NOAA Technical Memorandum NMFS F/NWR-11

FISH TRANSPORTATION OVERSIGHT TEAM ANNUAL REPORT-FY 1984 TRANSPORT OPERATIONS ON THE SNAKE AND COLUMBIA RIVERS

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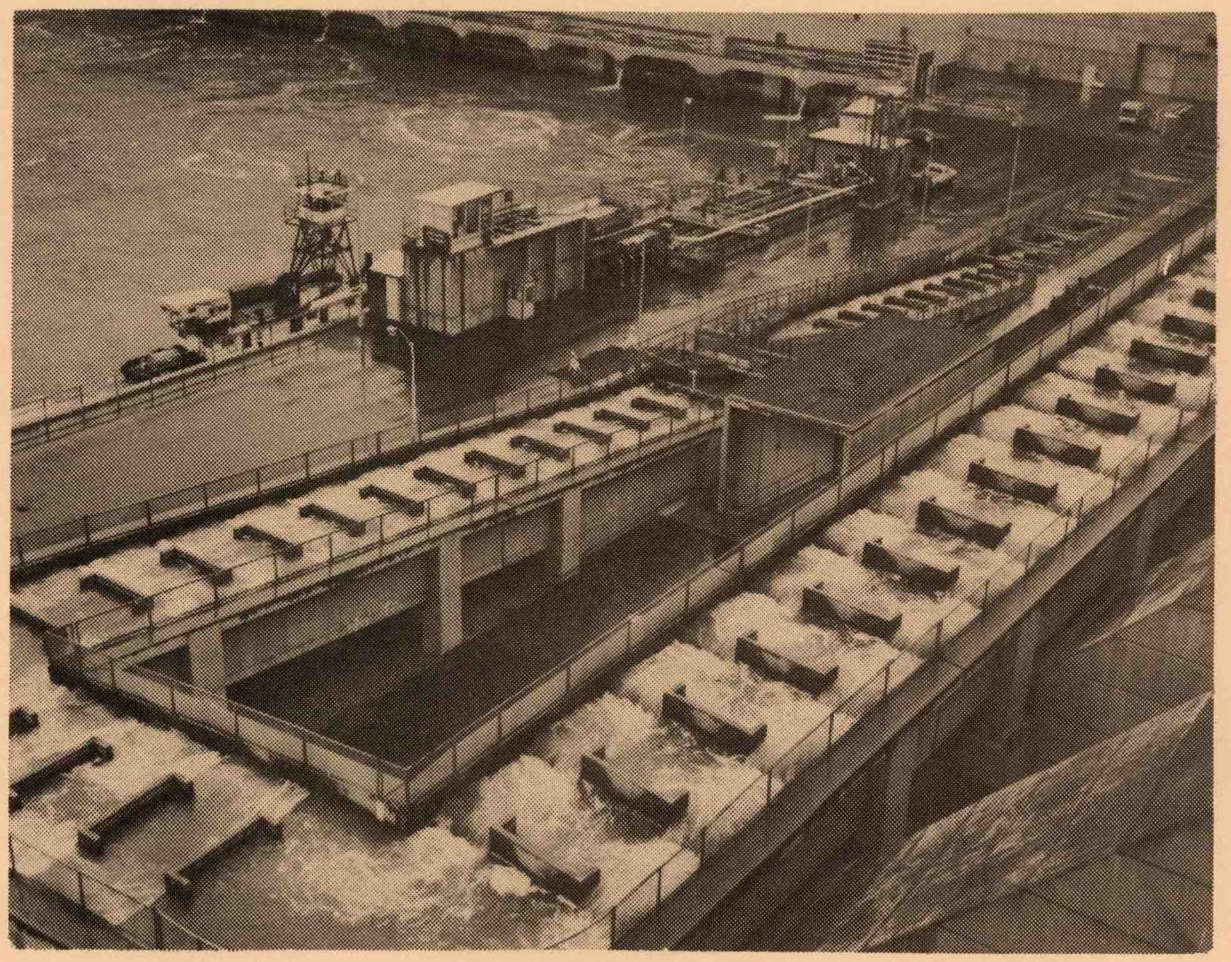

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS F/NWR-11

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FISH TRANSPORTATION OVERSIGHT TEAM ANNUAL REPORT-FY 1984

TRANSPORT OPERATIONS ON THE SNAKE AND COLUMBIA RIVERS

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FEBRUARY 1985

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At Lower Granite Dam:

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Sarah Willis, NPW
Willie Noll, Gary Findley, ODFW

At McNary Dam:

Brad Eby, NPW
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SUMMARY

The 1984 transport season commenced April 1 and ended on September 28. A total of 11,033,317 smolts were collected including 2,052,119 at Lower Granite, 2,737,422 at Little Goose, and 6,243,776 at McNary. Total collection included 1,504,941 and 445,922 smolts bypassed at McNary and Little Goose, respectively. Bypass operations began the first day of operation and ended on May 2 and May 29 at Little Goose and McNary, respectively.

A total of 9,028,959 juvenile salmonids were transported to below Bonneville, with Lower Granite accounting for 2,046,020, Little Goose 2,274,307, and McNary 4,708,632. Barge transport accounted for 7,998,933 and trucking for 1,030,026.

Interim modifications at Little Goose Dam prior to the 1984 migration season improved smolt quality and survival and eliminated the gas bubble disease problem experienced in 1983.

INTRODUCTION

Juvenile salmonids were collected and transported from the Snake River at Lower Granite (River Mile (RM) 107.5) and Little Goose (RM 70.3) Dams, and from the Columbia River at McNary Dam (RM 292). The Snake River, a major tributary of the Columbia River, joins at RM 324.3. Collected smolts were transported below Bonneville Dam (RM 146.1) via truck or barge and released into the river. Transported smolts bypassed 4 to 8 dams and 146 to 280 miles of impounded river (Figure 1).

The Fish Transportation Oversight Team (FTOT) continued to manage the transport program and provided coordination between Walla Walla District, Corps of Engineers (NPW), fishery agencies, and tribes. The FTOT is composed of biologists from the National Marine Fisheries Service (NMFS), Idaho Department of Fish and Game (IDFG), Columbia River Inter-Tribal Fish Commission (CRITFC), and NPW. The IDFG member was chairman for the team. Line of authority and responsibilities for transporting salmonids is given in Figure 2.

The FTOT's goal is to maximize survival of Snake and Columbia River salmonids by improving collection, transport, and bypass conditions for juvenile migrants. Responsibilities include providing coordination; biological and program oversight; developing an annual work plan; conducting on-site inspections of collection and transport facilities prior to, during, and after the season; and producing an annual report summarizing transport activities. A meeting is hosted by FTOT each summer for program participants and other interested individuals to discuss current season's operation and recommend program and facility modifications for the following year.

Additional biological oversight is provided by cooperative agreements between NPW and the states of Idaho, Oregon, and Washington. Under these cooperative agreements NPW funds state fishery biologists at each transport project. Idaho's representatives were assigned to Lower Granite, Oregon's to Little Goose, and Washington's to McNary. Work loads were shared by NPW's project biologists and state biologists.

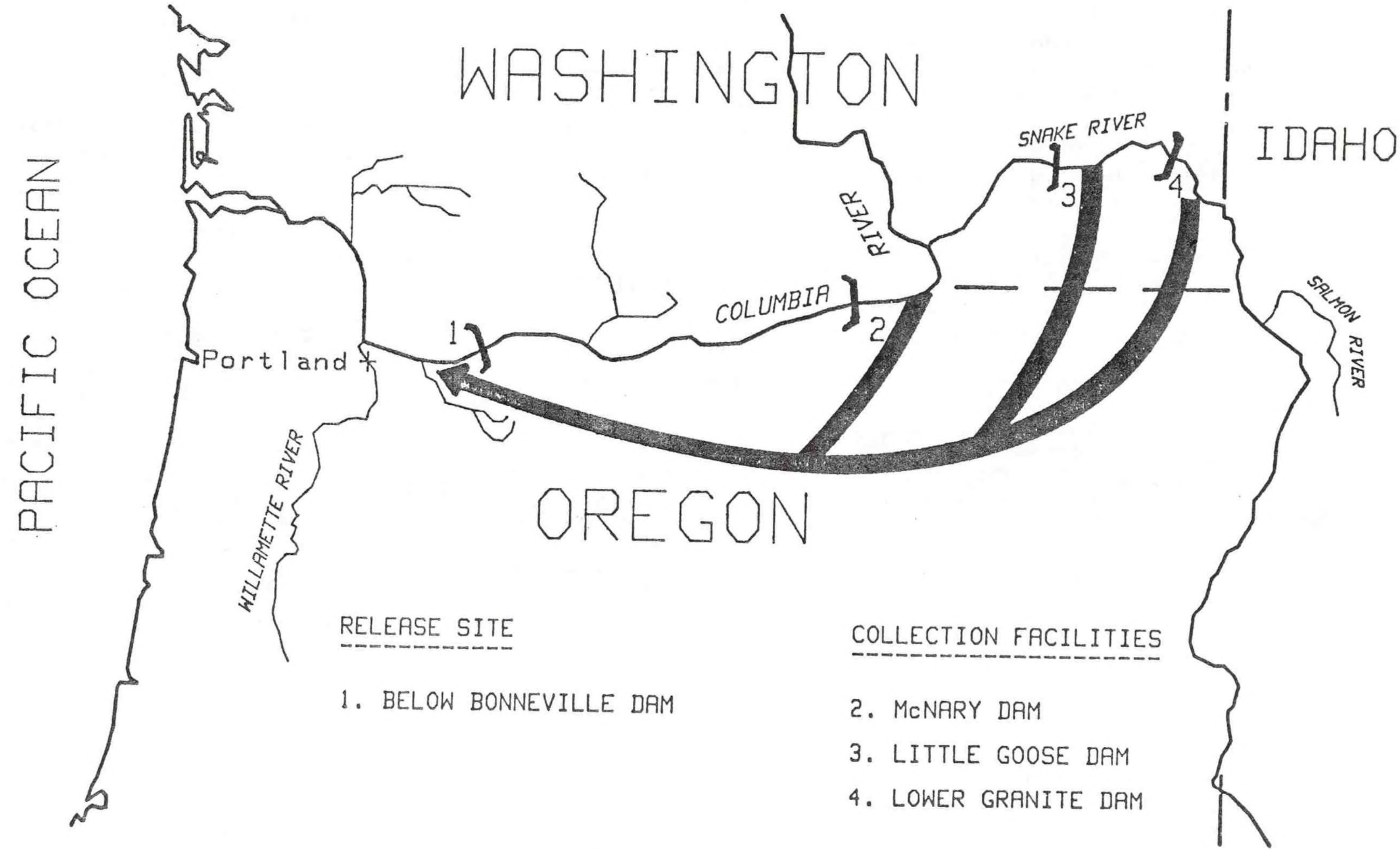
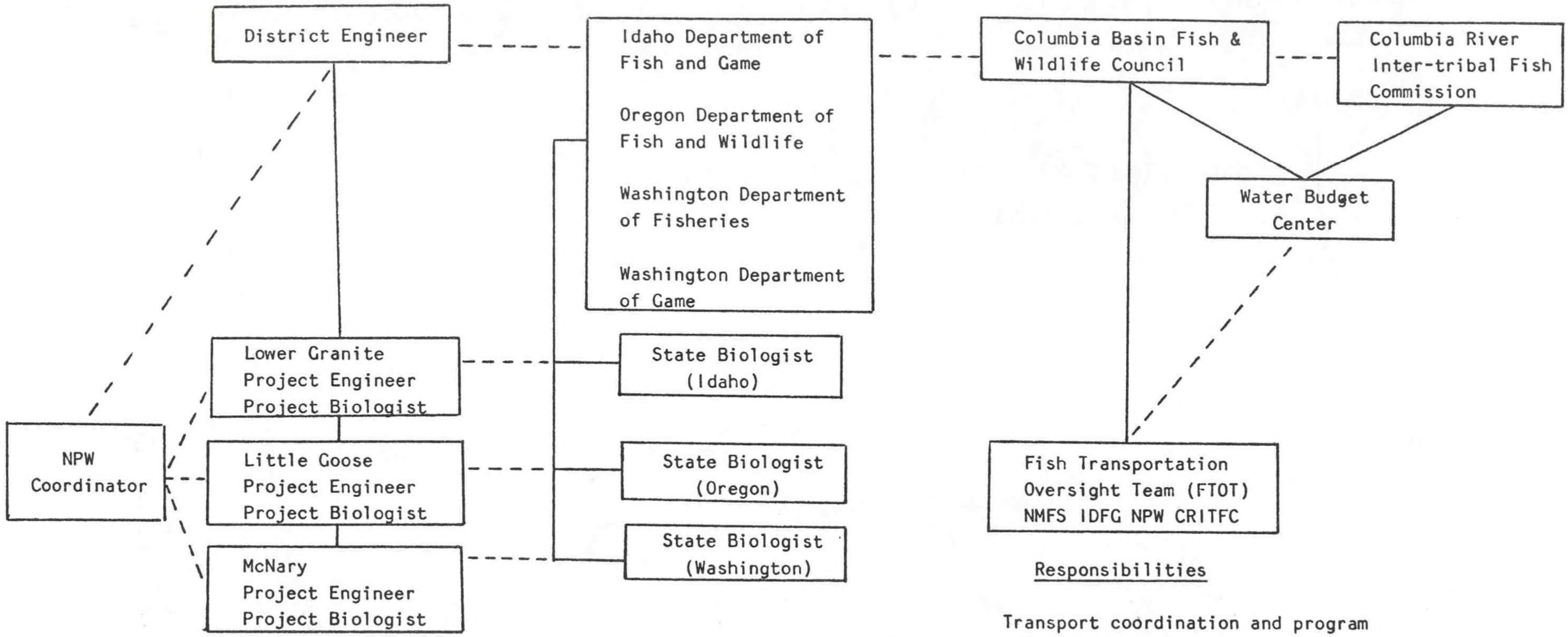


