,029	0	122	110,718
05/24/85	15,721	32	57,292	5,742	0	95	78,882
05/25/85	18,248	0	78,919	7,407	0	178	104,752
05/26/85	13,262	0	85,809	10,228	0	33	109,332
05/27/85	11,287	0	74,831	3,469	0	63	89,650
05/28/85	11,179	0	76,208	6,268	0	131	93,786
05/29/85	11,245	0	40,101	4,112	0	100	55,558
05/30/85	11,999	0	59,395	5,025	0	107	76,526
05/31/85	11,141	0	35,867	2,950	0	0	49,958
Total	758,199	185	1,900,076	325,906	0	3,562	2,987,928

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Table 3. Daily collection counts for all species at Lower Granite Juvenile collection facility, June 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steel head Hatcher	Steel head Wild	Coho	Sockeye	Daily Totals
06/01/85	5,430	0	23,739	2,205	0	28	31,402
06/02/85	4,097	0	16,862	1,741	0	0	22,700
06/03/85	3,505	0	18,188	1,720	0	30	23,443
06/04/85	2,494	0	11,914	1,115	0	65	15,588
06/05/85	3,069	0	9,976	1,501	0	200	14,746
06/06/85	2,844	0	11,068	1,321	0	46	15,279
06/07/85	7,665	410	14,485	984	0	33	23,577
06/08/85	5,036	1,592	13,874	1,234	0	96	21,832
06/09/85	5,841	1,154	15,926	1,495	0	103	24,519
06/10/85	4,120	777	11,894	1,322	0	38	18,151
06/11/85	2,866	672	10,178	1,220	0	120	15,056
06/12/85	2,712	819	9,155	983	0	84	13,753
06/13/85	1 ,891	426	6,431	396	0	61	9,205
06/14/85	4,335	1,024	9,530	851	35	35	15,810
06/15/85	2,654	359	5,991	359	0	0	9,363
06/16/85	2,038	503	3,891	212	0	53	6,697
06/17/85	2,436	343	4,682	419	0	76	7,956
06/18/85	1,563	440	4,802	228	0	49	7,082
06/19/85	1,258	274	3,370	193	0	16	5,111
06/20/85	1,221	418	2,396	96	0	32	4,163
06/21/85	1,313	671	1,099	57	0	14	3,154
06/22/85	1,012	1,289	628	96	0	11	3,036
06/23/85	557	1 ,404	568	97	0	0	2,626
06/24/85	723	1,331	723	101	0	13	2,891
06/25/85	450	952	546	43	0	21	2,012
06/26/85	76	1 ,172	417	22	0	0	1,687
06/27/85	46	1,356	673	91	0	23	2,189
06/28/85	204	1,071	1,021	51	0	13	2,360
06/29/85	205	453	428	17	0	26	1,129
06/30/85	548	648	212	34	0	0	1,442
Total	72,209	19,558	214,667	20,204	35	1,286	327,959

Table 4. Daily collection counts for all species at Lower Granite Juvenile collection facility, July 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steel head Hatchery	Steel head Wild	Coho	Sockeye	Daily Totals
07/01/85	296	605	295	48	0	25	1,269
07/02/85	510	700	3 92	12	0	12	1,626
07/ 03/ 85	672	9 82	522	50	0	13	2,239
07/04/85	770	1,127	771	0	0	23	2,691
07/05/85	680	788	384	20	0	0	1,872
07/06/85	354	890	269	12	0	0	1,525
07/07/85	303	597	312	38	0	0	1,250
07/08/85	474	1,730	475	38	0	0	2;717
07/09/85	832	4,347	7 03	59	0	0	5,941
07/10/85	481	2,970	503	21	0	11	3,986
07/11/85	259	2,347	5 87	27	0	0	3,220
07/12/85	242	1,607	5 92	0	0	9	2,450
07/13/85	259	1,136	432	12	0	0	1,839
07/14/85	127	771	478	20	0	10	1,406
07/15/85	156	501	201	11	0	0	869
07/16/85	59	437	495	12	0	0	1,003
07/17/85	36	688	510	0	0	12	1,246
07/18/85	49	523	475	0	0	0	1,047
07/19/85	89	513	266	0	0	0	868
07/20/85	22	458	3 06	0	0	0	786
07/21/85	45	191	461	11	0	0	708
07/22/85	0	143	112	20	0	0	275
07/23/85	11	165	143	11	0	0	330
Total	6,726	24,216	9,684	422	0	115	41,163

Table 5. Barge transportation summary for all species at Lower Granite Juvenile collection facility, April 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steelhead Hatchery	Steelhead Wild	Coho	Sockeye	Daily Totals
04/01/85	0	0	0	0	0	0	0
04/02/85	0	0	0	0	0	0	0
04/03/85	0	0	0	0	0	0	0
04/04/85	0	0	0	0	0	0	0
04/05/85	0	0	0	0	0	0	0
04/06/85	0	0	0	0	0	0	0
04/07/85	0	0	0	0	0	0	0
07/08/85	0	0	0	0	0	0	0
04/09/85	0	0	0	0	0	0	0
04/10/85	0	0	0	0	0	0	0
04/11/85	46,889	0	368	4,634	0	71	51,962
04/12/85	0	0	0	0	0	0	0
04/13/85	0	0	0	0	0	0	0
04/14/85	0	0	0	0	0	0	0
04/15/85	125,289	9	1,794	12,333	0	96	139,521
04/16/85	0	0	0	0	0	0	0
04/17/85	81,767	10	2,932	8,259	0	189	93,157
04/18/85	0	0	0	0	0	0	0
04/19/85	118,776	0	8,954	14,685	0	151	142,566
04/20/85	0	0	0	0	0	0	0
04/21/85	91,429	17	20,543	14,352	0	61	126,402
04/22/85	0	0	0	0	0	0	0
04/23/85	91,961	0	19,055	8,326	0	7	119,349
04/24/85	0	0	0	0	0	0	0
04/25/85	99,207	0	22,441	15,886	0	96	137,630
04/26/85	0	0	0	0	0	0	0
04/27/85	114,870	0	19,826	15,409	0	36	150,141
04/28/85	0	0	0	0	0	0	0
04/29/85	68,367	0	8,843	8,541	0	0	85,751
04/30/85	0	0	0	0	0	0	0
Total	838,555	36	104,756	102,425	0	707	1,046,479