Figure 1. LOCATIONS OF FISH COLLECTION FACILITIES, TRANSPORTATION ROUTE, AND RELEASE SITE.

Figure 2.--Line of authority and responsibilities for trapping and transportation of juvenile salmon and steelhead trout from collection points at Lower Granite, Little Goose, and McNary Lock and Dam projects to release sites below Bonneville Lock and Dam. Dotted line denotes line of communication and solid line is supervision.



<u>Responsibilities</u>

Maintenance of transportation, collection, bypass, and holding facilities and equipment

Operate and monitor collection and transportation equipment and facilities

Contract tug and tractor rental

Administer cooperative agreements and task orders for State biologists

<u>Responsibilities</u>

Inspection and quality control of collection and transportation equipment and facilities

Monitor fish sampling and handling

Monitor water quality and fish condition

Compile data and write progress reports

<u>Responsibilities</u>

Transport coordination and program oversight

Prepare annual work plan

Inspection and oversight of collection and transportation facilities and quality control

Identify and recommend changes needed in facilities and equipment or their operation

Assimilate data and write annual report

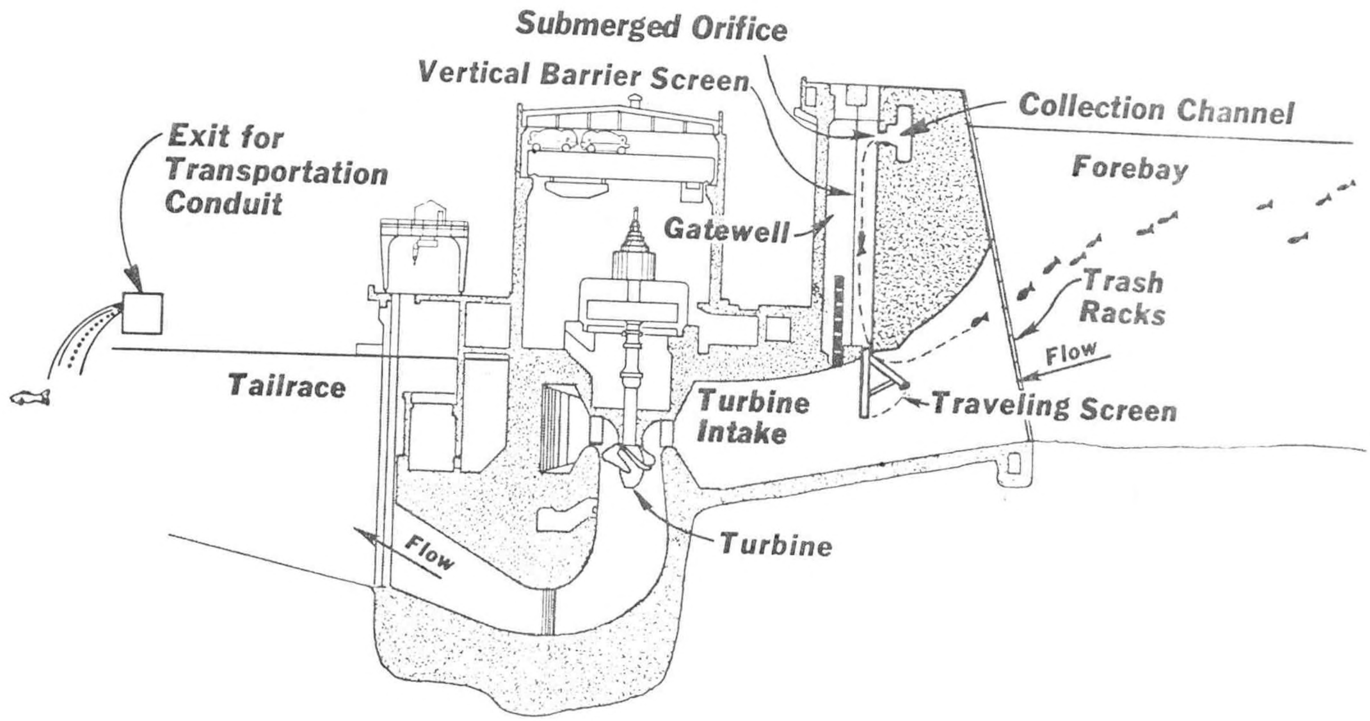


Figure 3. A typical traveling screen bypass system

A typical collection/bypass system consists of submersible traveling screens (STS's), orifices, and a flume or pipe transport conduit (Figure 3). Fish are collected after they pass through trash racks and encounter a STS that intercepts and deflects them into a gatewell, away from the turbine. Fish then exit gatewells via 8- or 12-inch orifices into a transport conduit that carries them to a collection facility or to the tailrace.

This report summarizes 1984 transport operations including numbers of salmonids transported or bypassed by species, overall fish condition, river and flow conditions, and facility and equipment operations.

RIVER CONDITIONS AND FLOW MANAGEMENT

The January - July runoff at The Dalles was 111%, Grand Coulee 92% and Lower Granite 146% of the 20-year average. Flows at Lower Granite and McNary dams are compared with the outmigration of yearling and subyearling chinook and steelhead in figures 4 and 5. Flows in the Snake River were above minimums (Figure 6) for juvenile fish migration throughout the spring period.

The fishery agencies and tribes requested that the majority of yearling chinook be passed over the spillway or collected and passed back to the river. This is a continuation of a policy adopted because yearling chinook have not responded as positively to transportation as have steelhead.

Snake River

Annual flows in the Snake River are regulated and adjusted by upstream storage reservoirs, however 65% of the runoff is uncontrolled. Flows in the Snake River were above minimum throughout the spring period and above optimum the majority of the time (Figure 6). Spill occurred every day from March 31 through July 5 with the exception of no spill on May 11.

Streamflow records have been collected at various sites near Lower Granite Dam since 1917. The annual runoff for 1984, adjusted for upstream storage was 54.7 million acre feet (MAF), 149% of the 1917-83 average. This