Table 6. Barge transportation summary for Lower Granite Juvenile collection facility, May 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steel Hatcher	Steel head Wild	Coho	Sockeye	Daily Totals
05/01/85	89,779	0	12,315	9,688	0	44	111,826
05/02/85	52,404	0	11,827	6,922	0	14	71,167
05/03/85	56,757	0	31,946	12,245	0	51	100,999
05/04/85	70,768	0	113,784	22,194	0	62	206,808
05/05/85	43,998	0	101,815	18,398	0	33	164,244
05/06/85	20,340	0	91,616	19,535	0	40	131,531
05/07/85	16,830	0	65,043	15,030	0	27	96,93 0
05/08/85	22,206	0	70,968	18,730	0	66	111,970
05/09/85	31,690	0	93,211	16,446	0	0	141,347
05/10/85	26,590	0	59,836	11,166	0	69	97,661
05/11/85	25,289	0	65,046	10,951	0	102	101,388
05/12/85	20,189	0	51,175	6,891	0	126	78,381
05/13/85	21,082	0	52,827	71,113	0	107	81,129
05/14/85	21,983	0	57,291	9,331	0	161	88,766
05/15/85	18,258	16	35,191	6,261	0	373	60,099
05/16/85	21,940	0	46,232	6,731	0	113	75,016
05/17/85	11,497	0	39,536	5,011	0	29	56,073
05/18/85	21,708	0	54,729	7,786	0	442	84,665
05/19/85	14,212	86	47,189	9,871	0	337	71,695
05/20/85	16,532	32	49,335	12,253	0	157	78,309
05/21/85	23,447	19	68,894	16,596	0	285	109,241
05/22/85	21,651	0	93,814	18,801	0	134	134,400
05/23/85	16,520	0	77,948	16,027	0	122	110,617
05/24/85	15,668	32	57,251	5,737	0	95	78,783
05/25/85	18,225	0	78,890	7,402	0	178	104,695
05/26/85	13,223	0	85,768	10,224	0	33	109,248
05/27/85	0	0	0	0	0	0	0
05/28/85	22,354	0	150,711	9,716	0	193	182,974
05/29/85	0	0	0	0	0	0	0
05/30/85	23,152	0	99,303	9,123	0	206	131,784
05/31/85	0	0	0	0	0	0	0
Total	778,292	185	1,863,491	326,179	0	3,599	2,971,746

Table 7. Barge transportation summary for Lower Granite Juvenile collection facility, June 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steel head Hatchery	Steel head Wild	Coho	Sockeye	Daily Totals
06/01/85	16,493	0	59,525	5,149	0	28	81,195
06/02/85	0	0	0	0	0	0	0
06/03/85	7,588	0	34,995	3,458	0	30	46,071
06/04/85	0	0	0	0	0	0	0
06/05/85	5,556	0	21,856	2,612	0	265	30,289
06/ 06/ 85	0	0	0	0	0	0	0
06/07/85	10,468	404	25,257	2,291	0	78	38,498
06/08/85	0	0	0	0	0	0	0
06/09/85	10,823	2,728	29,685	2,722	0	199	46,157
06/10/85	0	0	0	0	0	0	0
06/1 1/85	6,963	1,434	22,011	2,540	0	147	33,095
06/ 12/ 85	0	0	0	0	0	0	0
06/13/85	4,595	1,244	15,525	1,378	0	145	22,887
06/14/85	0	0	0	0	0	0	0
06/15/85	6,987	1,378	15,468	1,208	35	35	25,111
06/16/85	0	0	0	0	0	0	0
06/17/85	4,460	846	8,534	628	0	126	14,594
06/ 18/ 85	0	0	0	0	0	0	0
06/19/85	0	0	0	0	0	0	0
06/20/85	0	0	0	0	0	0	0
06/ 21 / 85	0	0	0	0	0	0	0
06/22/85	0	0	0	0	0	0	0
06/23/85	0	0	0	0	0	0	0
06/24/85	0	0	0	0	0	0	0
06/25/85	0	0	0	0	0	0	0
06/26/85	0	0	0	0	0	0	0
06/27/85	0	0	0	0	0	0	0
06/28/85	0	0	0	0	0	0	0
06/29/85	0	0	0	0	0	0	0
06/30/85	0	0	0	0	0	0	0
Total	73,933	8,034	232,856	21,986	35	1,053	337,897

time from chinook dominance in the collection to steel head dominance in the collection. During this time, the pound count will drop quickly and, in the future, may cause a barge to be overloaded.

The barges performed well throughout the transport season with the exception of some minor problems. None of the malfunctions caused fish health problems, but there were some problems that should be remedied.

The loading dock and barge storage docks of Lower Granite have fixed attachment points for barge tie-down ropes and cables. When the tailrace level lowers, the barges hang from their tie-down cables and put stress on the points of attachment. A tie-down bal lard was pulled out of the concrete barge storage dock on April 21 when the tailrace level was lowered because of increased power output at Little Goose. Movable floating ballards would alleviate this problem. An electric winch would also be useful in loosening the barges' cables when the tailrace level drops.

The Waukesha pumps had various malfunctions throughout the year. On April 24, the middle engine on barge 2127 blew a 2-inch wide hole out of the crankcase. The engine was replaced with an engine from another barge on April 25. Fish were not stressed by this occurrence, and the barge left Lower Granite on April 25 in a fully operational status. Barge riders claimed that the valves in the engines would stick quite often, but this was not the cause of any mishaps.

On April 27, the rear starboard compartment on barge 4394 began overflowing at Little Goose four hours after it had departed from Lower Granite. The barge rider was advised to run one engine instead of two until he reached McNary Dam. The barge was checked, but the problem was not corrected. On April 28, the barge system was back-flushed. This action stabilized the water level, and two pumps were once again utilized.

On April 3, barge 4394 had problems with the intake and was not bringing in normal amounts of water. The sea chest was inspected on April 5, but the reason for decreased flow was not discovered. The problem stopped before the barge reached Lower Granite on the return trip. The cause of this mishap was not determined.

Barge transport capacity w ill have to increase in order to meet the increase in numbers of smolts that will be released in the near future.

Truck Transportation

Early season trucking of smolts from Lower Granite began on March 28 and ended on April 7 when barge transportation of smolts began. Trucking of smolts to below Bonneville Dam occurred every other day during this 11-day period. The number of smolts transported during 1-he early season trucking phase was 25,885. Of this number, 91.37% were yearling chinook, 5.5% were wild steelhead, 2.9% were sockeye, 0.18% were hatchery steelhead, and 0.05% were sub-yearling chinook (Table 8).

Table 8. Truck transportation summary for the Lower Granite Juvenile collection facility, March-April 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steelhead Hatchery	Steel head Wildd	Coho~	Sockeye	Daily Totals
03/28/85	1,443	0	0	94	0	273	1,810
03/29/85	0	0	0	0	0	0	0
03/3 0/ 85	1 , 072	0	0	58	0	103	1,233
03/31/85	0	0	0	0	0	0	0
04/01/85	2,126	0	0	13	0	137	2,276
04/02/85	0	0	0	0	0	0	0
04/03/85	2,212	0	0	37	0	88	2,337
04/04/85	0	0	0	0	0	0	0
04/05/85	5,519	0	0	280	0	68	5,867
04/06/85	0	0	0	0	0	0	0
04/07/85	11,280	13	47	945	0	77	12,362
04/08/85	0	0	0	0	0	0	0
04/09/85	0	0	0	0	0	0	0
04/10/85	0	0	0	0	0	0	0
04/11/85	0	0	0	0	0	0	0
04/12/85	0	0	0	0	0	0	0
04/13/85	0	0	0	0	0	0	0
04/14/85	0	0	0	0	0	0	0
04/ 15/ 85	0	0	0	0	0	0	0
04/16/85	0	0	0	0	0	0	0
04/17/85	0	0	0	0	0	0	0
04/18/85	0	0	0	0	0	0	0
04/19/85	0	0	0	0	0	0	0
04/20/85	0	0	0	0	0	0	0
04/21/85	0	0	0	0	0	0	0
04/22/85	0	0	0	0	0	0	0
04/ 23/ 85	0	0	0	0	0	0	0
04/24/85	0	0	0	0	0	0	0
04/25/85	0	0	0	0	0	0	0
04/26/85	0	0	0	0	0	0	0
04/27/85	0	0	0	0	0	0	0
04/28/85	0	0	0	0	0	0	0
04/29/85	0	0	0	0	0	0	0
04/30/85	0	0	0	0	0	0	0
Total	23,652	13	47	1,427	0	746	25,885

The late season smolt trucking phase began on June 18 and continued until July 23. Truckloads of smolts left every day from Lower Granite between June 18 and June 22. After June 22, trucks were loaded and departed every other day until transport operations ceased (Tables 9 and 10).

During June, 38,609 smolts were transported by truck. Of this number, 43.4% were hatchery steelhead, 29.6% were fall chinook, 23.6% were yearling chinook, 2.9% were wild steel head, and 0.5% were sockeye.

Trucking of smolts was continued during July because fish collection numbers of fall chinook and hatchery steelhead remained high. There were 38,822 smolts transported from Lower Granite during July. Of this number, 59.57% were sub-yearling chinook, 22.06% were hatchery steel head, 17.05% were yearling chinook, 1.03% were wild steelhead, and 0.30% were sockeye. Due to extremely low flows and high water temperatures, the fish condition deteriorated the last five days of transport, and mortality increased to intolerable levels; both of which caused transport operations to cease on July 23.

Factility Descaling

Fish quality stayed at a high level throughout most of the smolt transportation season. The last two weeks of July were the exception when water temperatures were over 70°F and steelhead condition deteriorated. The steelhead, at this time, were soft to the touch and lacked the firm body tone that they had earlier in the season. Fall chinook remained i n good condition during this time even though mortalities were high. The new nine type of descaling used in 1985 is defined as a lateral band of missing scales from one or both sides of a fish, comprising 10% of the area on the side of the fish from which the scales were missing. This new descaling classification is included in all descaling figures.

The mean weekly yearling chinook descaling was 3.26% (Table 11). The lowest descaling week for yearling chinook occurred from May 31 to June 6. This period coincided with the time that hatchery-branded chinook first stopped showing up in the sample. This period also coincided with the time when chinook mean total lengths became less than 130 mm (Fig. 5). These occurrences all happening simultaneously may indicate that wild chinook salmon smolts made up the largest portion of the collection at this time.

The highest chinook descaling occurred 1-he first week of collection from March 29 to April 4. The majority of the year! ing chinook collected at this time were from the Hells Canyon release. The process of trucking these smolts may have caused the elevated descaling.

Fall chinook had a weekly mean descaling rate of 2.44%. Hatchery steelhead had the highest descaling rate of all the fish groups that were checked for descaling. The mean weekly descaling rate for hatchery steelhead was 3.82%. The two highest weeks of descaling had a 5.29% descaling rate and occurred during the week starting May 10 and during the week starting May 24. These

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Table 9. Truck transportation summary for the Lower Granite Juvenile collec-tion facility, June 1985.

Date	Chinoo Yearling	Chinook Sub-Yearling	Steelhead Hatcher	Steelhead Wild	Coho	Sockeye	Daily Totals
06/01/85	0	0	0	0	0	0	0
06/02/85	0	0	0	0	0	0	0
06/03/85	0	0	0	0	0	0	0
06/04/85	0	0	0	0	0	0	0
06/05/85	0	0	0	0	0	0	0
06/ 06/ 85	0	0	0	0	0	0	0
06/07/85	0	0	0	0	0	0	0
06/08/85	0	0	0	0	0	0	0
06/09/85	0	0	0	0	0	0	0
06/10/85	0	0	0	0	0	0	0
06/11/85	0	0	0	0	0	0	0
06/ 12/ 85	0	0	0	0	0	0	0
06/13/85	0	0	0	0	0	0	0
06/14/85	0	0	0	0	0	0	0
06/15/85	0	0	0	0	0	0	0
06/16/85	0	0	0	0	0	0	0
06/17/85	0	0	0	0	0	0	0
06/18/85	1,560	439	4,782	227	0	44	7,052
06/19/85	1,258	274	3,363	193	0	15	5,103
06/20/85	1,213	416	2,380	95	0	28	4,132
06/21/85	1,312	670	1,085	57	0	11	3,135
06/22/85	1,011	1,284	620	96	0	9	3,020
06/ 23/ 85	0	0	0	0	0	0	0
06/24/85	1,268	2,724	1,275	194	0	9	5,470
06/25/85	0	0	0	0	0	0	0
06/26/85	519	2,114	937	65	0	20	3,655
06/ 27/ 85	0	0	0	0	0	0	0
06/28/85	244	2,407	1,674	142	0	36	4,503
06/29/85	0	0	0	0	0	0	0
06/30/85	745	1,094	625	51	0	24	2,539
Total	9,130	11,422	16,741	1,120	0	196	38,609

Table 10. Truck transportation summary for the Lower Granite juvenile collection facility, July 1985.

Date	Chinook Yearling	Chinook Sub-Yearling	Steel head Hatcher	Steel head Wild	Coho	Sockeye	Daily Totals
07/01/85	0	0	0	0	0	0	0
07/02/85	800	1,295	672	59	0	37	2,863
07/03/85	0	0	0	0	0	0	0
07/04/85	1,427	2,095	1,258	50	0	36	4,866
07/05/85	0	0	0	0	0	0	0
07/06/85	1,014	1,658	603	31	0	0	3,306
07/07/85	0	0	0	0	0	0	0
07/08/85	767	2,307	729	74	0	0	3,877
07/09/85	0	0	0	0	0	0	0
07/10/85	1,311	7,244	1,067	77	0	11	9,710
07/11/85	0	0	0	0	0	0	0
07/12/85	479	3,670	980	25	0	9	5,163
07/13/85	0	0	0	0	0	0	0
07/14/85	368	1,791	796	31	0	10	2,996
07/15/85	0	0	0	0	0	0	0
07/16/85	207	807	608	15	0	0	1,637
07/17/85	0	0	0	0	0	0	0
07/18/85	84	1,100	852	0	0	12	2,048
07/19/85	0	0	0	0	0	0	0
07/20/85	107	830	440	0	0	0	1,377
07/21/85	0	0	0	0	0	0	0
07/22/85	44	198	435	26	0	0	703
07/23/85	10	132	123	11	0	0	276
Total	6,618	23,127	8,563	399	0	115	38,822

Table 11. Weekly mean descaling percent at Lower Granite Dam, 1985.