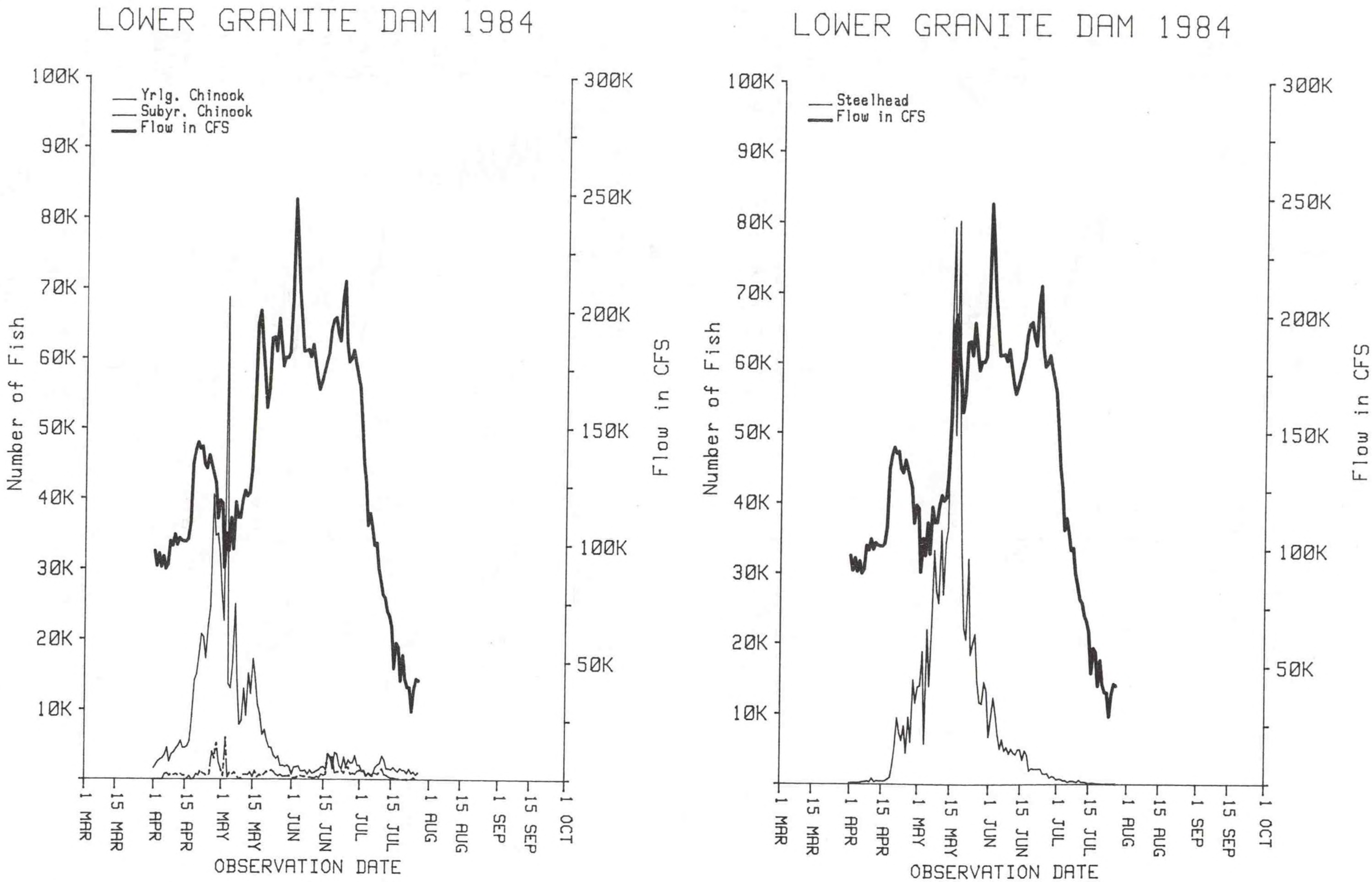
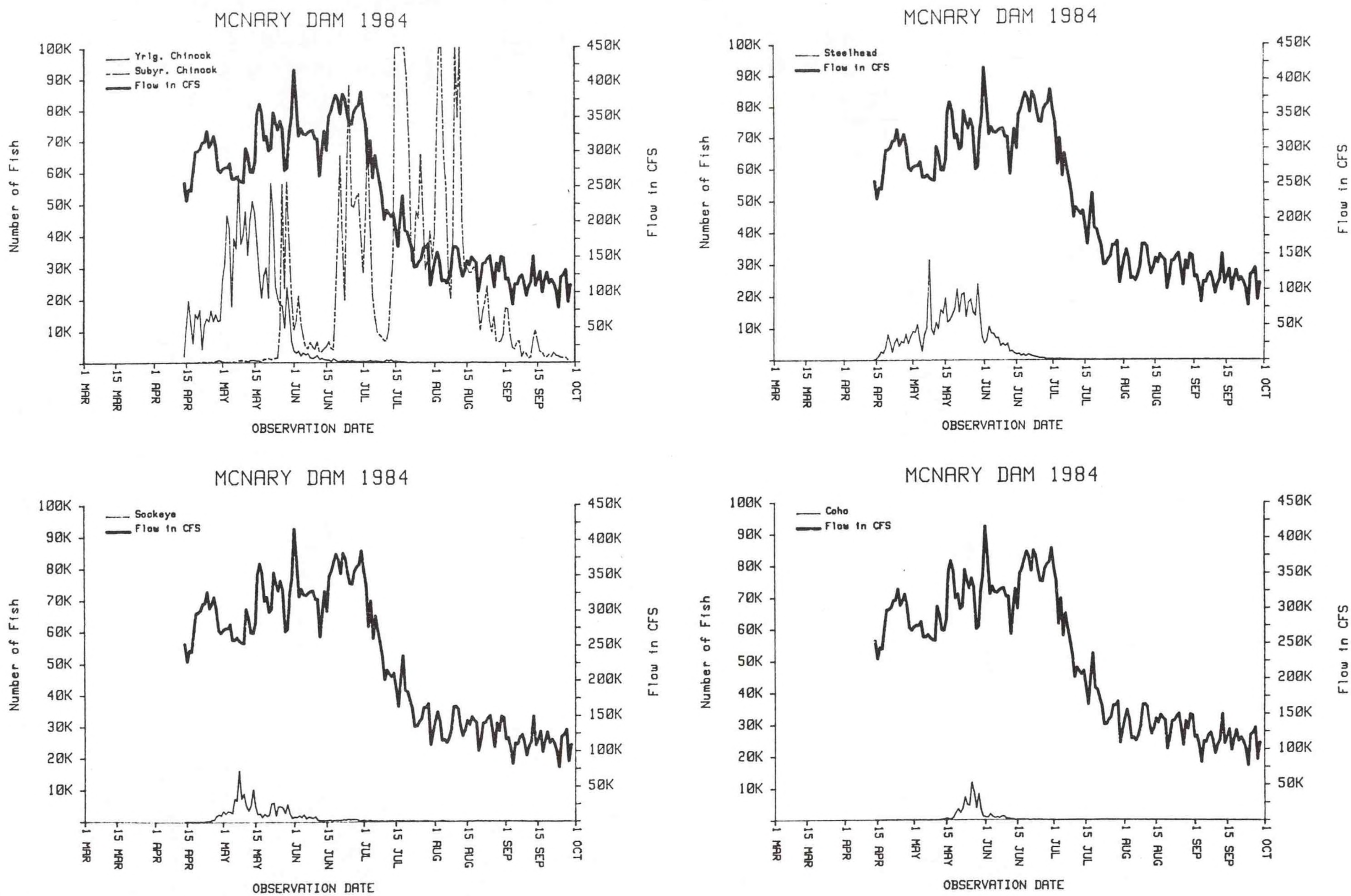


Figure 4. Snake River flows versus daily counts of yearling chinook, subyearling chinook and steelhead during 1984 at Lower Granite Dam.

Figure 5. Columbia River flows versus daily counts of yearling chinook, subyearling chinook, steelhead, sockeye and coho during 1984 at McNary Dam.



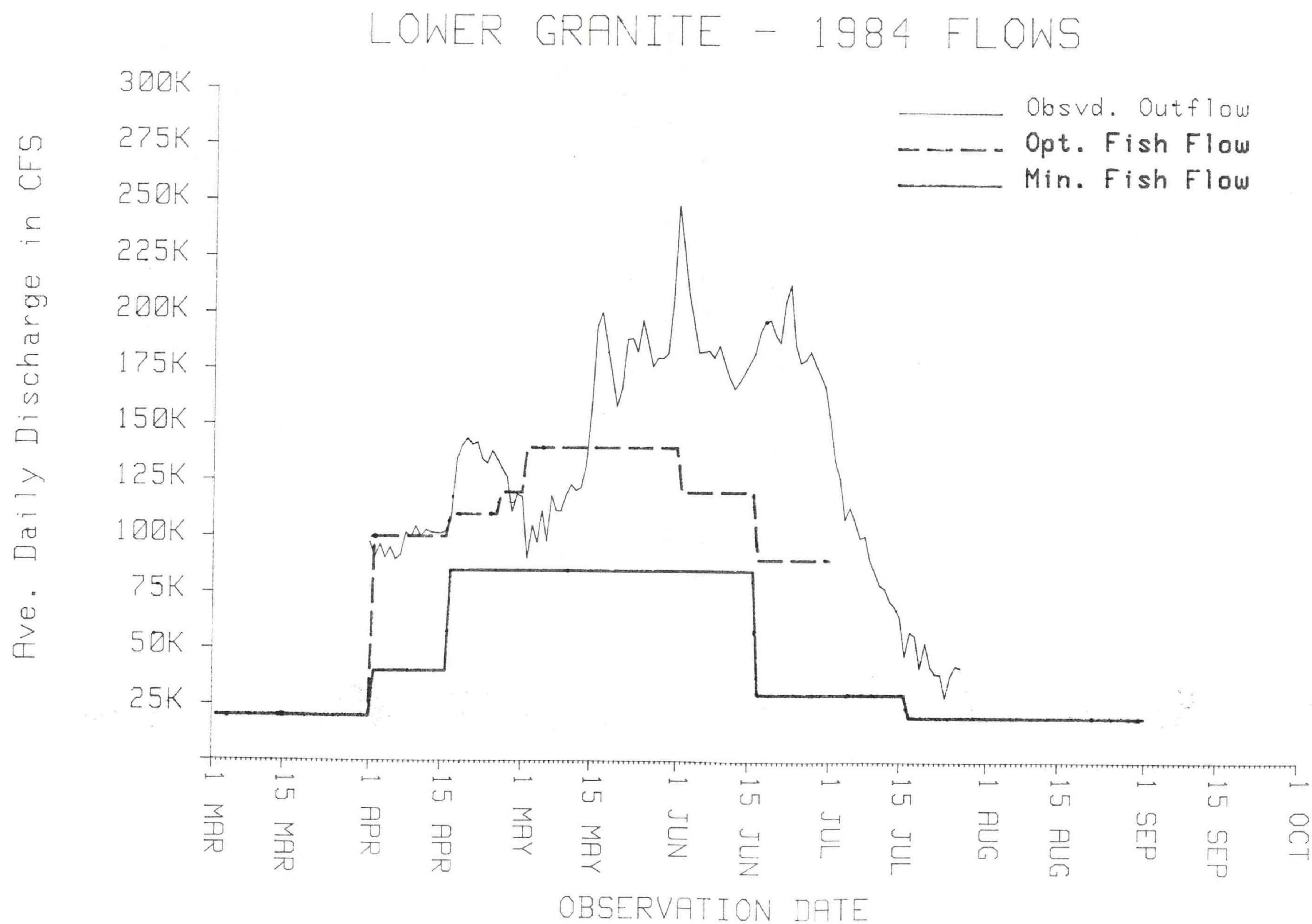


Figure 6. Observed flows at Lower Granite Dam in 1984 and Columbia Basin Fish & Wildlife Council recommended optimum and minimum fish flows.

represents the second highest flow in 68 years, exceeded only by the runoff of 1974.[1] This high runoff provided good downstream migration flows thereby eliminating the need to request a water budget flow from Snake River storage.[2]

Lower Granite flows peaked on May 31 at 247,900 cfs with 49% of the flow spilled and peaked again on June 22 at 213,000 cfs with 41% of the flow spilled. Peaks in fish numbers did not coincide with peaks in flows although flows were well above optimum during fish peaks. Spill ranged from zero on May 11 to 122,000 cfs on May 31.

Columbia River

Columbia River flow measured at The Dalles was the 32nd highest since monitoring began in 1879. Annual runoff was 154.6 MAF (109% of the 1879 - 1983 average) this year.[3] Annual flows (measured from October through September) were regulated and adjusted for upstream storage.

Minimum flows were exceeded the entire spring season at McNary Dam and optimum flows were exceeded the majority of the time (Figure 7). Flows increased to 367,700 cfs on May 16 with almost 50% of the flow spilled (Appendix Table 8). On May 31 flows peaked at 417,000 cfs with 55% of the flow spilled. Spill ranged between 30 and 55 percent of the total flow through July 6 and was discontinued on July 20.