Week	Yearl ing Chinook	Sub-Yearling Chinook	Hatchery STT	Wild STT	Total
03/29/85	4.39	---	---	0	4.39
04/04/05					
04/05/85	3.70	---	0	1.14	4.84
04/11/85					
04/12/85	3.69	---	3.24	0.71	7.64
04/18/85					
04/19/85	3.00	---	5.20	1.14	9.34
04/25/85					
04/26/85	4.00	---	6.00	0.50	10.50
05/02/85					
05/03/85	3.00	---	1.57	1.14	5.71
05/09/65..					
05/10/85	2.86	---	5.29	0.86	9.01
05/16/85					
05/17/85	4.29	---	5.00	1.29	10.58
05/23/85					
05/24/85	2.00	---	5.29	2.43	9.72
05/30/85					
05/31/85	1.04	---	4.11	1.97	7.12
06/06/85					
06/07/85	3.26	1.32	4.85	0.50	9.93
06/13/85					
06/14/85	2.49	1.46	4.57	3.44	11.96
06/20/85					
06/21/85	2.21	2.37	4.00	1.59	10.17
06/21/85					
06/28/85	3.33	2.96	3.00	0	9.29
07/04/85					
07/05/85	6.08	2.71	1.77	0	10.56
07/11/85					
07/12/85	2.86	2.24	2.46	0	10.02
07/18/85					
07/19/85	0	4.00	4.76	0	8.76
07/23/85					
X percent descaling	3.26	2.44	3.82	0.98	8.80

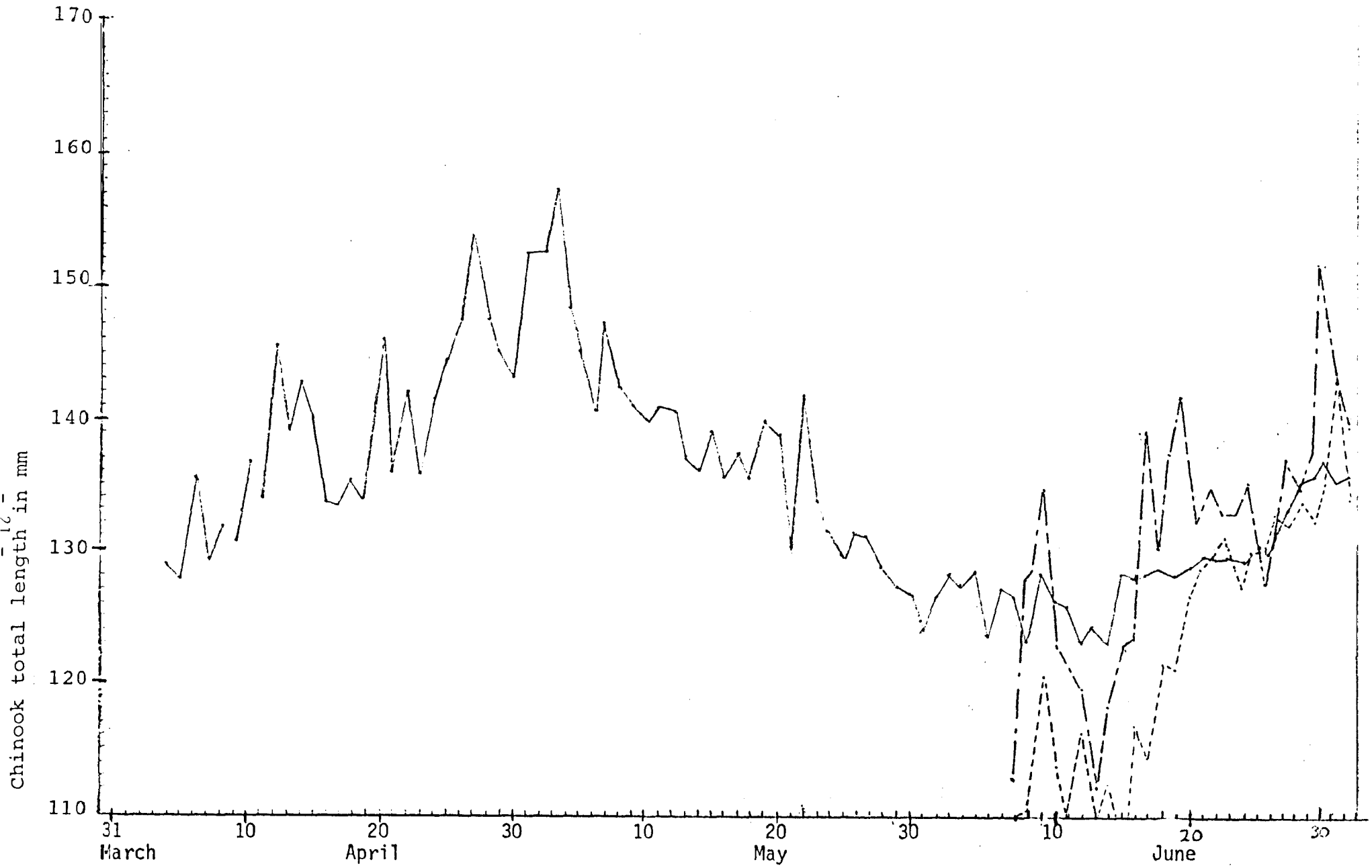

Fig. 5. Chinook total length mean vs. days of collection. The mean total length was derived from a 100 fish sample each day. After 7 June the 100 fish sample included fall chinook and yearling chinook. Fall branded chinook are represented by the line-dot line. Fall chinook total lengths are represented by the dotted line. Fall chinook total lengths continued to increase through the month of July.

two high descaling rate weeks occurred when the steel head were peaking. The descaling may have been enhanced at these times because of crowded conditions in the collection system.

Wild steel head had the lowest rate of descaling of all four fish groups. The mean weekly descaling rate for w i l d steelhead was 1.04%. Four of the weeks during the collection season did not have any wild steelhead descaled. The low rate of descaling in the wild steelhead was probably due to a lack of handling and trucking at smoltification time.

Gatewell Descaling

Fish were sampled from the gatewells to determine the quality of the fish before they entered the orifices and came through the fish collection system. Each week, an attempt was made to get a 100-fish sample of chinook, hatchery steelhead, and w i l d steelhead frail the gatewells. In many cases, this was not possible due to low numbers of fish or during peak migration periods when handling fish resulted in high levels of stress.

Gatewell descaling percentages were compared to facility descaling percentages taken the day of gatewell sampling. Descaling rates that were higher at the facility were given a positive sign, and descaling rates that were lower at the facility were given a negative sign. These descaling differences between gatewell and facility descaling were added together then divided by the number of samples to get a seasonal mean of the facility caused by descaling (Table 12).

The chinook facility descaling the day that gatewell descaling occurred was +0.65. Hatchery steelhead descaling differences were +1.47. Wild steelhead differences were +1.06.

Gatewells were usually dipped at 1300 hours. The chinook gatewell sample number was the most consistent, followed by hatchery steelhead, then wild steelhead.

A possible source of descaling could be the small orifices diameters. The 8-inch diameter orifices were constantly plugging, even during the low trash situation that occurred during 1985. The two orifices that were drilled out to 12-inch diameters were not plugged once the entire season. When orifices are plugged, the laminar flow of the water is disrupted. This increases the turbulence inside the orifices and, thus, increases the water-orifice contact surface area. This may be a place where descaling occurs.

In addition, the raceway technicians mentioned that descaling was occurring when the raceway 10 sample was brought into the sample buildingng. The sample line exit to raceway 10 is located on the raceway wall instead of on the raceway bottom. Raceway technicians have to push fish toward the wall drain with a net. This technique caused the fish to struggle and scales were often seen in the water, especially when the sample contained large numbers of fish.

Table 12. Gatewel I descal ing compared to facil ity descal ing at Lower Granite Dam, 1985.

Date	Species	Gatewell Descalinq N	Gatewell Descalinq % Descaled	Facility_Descalinq N	Facility_Descalinq %_ Descaled	Difference
4/11	SC&SU	303	3.6	100	4.0	+0.4
	HSTT	2	0	11	0	0
	WSTT	6	0	92	4.4	+4.4
4/18	SC&SU	300	6.3	100	6.0	-0.3
	HSTT	23	8.7	100	5.0	-3.7
	WSTT	15	0	100	0	0
4/22	SC&SU	300	6.3	100	4.0	-2.3
	HSTT	10	0	100	2.0	+2.0
	WSTT	0	-	100	0	-
4/29	SC&SU	290	1.7	100	2.0	+0.3
	HSTT	232	4.3	100	5.0	+0.7
	WSTT	23	0	100	0	0
5/13	SC&SU	169	0.6	100	1.0	+0.4
	HSTT	208	2.4	100	7.0	+4.6
	WSTT	13	0	100	1.0	+1.0
5/20	SC&SU	231	2.2	100	1.0	-1.2
	HSTT	241	3.3	100	4.0	+0.7
	WSTT	18	0	;CO	0	0
5/31	SC&SU	163	3.8	100	1.0	-2.8
	HSTT	275	6.9	100	8.0	+1.1
	WSTT	14	7.0	100	1.1	-5.9
6/ 10	SC, SU, FC	93	0	81	4.9	+4.9
	HSTT	182	1.1	100	5.0	+3.9
	WSTT	8	0	32	0	0
6/ 17	SC, SU, FC	112	0.9	74	2.7	+1.8
	HSTT	135	2.2	100	4.0	+1.8
	WSTT	1	0	11	9.0	+9.0
6/24	SC, SU, FC	67	0	100	2.0	+2.0
	HSTT	5	0	56	3.6	+3.6
	WSTT	0	-	0	-	-
Chinook fac I I ity descaling mean						+0.35
Hatchery steel head facility descaling mean						+1.47
Wild steel head facility descaling mean						+1.06

A + denotes facility descaling was higher. A denotes - facility descaling was lower.

A floor drain would take advantage of gravitational effects and the coriol is effect, and may prove to be easier on the fish.

The collection system at Lower Granite seems to have only a minor descaling effect on smol ts. The system performed well this year, and descaling was kept to a low level. Gatewel I dipping should be done anytime facility descaling is above 5% for any fish group.

Effect of '"9"-Tvpe Descal ing Criteria Chance

The new "9"-type of descaling made up a considerable portion of descaling in 1985 (Table 13). March sample roan fish did not have any "9"-type descaling but, during April, the "9"-type of descaling made up 62% of the yearling chinook descaling, 27% of hatchery steel head descaling, and 47% of wild steelhead descaling. During May, the new category of descaling made up 25.3% of yearling chinook descaling, 1.4% of hatchery steel head descaling, and had no effect on wild steelhead descaling. During June, the new category made up 22% of yearling chinook descaling, 15.79% of sub-yearling chinook descaling, 0.9% of hatchery steelhead descaling, and did not effect wild steelhead descaling. During July, the "9"-type descaling had no effect on yearling chinook, hatchery steelhead, or wild steelhead, but provided 8.6% of the sub-yearling chi nook descaling.

FACILITY MORTALITY

Facility smolt mortality remained low during the 1985 transport season (Table 14). Until July, when water quality deteriorated, the mean facility mortality rate was less than 1%. Facility mortality in this report does not, however, include the mortality that occurred during the 2 hours after barge departure. Barge riders combined the 2 hour post departure barge mortality from all three dams, but this information was not available at the time of submission of this report.

The warm water conditions of July had a deleterious effect on fish health. Yearling chinook mean daily mortality for July increased to 1.38%. The highest yearling chinook daily mortality occurred on July 20 and was 13.63% of collection. Sub-yearling chinook mean daily mortality for July was 3.79%. The highest sub-yearling chinook daily mortality was 59.44% on July 22. The hatchery steelhead mean daily mortality for July was 4.98%, with a daily mortal Ity high at 100% on July 17.

The fish collection system was switched to a bypass mode at 1200 hours on July 23. The facility was changed to bypass because of low collection numbers and high mortality rates. Steel head appeared to be reverting back to parr during the last days of collection.

On April 15, the separator began surging and overflowed onto the rip rap along the Snake River shoreline. Human error on one COE employee and one IDFG employee were partially responsible for this mishap. An estimated 200 chinook smolis were killed because of this incident.

Table 13. Lower Granite "9"-type descaling versus other types of descaling for April, May, June, and July 1985.

	Yearling Chinook		Sub-Yearling Chinook		Hatchery STT_		W i l d STT _	
	Other	9	Other	9	Other	9	Other	9
April	41	67	-	-	57	21	10	9
May	71	24	-	-	140	2	42	0
June	39	11	16	3	111	1	12	0
July	18	0	32	3	17	0	0	- 0
Totals	169	102	48	6	325	24	88	9
Percent	62.4	37.6	88.8	11.2	93.1	6.9	90.7	9.3

Table 14. Collection mortality rates at Lower Granite from 1980-85. Hatchery and wild steel head were not separated until 1985. Yearlings and sub-yearlings were not separated until 1983.

Species	1985	1984	-------1983.	1982	1981	1980
Total Chinook	0.31	0.5	0.7	0.8	0.7	0.6
Yearlings	0.26	0.4	-	-	-	-
Sub-Yearlings	2.32	0.7	-	-	-	
Total Steel head	0.15	0.1	0.2	0.1	0.1	0.3
Hatchery	0.17	-	-	-	-	-
Wild	0.04	-	-	-	-	-

JUVENILE SAMPLING

The sample roan began operations on March 29 and ceased operations on July 23 . During March and April, the sample roan personnel handled 79,086 smolts. This amounted to 7% of the March-April collection. During May, sample roan personnel handled 116,906 smolts (3.9% of collection). During June, 12,187 smolts were handled i n the sample room (3.7% of collection). During July, the sample fish made up 8.82% of collection.