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[1] Alexander, Clyde . U.S. Geological Survey, 847 N.E. 19th Avenue, Suite #300, Portland, Oregon 97232 (Pers. commun. 1984)

[2] 1984 Annual Report from the Water Budget managers, Water Budget Center, 2705 East Burnside Street, Suite #213, Portland, Oregon 97214

[3] Alexander, Clyde. U.S. Geological Survey, 847 N.E. 19th Avenue, Suite #300, Portland, Oregon 97232 (Pers. commun. 1984)

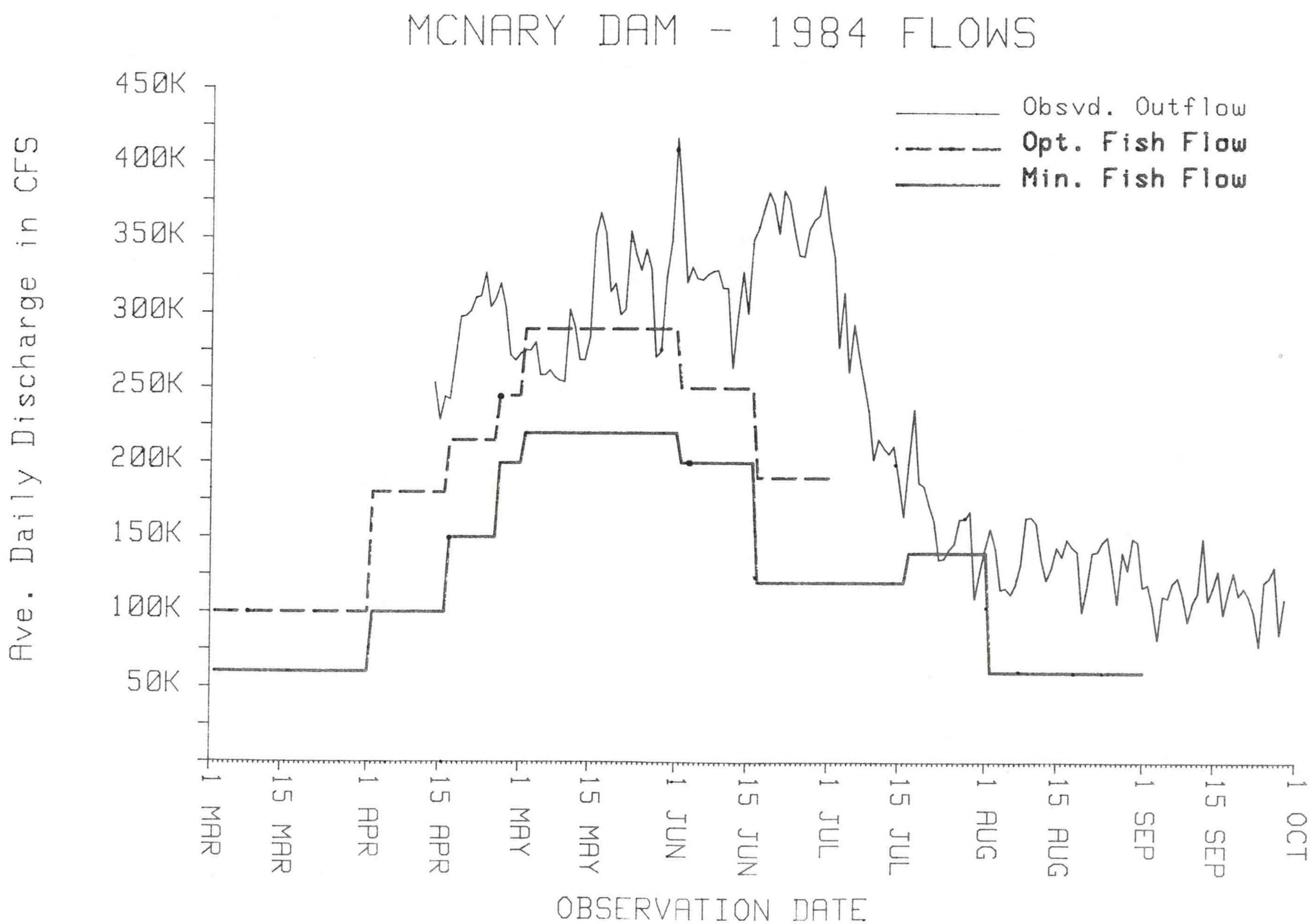


Figure 7. Observed flows at McNary Dam in 1984 and Columbia Basin Fish and Wildlife Council recommended optimum and minimum fish flows.

EQUIPMENT

Transport Vehicles

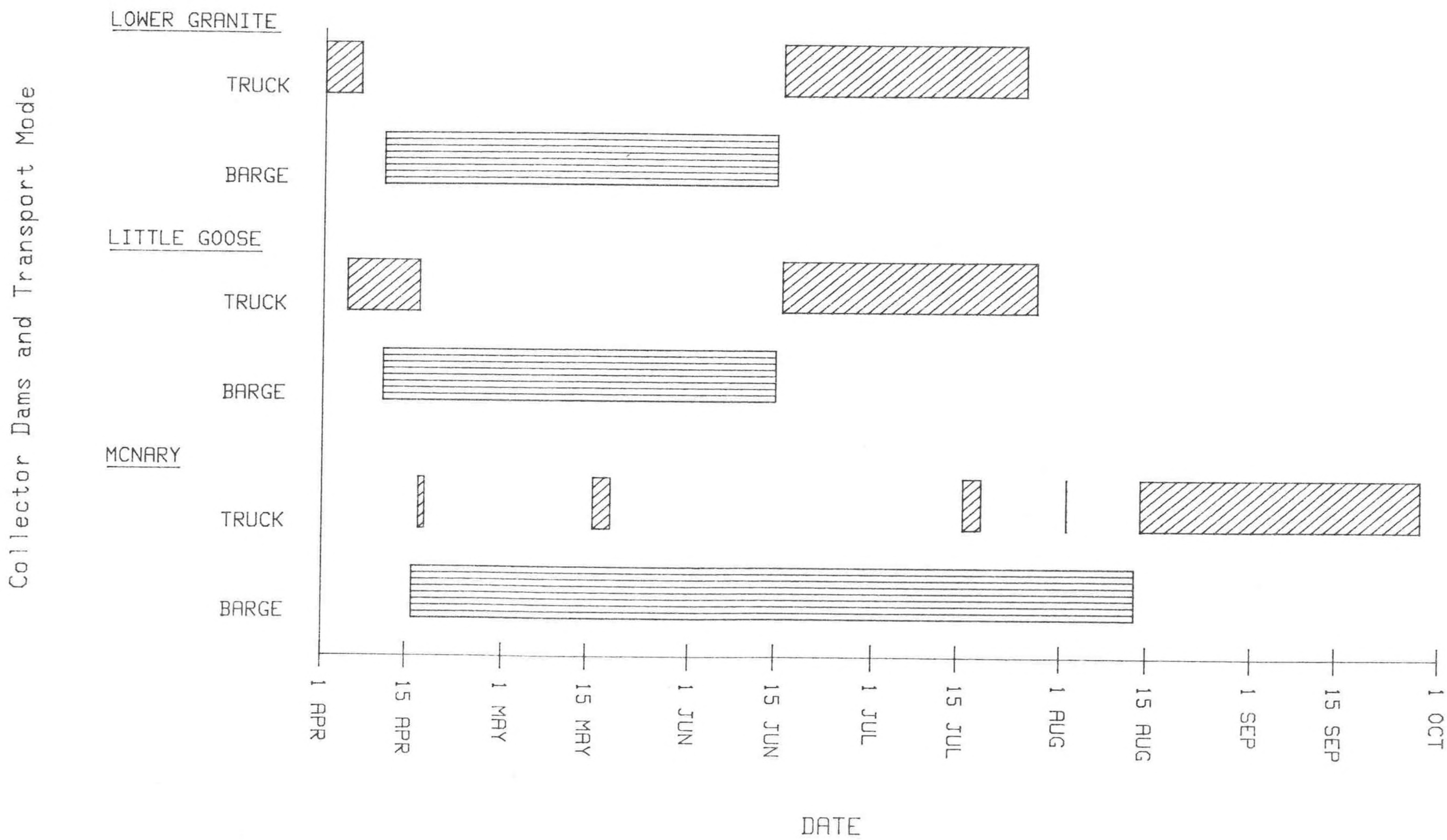
Present criteria allows holding fish a maximum of two days in a raceway. They are loaded into trucks or barges for transport to below Bonneville Dam. Trucked fish were released at two sites: Dalton Point, approximately 12 miles below Bonneville Dam, and into the juvenile bypass downwell at Bonneville Dam Second Powerhouse. The barge release site was approximately five miles below Bonneville Dam near the Skamania light buoy.

Five fish hauling trucks were used prior to and after the peak outmigration period (Figure 8). Rated capacity is 3500 gallons of water per vehicle and, at the present hauling criterion of 0.5 pounds of fish per gallon of water, a fully loaded truck contained approximately 1,750 pounds of fish. Driving time varied with distance traveled. An average trip to Bonneville from Lower Granite took about 8 hours, from Little Goose 6½ hours, and from McNary 3½ hours.

Four fish barges were on line at various times from April 11 through August 13 (Figure 8). These periods correspond to the peak spring and summer migration periods. Two older barges, #2127 and #2817, have a capacity of 85,000 gallons of water and inflow of 5,200 gallons per minute (gpm). Two newer barges, #4382 and #4394, have a capacity of 100,000 gallons of water and inflow of 10,000 gpm. The barge holding criterion is 5 pounds of fish per gpm water inflow. This allows a maximum 26,000 and 50,000 pounds of fish for the two older and two newer barges, respectively.

Water temperatures in the fish trucks are kept within 3 degrees of ambient river temperature at the release site. Chillers are available to cool water if necessary during truck transport. Fish barges normally use a flow-through water supply system providing an ambient river temperature throughout the trip; however, they are also equipped with recirculation systems.

Figure 8.-- Operational dates for barge and truck transportation in 1984.



Wet Separators/Distribution Systems

Major preseason modifications at Little Goose Dam included reconditioning orifices, remodeling the fish gallery, and remodeling the smolt collection pipe. The fish separator hopper was reduced in size and new separator bars were installed. A 10-inch pipe was installed to bypass chinook back to the river. Also, a second sample tank was added to sample bypassed fish.

Major changes at McNary Dam were made to the separator and distribution system prior to the season. The separator was modified for size separation to allow bypass of yearling chinook. In-season adjustments were made to improve separation. The hopper under the separator was reduced in size by raising the floor approximately six inches and sloping it towards the exits. A new flume was installed to move large and small fish separately and the sample counter tank was divided to accommodate separated fish. The barge loading line was modified to improve smolt loading.

Submersible Traveling Screens (STSs)

Screens began operating about April 1 and continued for approximately one month after transportation. Lower Granite pulled all STSs in late August except in gatewell slots 1 A and 1 B. A request was made by the fish agencies and tribes to monitor late summer juvenile fish passage at Lower Granite. Gatewells were sampled during September and observed passage was minimal. At Little Goose all STSs were removed in late August and at McNary removal began on November 1.

Four spare STSs were purchased and located one each at Little Goose and Lower Granite and two at McNary. Video inspections of STSs were conducted periodically at all three collection projects during the season. Specific inspection dates are listed in individual project reports. Annunciation systems were functional at all three projects in 1984 and STS cycling closely followed the FTOT Annual Work Plan. A number of STS problems occurred in 1984 and are listed in project report sections. They were mostly routine but some required considerable attention to correct.

JUVENILE OUTMIGRATION

The transport season began April 1 and ended September 28. Total numbers of juveniles transported in 1984 were 9,028,959 compared with 7,562,999 in 1983. Total juvenile collection at all projects was 11,033,317, including 1,504,941 and 445,922 smolts bypassed at McNary and Little Goose dams, respectively. Table 1 presents numbers of smolts by species, date and transport mode from each project. Table 2 summarizes juvenile fish transported from 1978 through 1984. Table 3 summarizes all juvenile fish transported by mode of transportation from 1978 through 1984.

Estimated numbers of chinook salmon and steelhead smolts arriving at upper Snake River dams with number and percent transported for years 1971 through 1984 is presented in Table 4.

Estimated numbers of yearling chinook arriving at lower Granite Dam in 1984 were 4,600,000 with 28% being transported compared to 3,900,000 and 26% in 1983. Estimated steelhead numbers more than doubled the 1983 estimates with 44% being transported in 1984 compared to 69% in 1983.

Sampling Techniques

A random sample of 100 fish per species was taken daily. Information recorded from the sample included species enumerations and composition, descaling, mortality, weight and mark/recapture information.

Sampling rates were according to the sampling guidelines outlined in the FTOT Annual Work Plan, Appendix 2.

Work shops to present uniform guidelines for determining descaling rates and sampling techniques were conducted prior to the sampling season.

Table 1. 1984 Juvenile Fish Transport Summary and Dates of Operation.

	Trucked	Barged	Total
Lower Granite			
April 1-July 26			
Yearling chinook	97,807	726,657	824,464
Subyearling chinook	37,823	59,102	96,925
Steelhead	39,157	1,074,518	1,113,675
Sockeye	2,713	7,987	10,700
Coho	43	213	256
TOTAL	177,543	1,868,477	2,046,020
Little Goose			
April 5-July 28			
Yearling chinook	104,730	383,769	488,499
Subyearling chinook	73,446	84,150	157,596
Steelhead	55,506	1,562,043	1,617,549
Sockeye	2,133	8,530	10,663
Coho	0	0	0
TOTAL	235,815	2,038,492	2,274,307
McNary			
April 16-September 28			
Yearling chinook	28,599	263,973	292,572
Subyearling chinook	552,163	3,357,820	3,909,983
Steelhead	30,194	336,453	366,647
Sockeye	4,243	95,085	99,328
Coho	1,469	38,633	40,102
TOTAL	616,668	4,091,964	4,708,632
Grand Total	1,030,026	7,998,933	9,028,959

Table 2. Summary by dam of all juvenile fish transported from 1978 through 1984.

	Lower Granite	Little Goose	McNary	Total
1978	1,980,600	996,285	82,211	3,059,906
1979	2,367,446	1,453,615	1,247,120	5,068,181
1980	3,830,747	2,282,987	1,740,545	7,854,279
1981	2,730,866	1,464,991	4,112,993	8,308,850
1982	1,851,616	1,234,110	3,003,853	6,089,579
1983	2,368,049	868,937	4,326,013	7,562,999
1984	2,046,020	2,274,307	4,708,632	9,028,959

Table 3.--Transport summary of total juvenile fish trucked or barged from Lower Granite, Little Goose, and McNary Dams from 1978 through 1984.

	Trucked	Barged	Total
1978	1,580,724	1,478,372	3,059,096
1979	2,031,212	3,036,969	5,068,181
1980	3,019,232	4,835,047	7,854,279
1981	3,145,980	5,162,860	8,308,850
1982	2,152,901	3,936,678	6,089,579
1983	2,780,487	4,782,512	7,562,999
1984	1,030,026	7,998,933	9,028,959

Table 4. Number of yearling chinook salmon and steelhead smolts arriving at the upper dams on the Snake River and the number and percent of the total Snake River outmigration transported below Bonneville Dam 1971-1984 (includes experimental fish marked for transport evaluation).

	Yearling chinook smolts			Steelhead smolts		
	No. at upper dam (1,000)	No. hauled (1,000)	Percent hauled	No. at upper dam (1,000)	No. hauled (1,000)	Percent hauled
Transport from Little Goose Dam						
1971 a	4,000	109	3	5,550	154	3
1972	5,000	360	7	2,500	227	9
1973	5,000	247	5	5,550	176	3
1974	3,500	0	0	5,000	0	0
Transport from Lower Granite and Little Goose Dams combined						
1975	4,000	414	10	3,200	549	17
1976	5,000	751	15	3,200	435	14
1977	2,000	1,365	68	1,400	895	64
1978	3,180	1,623	51	2,120	1,355	64
1979	4,270	2,109	49	2,500	1,712	67
1980 b	5,600	3,254	58	3,600	2,860	79
1981 b	3,200	1,549	46	3,700	2,737	74
1982 b	2,100	581	28	4,300	2,271	53
1983	3,900	1,029	26	2,900	1,939	69
1984 c	4,600	1,313	28	6,200	2,731	44

a Data for years 1971-79 from Smith et al. (1980).

b Number of smolts estimated at upper dam from Sims et al. (1981, 1982, 1983).

c Number of smolts estimated at upper dam from McConnaha (pers. comm.). Little Goose counts were used for estimating upper dam numbers.

Table 5.--Number of yearling chinook, steelhead, and subyearling chinook arriving at McNary Dam with numbers and percent transported below Bonneville Dam 1982-1984 (includes experimental fish marked for transport evaluation).

	Yearling chinook			Steelhead			Subyearling chinook		
	No. at dam (1000)	No. hauled (1000)	Percent hauled	No. at dam (1000)	No. hauled (1000)	Percent hauled	No. at dam (1000)	No. hauled (1000)	Percent hauled
1982 a	3,800	790	21	1,500	354	24			
1983 b	3,700	11	0.3	1,700	55	3	12,300	4,200	34
1984 c	5,100	293	6	1,900	367	19	12,900	3,900	30

a Number of smolts estimated (Sims et al. 1983)
b Number of smolts estimated (Sims pers. comm.)
c Number of smolts estimated (McConnaha pers. comm.)

TRANSPORT OPERATIONS - LOWER GRANITE DAM 1984

MODIFICATIONS

Prior to the 1984 transport season a number of facility modifications were completed in the Corp's continued attempt to improve fingerling collection and reduce handling stress associated with facility and transport operations. The most significant included complete remodeling of the sample and marking building (Photo 1), and installation of a permanent trash boom in the forebay (Photo 2). Remodeling included installation of new, more

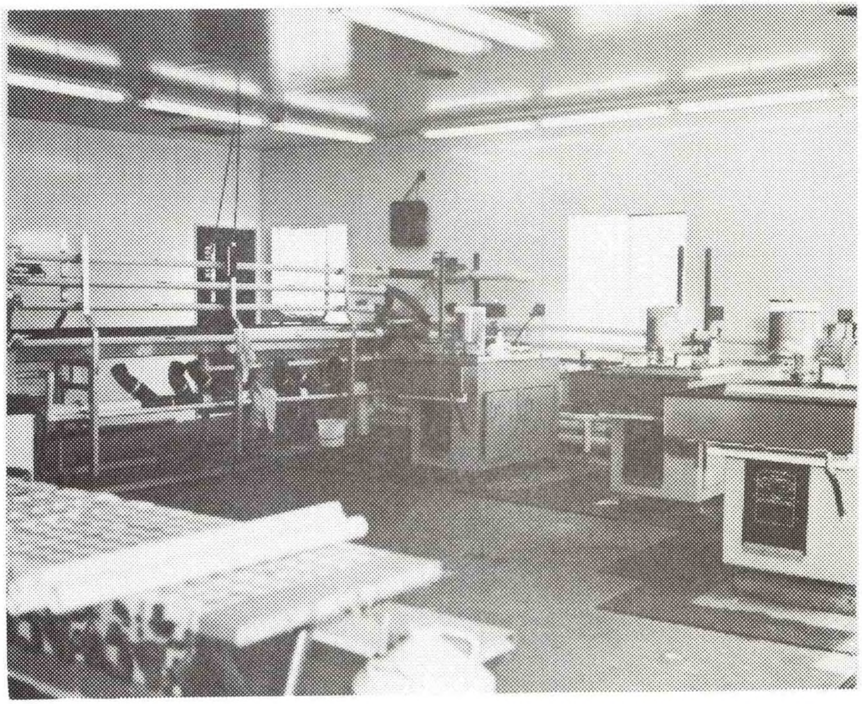


Photo 1. Sample and marking room at Lower Granite Dam.

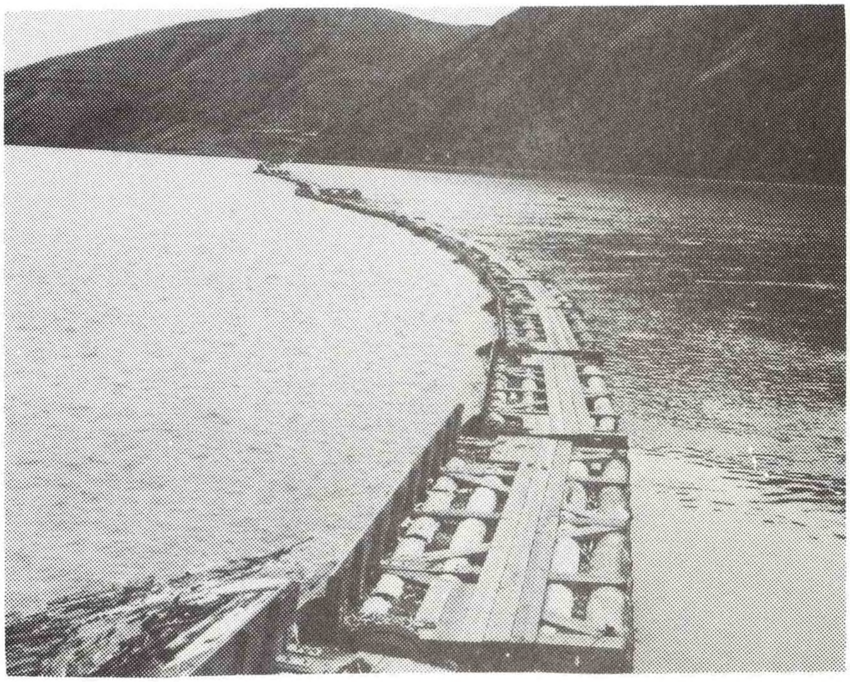


Photo 2. Permanent trash boom in the forebay at Lower Granite Dam.

efficient sorting troughs and plumbing. Additional facility and barge modifications included:

1. The opaque flex hose on the direct-load barge line was replaced with transparent flex hose to allow better monitoring of fish passage.
2. Barge pumps were inspected and overhauled.
3. Bypass gallery lights were relocated to opposite walls.
4. A back-up air compressor for the separator control valves was installed.
5. Flume flush-lines were improved.
6. Supports for the 10-inch flex hose to the barge were installed.
7. Wing walls were removed from barges 2127 and 2817 to facilitate loading.
8. A flow meter system was installed on barge 2817.
9. A new stainless steel inclined screen and fiberglass grating were installed in the upwell.
10. The pipe threader motors for opening fish release valves were replaced with individually-controlled AC motors and gear boxes on barges 2127 and 2817.

COLLECTION OF JUVENILES

Migration and Collection

Enumerating fall chinook migrants continued to be a problem in 1984. The difficulty of distinguishing fall chinook smolts from sub-yearling spring chinook migrants was discussed fully in the previous FTOT report (Delarm et al. 1984). Project workers at Snake River transport facilities had little confidence in the accuracy of fall chinook identification methods. When transport was terminated at Lower Granite and Little Goose, the estimated number of fall chinook collected exceeded the predicted number of migrants from the Snake River. Faced with this obvious inconsistency and a desire to avoid similar problems in the future, the classification system for chinook migrants was changed. Chinook juveniles were classified as being either yearling or sub-yearling migrants based on total length. Average sizes at time of release for both fall and spring-summer chinook were compared to established classification guidelines. Chinook collected prior to July 1 that were 110 mm in length and those collected on or after July 1 that were 115 mm were classified as sub-yearlings. Chinook longer than these lengths were considered to be yearlings. Estimates of subyearlings collected were derived by back calculating the percentage below 110 mm/115 mm from each daily length frequency sample.