During April and May, the transport evaluation study fish were fin clipped, branded, and coded wire tagged. The fish marking crew marked 45,734 yearling chinook, 24,350 hatchery steelhead, and 5,929 wild steelhead in this study. All of these fish were loaded into the barge after tagging was completed. Unfortunately, no control groups were marked and released.

On May 5 , 71 of these branded barge transport study fish were found dead in the barge. The mortalities were all marked chinook from the transport evaluation research group. Many more of the mortalities found in the barge were adipose clipped. The barge rider also observed that "9"-type of descaling was present on virtually all of the mortal sties.

This set of circumstances led biologists at Lower Granite to the conclusion that something was wrong with fish sample operations at the fish collection facility. The chinook sent to the branding stations were the best specimens that the fish sorters could find. The discovery that these fish had become descaled between the branding roan and barge led biologists to investigate the sample roan operations.

Sample room procedure was observed for 2 days after this incident was re-ported, and sane problems were found to exist:

1. When both chinook and steel head are anesthetized together in the pre-anesthetizer, the chinook become anesthetized much quicker than the steel head. The person operating the pre-anesthetizer had to wait until the steelhead were anesthetized before netting the fish into the sorting table. This procedure caused the chinook to be anesthetized for a longer period than the steel head.

2. Smolts were sorted out of the MS-222 filled sorting table at random. No emphasis was placed on moving chinook smolts out first. The healthiest appearing chinook smolts were sent to 1-he marking stations where they were fin clipped, branded, and coded wire tagged.

3. At times, the chinook would stack up in the marking trough and did not show a gill response by the time they were sent out to the barge. Many times, the CWT machine would malfunction and fish would stack up while it was being repaired. There was not good coordination between the sorting trough and the marking stations.

4. Water flow in the direct load line was found to be inadequate to move the fish from the sorting room to the barge.

After biologists made these observations, the following changes were made:

1. Fish were netted out of the pre-anesthetizer when the salmon demonstrated a marked response to anesthesia.

2. The crew was told to sort salmon out of the sorting table first each time that a new group of smolts were netted in to the sorting trough.

3. The valve on the outdoor holding tank was opened to increase the flow in the direct load line to the barge. it was possible that the "9"-type descaling occurred because the over-anesthetized fish were bumping and scraping along the bottom of the direct load line.

4. Flows in the sample roan exit pipe were turned up to get fish out of the MS-222 treated water and into the exit pipe which contained fresh water.

Dissolved oxygen was measured in the sorting trough later in the season when sample numbers were small. The sorting trough was found to have 7 ppm oxygen. Under heavy loads, the system was very likely less than the critical 5 ppm oxygen needed for salmonid survival. It was also noticed that the pre-anesthetizer was occasionally being overloaded, and fish were possibly suffering from anoxia during the pre-anesthetization procedure.

The 1986 smolt season will have larger numbers of fish marked than the 1985 season. A control group of fish w it l be branded. for bypass to the river. The following changes could be made to handle these fish with a minimum of stress:

1. Put an adjustable bar grader in the sample roan receiving tank so that chinook can be separated from steelhead. Once chinook are separated, they can be pre-anesthetized and sorted to the marking stations.

2. Set up all three marking stations with salmon brands and CWT's. Brand and CWT salmon at all three marking stations until the desired number is reached.

3. Allow the crew to take a break while the brands and CWT machines are changed to accommodate marking steel head.

4. After break, sort steel head and what salmon remain behind the bar grader.

5. Start sorting at 0700 hours instead of 0900 hours. This earlier start will allow the crew to slow down, and should result in less of a need to overfill the pre-anesthetizer with smolts.

6. Oxygenate the water in the sorting trough and branding stations to alleviate the low dissolved oxygen problems. The water should be broken up to release dissolved carbon dioxide.

FACIL ITY OPERATION AND MAINTENANCE

Trash Conditions

The low runoff did not bring a large amount of debris down the Snake River in 1985. The trash that did appear in the forebay was composed of logs, sticks, plastic bottles, visquene, animal carcasses, and tumbleweeds. On April 11 and 12, the largest debris influx occurred. The remainder of the year, the debris came down in steady, smaller amounts. At no time was there more than 1/2 acre of debris accumulated in the forebay.

Trash was removed by COE employees whenever the build-up was large enough to warrant removal.

The log boom was removed on April 16 to determine what effect it had on fish guidance efficiency. The level of trash coning across the separator increased immediately after log boom removal. The direct load line to the barge plugged on April 17, and forced the facility crew to load smolts into raceways instead of directly into the barge compartment.

On April 18, the direct load line was pulled apart and the debris plug was cleared. The debris plug was composed of a hollow hemlock stem which had a strip of silicone and tumbleweeds wrapped around it. The hemlock stems were the substance most often responsible for initiating stoppages in pipes.

The direct load line plugged once again on April 19. The pipe plugged three times in one hour. On April 20, the direct load i i ne was cleared, and a hatch cover was put in the line to facilitate cleaning. The direct load line plugged for the last time on May 19, and fish were diverted to raceways while it was cleared.

STS_ Operations Maintenance

Screen Installation began on March 5 and was completed by March 27. All turbine intakes were fully screened for operation on March 28.

Video screen inspections were done in April and June. Due to the low trash conditions in 1985, screens incurred little damage compared to other years.

Damaged screens were observed during the June STS video Inspections. Screen number 9 in slot 1 A had bad mesh. it was pulled on June 10 and replaced with a spare screen while being repaired. Screen number 10 in slot 3A had a loose link bar and was repaired on June 11. Screen number 16 in slot 2A had bad mesh. It was repaired on June 11. Screen 9 was video inspected on June 10, screen number 10 was video inspected on June 11, and screen 16 was video inspected on June 11.

All screens except for numbers 1, 6, 7, and 11 had the new black Christmas tree clips installed in them before the smolt collection season began. Screen number 1 was pulled from slot 3B and clips were replaced on July 3. Screen number 6 was pulled from slot 6C on J u l y 10 to replace clips. Screen

number 7 was pulled from slot 1C on June 19 to replace clips. Screen number 11 was pulled from slot 2B on June 27 to replace clips. All STS now have black Christmas tree clips.

STS were on cycle run from March 28 to June 6. From June 6 to July 2, STS were put on continuous operation to reduce the chance of impingement by sub-yearlings chinook. Sub-yearling ch i nook length increased to yearling chinook by early July, and it was decided that continuous run of screens was not necessary. Fran July 3 to July 23, the screens were placed back on cycle run.

Orifices and Collection Gallery

The fish passage orifices were cleared once each day between 0730 and 0830 hours. When the log boom was removed, the orifices were cleared three times daily. Orifices were also cleared three times a day during the steelhead peak.