For the most part, juveniles experienced excellent migration conditions in the Snake River. Natural runoff at Lower Granite was well above the 20-year average throughout the spring migration period. In fact, 1984 flows were the second highest yet recorded and eliminated the need for a water budget request from upriver storage sites in the Snake River. Peak dates for collection of yearling chinook and steelhead were separated by approximately two weeks (Figure 9). This distinct separation probably resulted from Idaho's continued policy of delaying steelhead releases for two to three weeks. Yearling chinook juveniles peaked on May 2 when 68,780 migrants were collected. Chinook migrants dominated the daily collection until May 7 when steelhead started arriving at the project in greater numbers (Appendix Table 1). An estimated 828,330 yearling chinook and 97,525 subyearlings were collected at Lower Granite during the 1984 transport season. Approximately 80% of the season's total of yearling chinook had been collected by May 16 (Figure 10).

Steelhead smolts were collected throughout the transport season at Lower Granite. Daily collection remained less than 10,000 per day until April 28, but then increased rapidly until steelhead became the predominate species on May 7. Peak collection occurred during a four-day period, May 14 through May 17, when 272,800 smolts were collected (Appendix Table 1). The voluntary spill program for chinook passage reduced steelhead numbers available for collection prior to May 10 when collection was maximized. Approximately 80% of the steelhead collection occurred by May 25 (Figure 10).

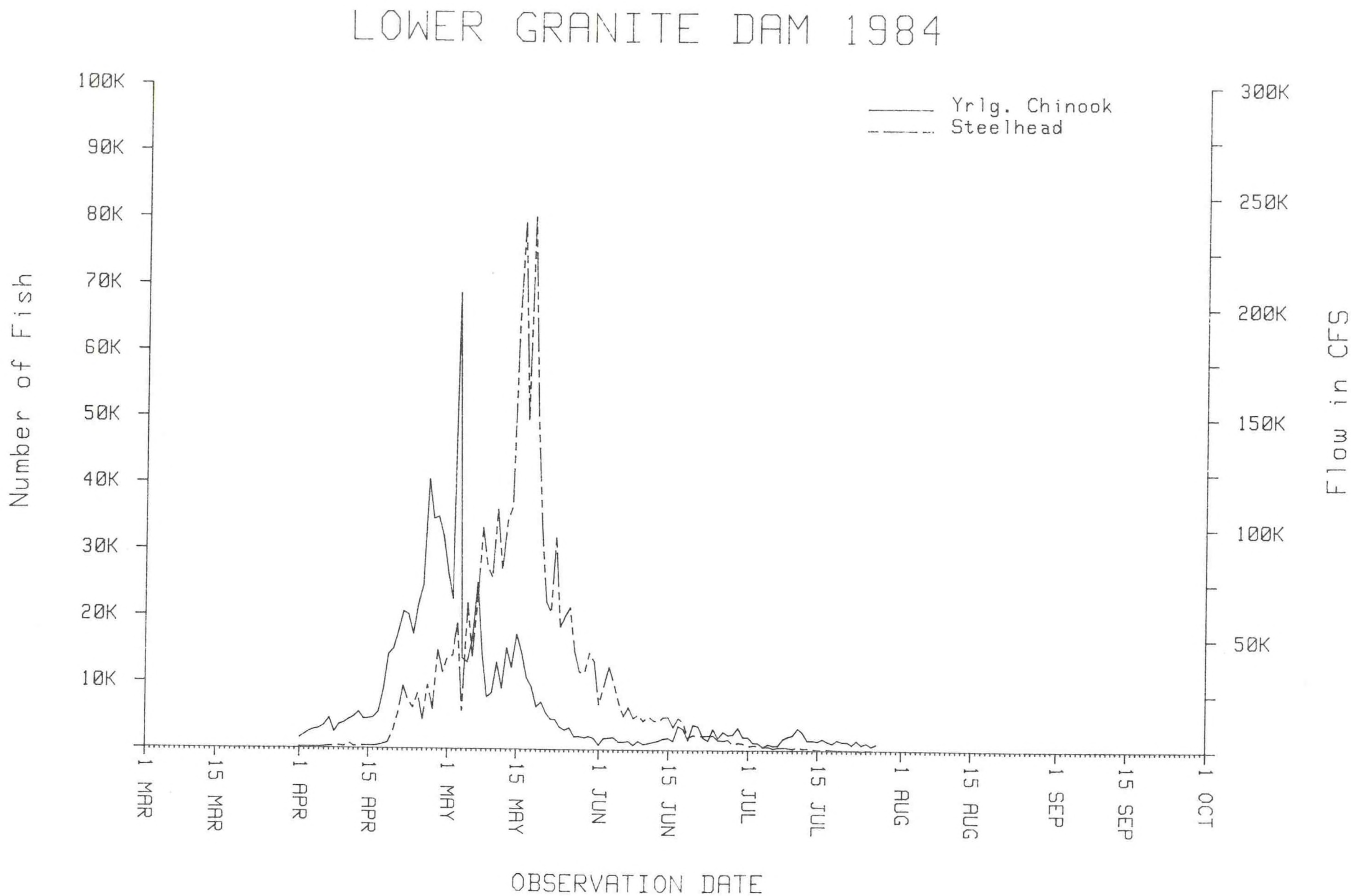
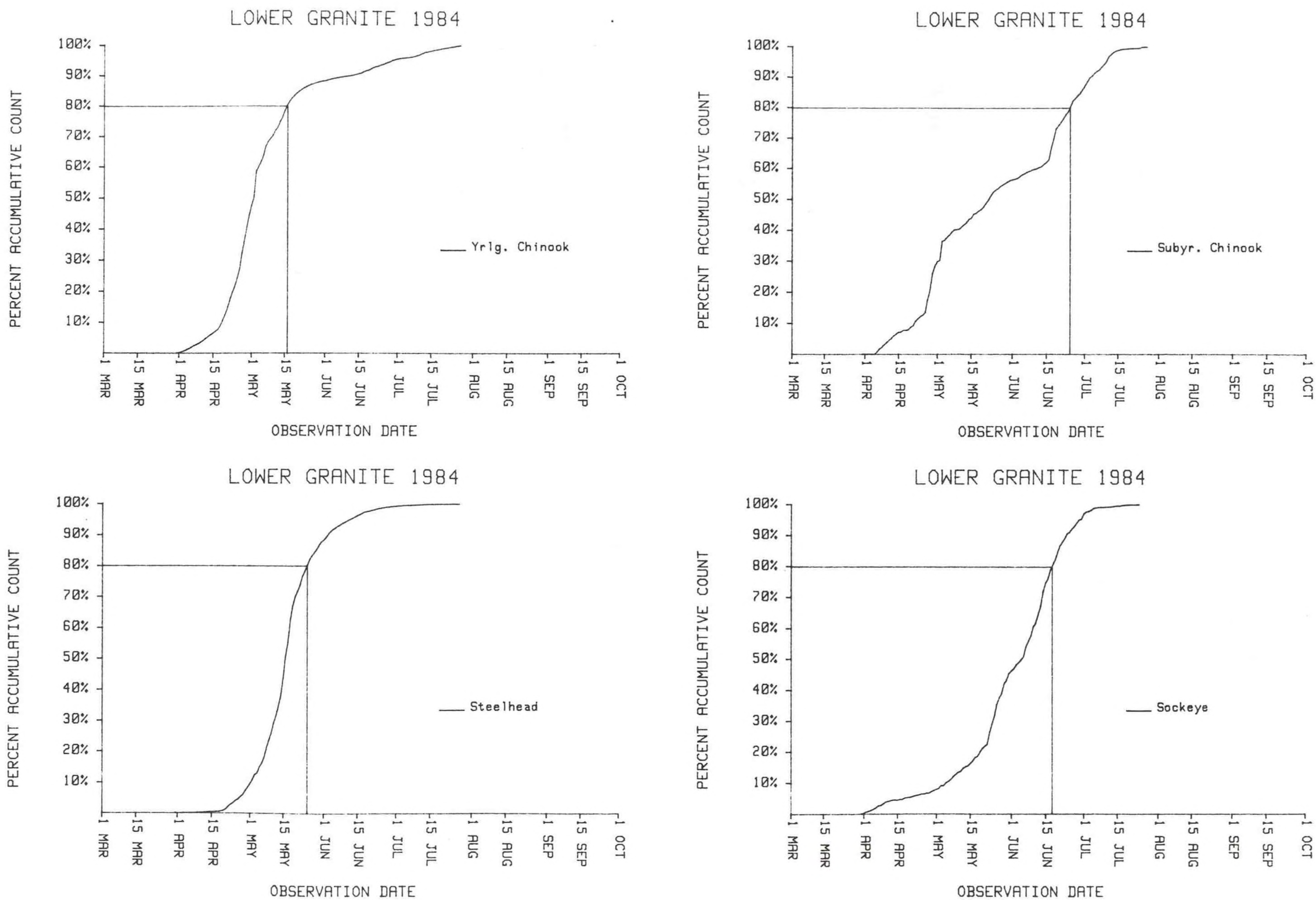


Figure 9. Daily counts of juvenile yearling chinook, and steelhead collected during 1984 at Lower Granite Dam.

Figure 10. Time frame when 80 percent of yearling chinook, subyearling chinook, steelhead and sockeye were collected at Lower Granite Dam.



Estimates of chinook passage needed to trigger maximized steelhead collection had in the past been provided by National Marine Fisheries Service workers (Sims et.al.), but their responsibility terminated with the 1983 season. Some confusion occurred in 1984 concerning who was responsible to provide the 80% spring chinook passage estimate. Analysts at the WBC provided the estimate. FTOT recommends that the WBC continue to provide passage estimates needed to trigger maximized collection. It is important for overall steelhead survival that they receive maximum benefits provided by transport, and this requires a timely analysis of yearling chinook passage data.

During 1984, approximately 11,152 sockeye salmon juveniles were collected at Lower Granite (Appendix Table 1) compared to 5,354 in 1983. In late June, many fish identified as sockeye may have been kokanee flushed from Dworshak Reservoir. The increase in sockeye migrants probably resulted from a release of 630,800 fry into Stanley Lake (upper Salmon River) between June 21 and 23, 1983. Juvenile sockeye spend a year in the lake prior to migrating. The 1982 release at Stanley Lake was only 260,400.

Coho migrants were somewhat more numerous in 1984 than the previous year. Coho juveniles arrived at Lower Granite between the dates of May 21 and June 25. Estimated total collection was 256 smolts (Appendix Table 1).

Workers counted 3,168 steelhead kelts across the juvenile separator. These individuals were returned to the tailrace. Most observed during 1984 appeared to be smaller, 1-salt hatchery fish and probably were outplanted adults surplus to Pahsimeroi Hatchery operations. Some of the smallest kelts, usually less than 23 inches, were able to pass through the separator bars and were ultimately transported.

Total collection was below last year's estimated total at Lower Granite, which was unexpected since both yearling chinook and steelhead hatchery releases from the Snake River drainage in 1984 were considerably greater (61%) than 1983. Since flow and spill patterns were not exceptionally different for the two years, causes of the reduced collection would appear to be related to fish behavior. The permanent trash boom installed prior to the start of the transport season may have deflected juveniles away from the powerhouse and over the spillway. The trash boom may have also affected the vertical distribution of migrants entering the intakes, however, preliminary evidence gathered by NMFS workers during 1984 indicates that vertical distribution was near normal (Krcma, personal communication). The boom deflection theory gains further support from the fact that Little Goose consistently collected greater numbers of migrants throughout the season than did Lower Granite.

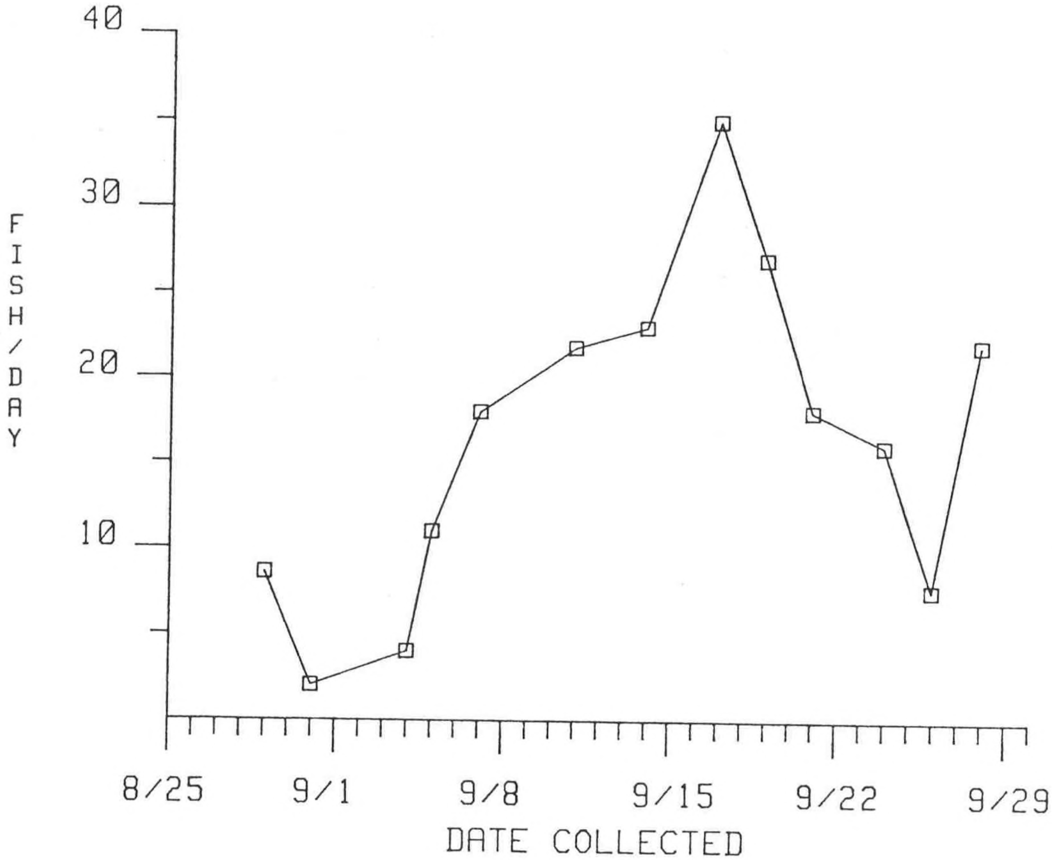
Late Season Sampling

After the Lower Granite facility was dewatered and closed down for the 1984 season, the project undertook a late-season, gatewell sampling program at the request of the Columbia Basin Fish and Wildlife Council (CBFWC) and CRITFC. Also, at their request, FTOT agreed to arrange scheduling and oversee the sampling program. Project personnel began sampling juveniles from two slots (A and B) at Unit-1 on August 29, and continued until September 28. When possible, the gatewells were sampled three times weekly during the four-week period. An FTOT representative was present at all but one of the sample dates.

Sample protocol involved dropping the gatewell dipnet two or three times in each slot until no salmonid juveniles appeared in the basket. Workers then transferred the fish to a temporary holding tank and counted and measured those salmonids collected and recovered marked juveniles. After sampling the fish were released into the tailrace. The number of juvenile steelhead collected from the two gatewells was very low, and ranged from 0 to 8 fish during the sample period (Table 6). No marked steelhead were collected.

Juvenile chinook numbers ranged from 4 to 111 fish per sample. Average lengths ranged from 143.1 mm to 181.3 mm. Except for several dates late in the sample period, average chinook lengths increased steadily during the four weeks (Table 6). Daily collection averages for chinook, based on numbers collected and duration between gatewell samples, ranged from 2 fish per day to 37 fish per day (Fig. 11). If all operating units had been fully screened, observed numbers could have tripled. (Only Units 1 and 2 were operating

FIGURE 11.- DAILY AVERAGE JUVENILE CHINOOK COLLECTED DURING LOWER GRANITE DAM GATEWELL SAMPLING.



because of low, summer flows). However, it is well documented that screen collection efficiency is not uniform across the power house, and actual numbers may have been somewhat lower for six STSs. Collection estimates, based on fully-screened conditions, of between 6 and 110 chinook migrants per day does not justify operating the juvenile collection and bypass system this late in the year.

Based on coded wire tag (CWT) recoveries, chinook numbers collected during the sample period would have been lower had it not been for an experimental, mid-summer release of spring chinook sub-smolts from Lookinglass Fish Hatchery. A total of 12 adipose-clipped chinook were recovered during the gatewell sampling. All but one fish were from two experimental groups released on July 13 at the upper Grande Ronde facility. This mid-summer release was experimental and is not expected to become a regularly-scheduled management operation (Dennis McClary, personal communication). The remaining marked fish was a fall chinook migrant from Hagerman National Fish Hatchery released at the Grande Ronde/Snake River confluence on June 16.

Table 6. Date, gatewell, and numbers of chinook and steelhead collected during 1984 post-season juvenile sampling at Lower Granite Dam. Average lengths of juvenile chinook collected are also included.

Date	Gatewell 1-A		Gatewell 1-B		Chinook	Totals	
	Chinook	Steelhead	Chinook	Steelhead	Lengths mm	Chinook	Steelhead
8/29	6	0	11	1	143.1	17	1
8/31	3	0	1	2	154.5	4	2
9/4	6	1	7	1	160.8	13	2
9/5	5	0	6	0	166.2	11	0
9/7	6	3	27	2	167.9	33	5
9/11	36	2	51	2	169.6	87	4
9/14	16	0	54	0	172.8	70	0
9/17	43	0	68	3	178.7	111	3
9/19	15	0	40	1	180.4	55	1
9/21	10	0	26	1	172.2	36	1
9/24	13	0	35	0	176.4	48	0
9/26	5	1	10	0	181.3	15	1
9/28	13	1	31	0	178.6	44	1

Transportation Summary

Approximately 2.05 million juveniles were collected during the transport season (Appendix Table 1). An estimated 1,868,477 (91.3 percent) migrants were barged while 177,543 (8.7 percent) were trucked (8.7 percent) for a total 2,046,020 (Table 1). Daily truck and barge totals are listed in Appendix Tables 2 and 3. Marked fish used for research were included in transport totals. Transport evaluation research accounted for 46,173 and 33,529 marked juvenile chinook and steelhead. Both groups were fin clipped, freeze branded, and coded wire tagged. During 1984, yearling chinook accounted for 40.4 percent of the total collection and steelhead an estimated 54.3 percent. Subyearling chinook accounted for 4.8% of the total collected. Because juvenile collection efficiencies for Lower Granite were difficult to estimate in 1984, that portion of the total outmigration collected and transported could not be determined using previous methods (Sims, et al.). For this reason an estimate of the Snake River outmigration was based on flow/collection efficiency relationships developed for Lower Granite but applied to Little Goose. Using 1984 estimates provided by the WBC, portions of the estimated total Snake River outmigration transported from Lower Granite Dam were 28 and 44 percent for chinook and steelhead, respectively (Table 4). These estimates are not collection efficiencies, but rather estimates based on WBC calculations of the numbers of juveniles arriving at Lower Granite. The estimates indicate that 4.6 million yearling chinook, and 6.2 million steelhead reached the project (Chip McConnaha, personal communication).

Transport operations were modified slightly in 1984 to provide increased barge transport for juveniles. The first barge arrived on April 10 and left with fish on the following day. Truck transport began on April 1 and continued until barges arrived. Barging continued through June 15. A total of four tugs were used to transport fish barges, with three additional tugs coming on line on April 21, May 4, and May 14. Trucking resumed on June 16 and terminated on July 26. Approximately 27,000 juveniles were transported during the initial trucking phase, which accounted for 2.8 percent of the total yearling chinook and 0.16 percent of steelhead transported. The early trucking phase accounted for only 1.3 percent of the entire population transported from Lower Granite. As in previous years, barges transported the bulk of the run, accounting for 1,868,477 juveniles (91.3%). Approximately 88.1 percent of the yearling chinook, 96.5 percent of the steelhead, and 61.0 percent of the subyearling chinook were barged. After the peak migration period, trucks were brought back on line for an additional eight weeks. During the late trucking phase, 150,536 juveniles were hauled (7.4 percent). Approximately 49.9 percent were yearling chinook, 23.6 percent subyearling chinook, and 24.8 percent steelhead. These numbers accounted for 9.1, 36.7

and 3.4 percent of the season's totals for yearling chinook, subyearling chinook, and steelhead, respectively.

FACILITY OPERATIONS AND MAINTENANCE

Debris/Trash Racks

The temporary "slick-bar" log boom used in 1983 was replaced by a permanent trash boom prior to the 1984 season. The new boom extended approximately 750 meters upstream from the powerhouse, to the south shoreline near Offield boat launch (Photo 2). It is constructed of wooden platforms arranged in linked segments. A rigid wooden, debris curtain extends vertically 1.2 meters on the leading edge. The boom is kept aligned by a series of buoys permanently anchored to the bottom of the forebay. The new boom greatly reduced the accumulation of floating debris in front of the powerhouse. In turn, the amount of trash in the gatewells and separator was the lowest in the project's history.

Prior to the 1984 transport season, all trash was dipped from gatewells and intake trash racks were raked to reduce juvenile descaling. Because debris was kept away from the powerhouse, the necessity to rake intake trash racks during the season was minimal and was only carried out twice (Unit 1, April 27 and Unit 6, April 30). The juvenile separator was dewatered on three occasions (May 3, 17, and 30) for inspection. Debris accumulation was minimal to nonexistent in each instance.

Floating debris brought downstream by spring runoff accumulated in front of the spill gates and reached a maximum of approximately 4.5 surface acres. Project workers began removing the debris on May 24 using a crane and small boat equipped with a log boom. Debris removal was completed by August 9. Minimal amounts passed over the spillway during the season.

Submersible Traveling Screens

Prior to the transport season, Lower Granite's STSs underwent several modifications including:

1. Modified link bar attachments.
2. New, high density plastic link guides.
3. New screen mesh.
4. Perforated plates.
5. New plastic rivet mesh attachments ("Christmas tree" clips), (Photo 3).
6. High density plastic sprockets (Photo 4).

STSs were lowered into position on March 26 and operated in a cycling mode (24 mins. off 4 mins. on) until June 15. At this time, the average size of chinook migrants had dropped below 115 mm and additional protection was necessary. Screens were then operated on continuous mode through June 29 at which time they were returned to cycling criteria. Two screens, 3-A and 4-A, were utilized for guidance efficiency research by NMFS workers during 1984 and remained inoperative except during testing periods for most of the spring migration. Closed circuit video inspections occurred on five occasions during the season (April 5 and 6, April 17 and 18, May 15 and 16, June 20 and 21, and July 17). Inspections occasionally revealed faulty screens, and affected units were either taken out of service until screen repair was completed, or replaced with a screen from a lower priority unit until the repaired screen could be returned to service. A list of STS outages and causes in 1984 is shown in Table 7.