Even under low trash conditions, a large number of the 8-inch orifices were clogged each day. The two 12-inch orifices were not blocked by debris the entire season.

The 12-inch diameter orifices drain more water out of the gatewells, but do not catch debris as easily as 8-inch orifices. Adult steelhead and chinook might suffer less damage when passed through a .12-inch diameter orifice. Many of the adult steelhead that came across the separator had a gaping wound on the cranium. The wound was fresh and appeared as if the skin on the head was scraped off. These wounds were not fungus infested and, therefore, were of recent origin. It is possible that these adults were being damaged when they passed through the orifices.

Some mishaps by research workers (FGE and Juvenile radio tracking) caused orifices to be blocked or partially blocked. On April 10, the FGE crew dropped a fyke net into slot 4A. This net moved into orifice 4A-BHSS and plugged up the orifice. On April 13, orifice 6C-BHSN was plugged by the submersible pump used by FGE crews. This pump was later moved to another location. On May 24, a radio tracking cable was hung up in the 4A-BNSS orifice.

From May 21 until shutdown on July 23, the make-up gate in the gallery did not function properly. Water levels were often over the metal floor grates in the collection gallery. Orifices on the north end of the fish collection gallery were under water. This problem made it difficult to tell if the orifices were plugged or not plugged. Dead fish were seen on the metal grates during this time.

The powerhouse crew was notified about this problem, but the situation was not remedied. During the final week of collection, only 33 orifices were open (including two 12-inch orifices), and water from the fish collection gallery could still be seen overflowing into the spillway.

Juvenile Separator.

The separator was watered up on March 26. Fish were collected off the separator until July 23, after which time the system was put into a bypass mode.

Trash was not a problem on the separator, but did increase dramatically when the log boom was removed. Trash eventually became a problem when the direct loading line was blocked.

During late June, an algae bloom occurred in the Lower Snake River. This algae clogged perforated plates on the separator, and also clogged screens in the raceways. Raceway technicians had to constantly brush off the sample line plugged between raceway 10 and the sample room.

The electronic fish counters were off by as much as 40% during collection peaks. This discrepancy from the hand counts could cause a barge overload problem in the future. Electronic counts are low when the fish pass through the counting tubes side by side or head to tail. The beam is broken only once when fish enter in these positions and two Juveniles end up being counted as one juvenile. During peak collection, the sample tank should be drained once every half hour. Less fish would have to move through the counting tubes at any one time i f the sample tank i s flushed every half hour.

The control box for counting tube number 3 consistently had a lower count and was replaced on April 10. The counting tubes were not cleaned during the transport season. A piece of cellophane was visible in one of the counting tubes.

Because the flume test water supply came from the separator upwell box, workers anticipated that the separator would dewater during the time flume valves were being opened. Raceway technicians were able to coordinate with University of Idaho researchers and lower the operating gate when flume water valves were opened. This operation was performed smoothly and had little effect on separator operation.

The sample rate was lowered during collection peaks. The sample rate was lowered because of inadequate roan to hold large numbers of fish in the sample roan. The large numbers of fish in the sample roan caused an increase in sorting time and, thus, caused a delay in barge departure time. Late in the season, the sample rate was raised to 8.8% of the hour. This high sample rate allowed for increased brand capture and also provided a larger number of fish for descaling purposes (Table 15).

There were 7,107 adult steelhead and 155 adult chinook that cane across the separator. The steel head adults were mostly ripe, unspawned fish until early May. After early May, the percent of adults that were kelts increased. The last adult steelhead that had eggs running out of them came across the separator in early June. None of the adult chinook were spawned out.

On June 18, an adult 3-salt chinook male was found dead on the shoulder of the road by the separator upwell. The string holding the net over the upweller was broken. This left a gap between the net and the cement wall that an adult could jump through. The netting was secured to its frame once again on June 19.

Table 15. Sample rates used at Lower Granite Dam during the 1985 smolt collection season in percent of the hour.

	April	May	June	July
1	8.8	8.8 &5.9	3.0	8.8
2	8.8	5.9	3.0	8.8
3	8.8	5.9	3.0	8.8
4	8.8	3.0	3.0	8.8
5	8.8	3.0	3.0	8.8
6	8.8	3.0	3.0	8.8
7	8.8	3.0	3.0	8.8
8	8.8	3.0	3.0	8.8
9	8.8	3.0	3.0	8.8
10	8.8	3.0	3.0	8.8
11	8.8	3.0	3.0	8.8
12	8.8	3.0	3.0	8.8
13	8.8	3.0	3.0	8.8
14	8.8	3.0	3.0	8.8
15	8.8	5.9	3.0	8.8
16	8.8	5.9	3.0	8.8
17	8.8	5.9	3.0	8.8
18	8.8	5.9	5.9	8.8
19	5.9	5.9 & 3.0	5.9	8.8
20	5.9	3.0	5.9	8.8
21	5.9	5.9	5.9	8.8
22	5.9	5.9	8.8	8.8
23	5.9	3.0	8.8	8.8
24	5.9	3.0	8.8	-
25	5.9 &8.8	3.0	8.8	-
26	5.9	3.0	8.8	-
27	5.9	3.0	8.8	-
28	5.9	3.0	8.8	-
29	5.9	3.0	8.8	-
30	5.9	3.0	8.8	-
31		3.0	-	-

RESEARCH

TRANSPORT EVALUATION

Both chinook and steel head were used for transport evaluation studies. Juvenile chinook were adipose clipped, freeze branded, and coded wire tagged. Juvenile steelhead were ventral clipped, freeze branded, and coded wire tagged.

Researchers marked 45,734 yearling chinook, 24,350 hatchery steelhead, and 5,929 wild steelhead. The fish were sent to the various branding stations by the fish sorters. Only the healthiest appearing smolts were selected for this research.

A lack of coordination between fish sorting crews and branding crews and a poorly designed fish handling system may have caused a high level of mortality to the chinook used in this study. Juvenile yearling chinook were often lacking a gill response in the branding station holding tanks. The sample roan should be improved for the 1986 transport season.

NMFS EXTENDED REARING

in the National Marine Fisheries Service extended rearing test, yearling chinook were adapted to water with a salinity equal to that found in the ocean. The chinook were placed i n redwood tubs and fed on a daily basis. Mortalities were removed daily and a gross necropsy was performed on each Juvenile mortality.

The extended rearing test was run on 1,220 yearling chinook. Researchers acquired 600 of these fish by netting them off the separator on April 25. These fish were transferred to 35 gal Ion plastic barrels and then moved by truck up to the rearing tanks on the barge in the forebay. The remaining 620 fish were taken from the sample roan holding tank on April 26. The second group of fish were acquired from the sample roan because getting chinook off the separator was stressful to the fish and also affected the fish count.

PIT TAG TEST

PIT tags were tested in chinook juveniles during the 1985 transport season. On April 28, 113 Juvenile chinook were taken from the sample roan and injected with PIT tags. The tag was injected into the coel cm is cavity lateral to the pyloric ceaca. Injected Juveniles were hauled up to the NMFS barge in the forebay and reared under saltwater conditions.

On May 6, the cooling system on the extended rearing test leaked refrigerant into the fish rearing water and killed all of the chinook of the PIT tag test. The refrigerant leak would have entered three extended rearing tanks before entering the PIT tag tank. The leak did not appear to affect the extended rearing chinook. On May 15, 105 more chinook were taken from the sample roan and injected with PIT tags to replace the mortalities.

NMFS JUVENILE RADIO TRACKING

Radio tracking study fish were taken from the sample room. All of the chinook juveniles used in this test were longer than 150 mm total length. These larger smolts could more readily swallow the radio tag than normal sized chinook juveniles.

The test handled 597 chinook Juveniles and had a known mortality of 26 fish.

After the tag was placed in these fish, they were released upstream from the dam. The way these fish approached the dam was monitored across the width of the dam. The radio tagged fish that were guided into the collection system and came into the sample roan were severely descaled and had torn fins. This tag may have been detrimental to fish health.

FISH GUIDANCE EFFICIENCY (FGE) NMFS

Steelhead and chinook were studied during FGE testing. The main thrust of the test was yearling chinook. Yearling chinook do not have as high of a guidance efficiency as steelhead and are, thus, of a major concern in this study.

FGE researchers handled 62,302 Juvenile yearling chinook and caused 30,491 chinook mortalities. This test handled 40,091 steelhead and caused 10,476 steel head mortalities.

An additional mortality occurred because the fish screen slots of unit 4 were not sealed properly. Sane fish entered these slots and could not find their way out. These fish were emaciated, and many of them were dead when this problem was discovered late in the season. When the screens were pulled, it was found that the rubber seal around the screens were broken loose. Fish entering the turbine intake could swim into these slots, but did not find their way back out.

On May 5, 4,293 steel head Juveniles were ki l l ed by FGE testing. This was the highest one-day FGE steelhead k i l l of the 1985 season. The steelhead peak occurred on May 4, and steel head numbers in the river were still high on May 5. The FGE test time was shortened to one hour on May 5 to alleviate the steel head mortality. This shortened time did not allow for the capture of enough salmon to provide a statistically significant test. In the future, FGE testing should be banned when steel head collection numbers are high.

FLUME TEST - UNIVERSITY OF IDAHO

The University of Idaho researchers tested two flume designs in 1985. These flumes were tested to see which would be the least stressful on fish. The flume that is chosen will be incorporated into the fish collection system at Little Goose.

University of Idaho researchers handled 7,497 chinook. The researchers sacrificed 3,401 chinook from this test for blood cortisol samples. During May, steelhead Juveniles were tested in the flumes. Researchers handled 4,000 steel head and sacrificed 2,085 steelhead for blood cortisol tests.

Table 16. Numbers of chinook smolts handled and chinook smolt mortal it',' of research at Laver Granite Dam, April 1985.

	NMFS FGE Test		NMFS ER&PIT Test		NMFS Radio Trackinq		Uof I	Flume T
	Hand.	Mort.	Hand.	Mort.	Hand	Mort.	Hand.	Mort.
9	-	-	-	-	46	-	26	-
10	-	-	-	-	140	10	-	-
11	1,930	1,237	-	-	25	-	163	-
12	3,442	1,483	-	-	-	-	-	-
13	6,653	4,110	-	-	-	-	-	-
14	3,011	1,722	-	-	-	-	-	-
15	5,582	2,896	-	-	155	-	240	130
16	2,411	1,412	-	-	-	-	480	260
17	814	553	-	-	-	-	240	130
18	-	-	-	-	-	-	240	130
19	3,067	1,702	-	-	131	4	480	150
20	2,520	1,588	-	-	-	-	180	140
21	3,020	1,641	-	-	-	-	240	149
22	6,058	3,546	-	-	-	-	560	313
23	1,398	749	-	-	-	-	320	159
24	4,770	2,625	-	-	-	-	320	163
25	2,419	1,303	600	-	-	-	560	290
26			620	-	-	-	240	119
27			-	-	-	-	328	157
28			113 (PIT)	-	-	-	556	247
29	1,306	476	-	-	100	-	2 40	146
30	3,711	1,465	-	-	-	-	-	-
Total	52,112	26,567	1,333	-	597	14	5,413	2,683

Table 17. Numbers of ch inook smolts handled and chinook smolt mortal ity of research at Lower Granite Dam, May and June 1985.

[1]

	NMFS FGE Test		NMFS ER&PIT Test[r]		N_MFS[J] Radio Tracki nq		Uof Fl ume T.	
	Hand.	Mort.	Hand.	Mort.	Hand.	Mort.	Hand.	Mort
1	3,019	1,284	-	-	-	-	-	-
2	1,692	654	-	-	-	-	-	-
3	-	-	-	-	-	-	346	26
4	-	-	-	-	-	-	138	2
5	431	213	-	-	-	12	-	-
6	-	-	-	113	-	-	-	-
7	-	-	-	-	-	-	320	157
8	-	-	-	-	-	-	640	283
9	-	-	-	-	-	-	320	125
10		-	-	-	-	-	320	125
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-
15	942	374	105	-	-	-	-	-
16	1,142	358	-	-	-	-	-	-
17	1,311	403	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
31	448	172	-	-	-	-	-	-
June								
1	661	249	-	-	-	-	-	-
2	554	217	-	-	-	-	-	-
Total	10,190	3,924	105	113	0	12	2,084	718

NMFS PIT and extended rearing tests had daily mortalities that were recorded by researchers, but not given to the author.

Table 18. Steel head handled and steel head mortal iti es of research at Lower Granite Dam, April, May, and June 1985.

	April NMFS FGE Test		May NMFS_FGE_Test		May UofI Flume T	
	Hand	Mort.	Hand	Mort.	Hand.	Mort.
1			1,825	418	-	-
2			3,774	806	-	-
3					-	-
4	-	-			-	-
5	-	-	11,042	4,293	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	320	125
11	-	-	-	-	640	275
12	201	10	-	-	320	150
13	275	94	-	-	320	150
14	160	40	-	-	640	275
15	191	66	3,656	944	-	-
16	324	81	2,690	453	160	50
17	260	90	2,275	331	160	100
18	-	-	-	-	160	100
19	768	232	-	-	320	200
20	1,075	256	-	-	160	100
21	417	145	-	-	160	100
22	748	249	-	-	240	180
23	894	265	-	-	400	280
24	936	290	-		-	
25	614	159	-		-	
26	-	-	-		-	
27	-	-	-		-	
28	-	-	-		-	
29	616	177	-		-	
30	786	231	-		-	
31	-	-	1,972	28		
June						
1			2,493	374		
2			2,099	444		
Total	8,265	2,385	31,826	8,091	4,000	2,085