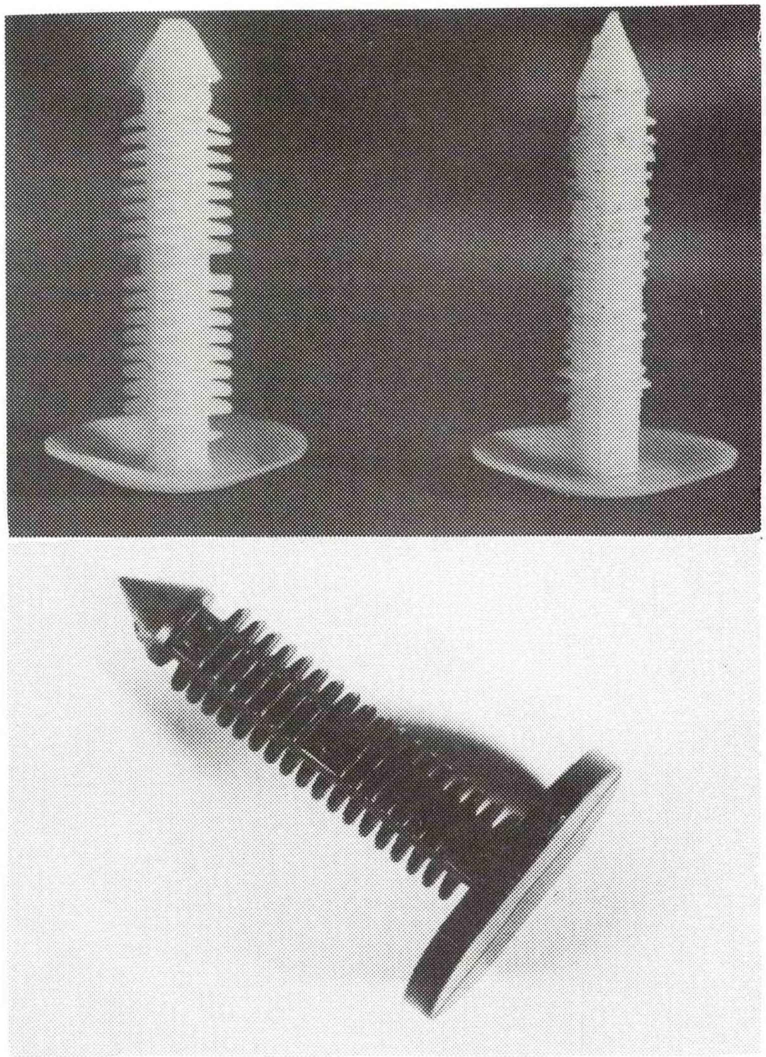


Photo 3. Plastic rivets (Christmas tree clips) used to fasten mesh to link-bars on submersible travelling screens (STSs). From upper left: original design (unused) damaged original, new design.

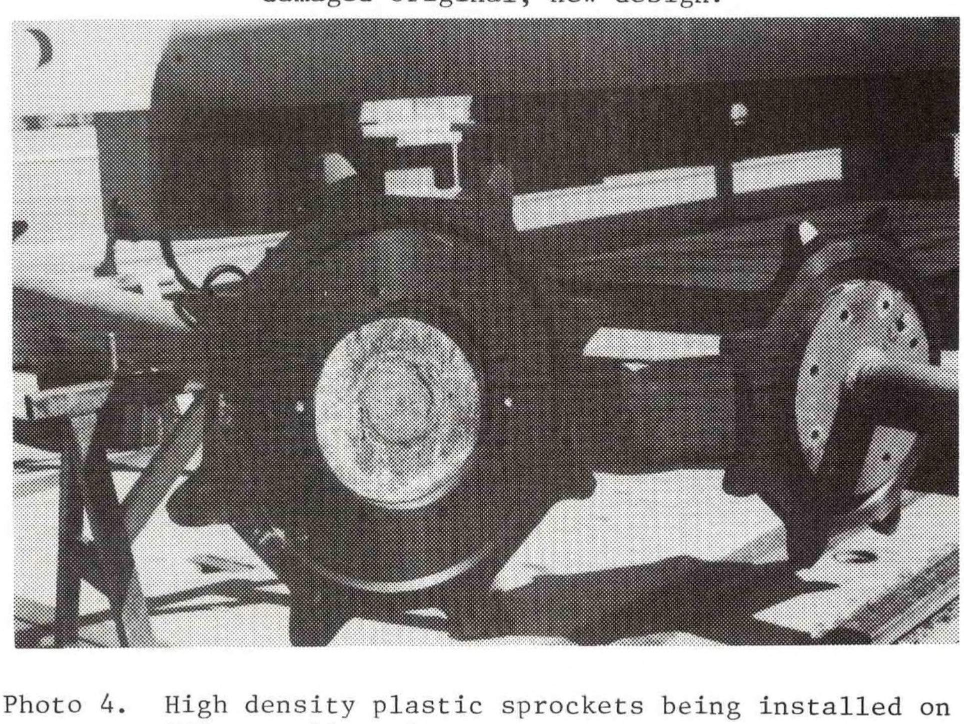


Photo 4. High density plastic sprockets being installed on STSs at all projects.

Table 7. Dates, unit affected, and submerged traveling screen malfunctions encountered at Lower Granite during 1984.

Date	Unit	Problem
4/5	3B	Mesh splice required repair[a]
4/6	1B, 1C, 2A, 2B 2C, 5A, 5B	Mesh splice required repair[a]
5/14	2C	Drive chain loose
5/15	2B	Splice repair and link bar
5/15	5A	Broken splice
5/16	1A	Broken splice
5/19	1B	Torn mesh
5/21	2B	Broken splice
6/19	1A	Torn mesh and missing link bar[a]
6/19	1B	Torn mesh
6/20	2A	Torn mesh
6/20	5B	Torn mesh
6/28	4B	Locked rotor
6/28	5C	Tripped circuit breaker
6/28	6A	High motor current + loose link bar

[a]"Christmas tree clip" replacement

A problem with mesh attachment occurred on the majority of screens that were retrofitted with the plastic rivets ("Christmas tree clips") prior to the 1984 season. Project maintenance crews at Lower Granite were alerted to the potential problem after loose STS mesh was discovered on April 2 at Little Goose. Lower Granite pulled screen 3-B on April 5, and found that many plastic rivets had failed, allowing the screen mesh to pull loose from the link bars. A decision was made to pull the remainder of the modified screens and replace the plastic rivets along splices with the original nylon strips anchored by metal screws.

Wet Separator and Distribution System

The juvenile wet separator operated smoothly during the entire transport season. The inclined screen located in the separator's upwell was replaced prior to the 1984 season. New stainless steel mesh and fiberglass grating was installed by project personnel. Accumulation of debris in the separator's hopper, which had plagued the system in the past, was effectively eliminated by installation of the permanent log boom. The separator was dewatered briefly on May 3 and 17. It was again dewatered for nine hours on May 30 to allow NMFS workers to install their orifice traps in the bypass gallery. On all occasions the hopper and distribution systems were found clear of debris.

The distribution system was modified during 1983 to enable direct barge loading, but never became fully operational because of problems with the barge dock loading line. The direct loading line was completed prior to the 1984 transport season and operated smoothly throughout the barging phase. Approximately 63 percent of the barged juveniles were direct-loaded in 1984 compared to 31 percent in 1983. The increased percentage of direct-loaded fish resulted in part from rearranging tug schedules and adopting the practice of leaving an empty barge at the fingerling dock to be direct-loaded.

FISH CONDITION

Descaling

Juvenile descaling rates were taken daily at the facility sample tank and from regularly-scheduled gatewell dipping. Daily averages for both chinook and steelhead were kept between April 1 and July 26. Descaling rates for chinook averaged 3.0 percent and 2.3 percent for steelhead (Table 8). Daily averages ranged from 0.4 to 6.1 percent for juvenile chinook and from 0 to 4.4 percent for steelhead. These rates compared favorably with previous seasonal averages (Table 9), and it would appear that 1984 migrants were,

Table 8. Average percent descaling of juveniles by week at Lower Granite Dam during 1984. Samples were taken from the sample upwell at the fish facility lab for both chinook and steelhead smolts.

Sample period	Percent descaled	
	Chinook	Steelhead
April 1 - April 7	1.9	2.0
April 8 - April 14	3.1	3.1
April 15 - April 21	3.2	1.1
April 22 - April 28	6.1	4.4
April 29 - May 5	3.5	1.9
May 6 - May 12	4.9	1.9
May 13 - May 19	4.4	3.3
May 20 - May 26	3.7	3.3
May 27 - June 2	1.9	3.6
June 3 - June 9	2.6	2.0
June 10 - June 16	4.4	1.9
June 17 - June 23	3.3	2.6
June 24- June 30	3.0	3.0
July 1 - July 7	2.1	3.0
July 8 - July 14	1.4	3.4
July 15 - July 21	0.5	0.0
July 22 - July 26	0.4	0.0
Season Average	3.0	2.3

Table 9. Average seasonal descaling rates for juvenile chinook and steelhead collected and sampled at Lower Granite juvenile facility, 1981-1984.

Year	Percent descaled	
	Chinook	Steelhead
1981	15.5	16.8
1982	8.8	10.1
1983	3.0	4.1
1984	3.0	2.3

generally, in excellent condition. Once juvenile steelhead began arriving in large numbers, workers began recording descaling rates for hatchery and wild smolts. Average descaling for juveniles of hatchery origin was 2.6 percent while wild stocks averaged 2.3 percent.

Descaling rates for chinook and steelhead juveniles sampled from powerhouse gatewells were kept between April 13 - July 13. The seasonal average for gatewell sampled chinook was 4.0 percent and 1.4 percent for steelhead (Table 10). Averages ranged from to 0.5 - 10.7 percent and from 0.0 - 4.5 percent for chinook and steelhead, respectively. Workers did not separate wild from hatchery fish in the steelhead gatewell sample. Gatewell samples taken in 1983 averaged 1.6 percent and 5.6 percent for chinook and steelhead, respectively.

Excellent flow conditions, resulting in reduced travel time, and improved quality of hatchery smolts resulted in high quality juveniles collected at Lower Granite. The new trash boom is credited with effectively eliminating debris from the collection and bypass system that reduced physical injury and descaling.

Table 10. Average rate of descaling for juvenile chinook and steelhead migrants dipped from powerhouse gatewells at Lower Granite during 1984.

Sample dates	Percent descaled	
	Chinook	Steelhead
April 13	3.7	None in sample
April 17	0.5	None in sample
April 26	7.0	None in sample
May 4	5.0	None in sample
May 11	3.5	None in sample
May 18	2.0	None in sample
May 31	3.7	4.5
June 8	None in sample	2.0
June 15	3.8	0.7
July 2	2.9	None in sample
July 6	1.5	1.7
July 13	10.7	0.0
Season Average	4.0	1.4

Fish Facility and Barge Transport Mortality

Generally, the overall condition of the fish collected in 1984 was excellent, although some BKD symptoms were observed in early arriving chinook. Total mortality at Lower Granite's fish facility for all species was 5,660, or 0.3 percent of the total collection (Appendix Table 1). This compares with 0.5, 0.5 and 0.3 percent for transport season mortalities in 1983, 1982 and 1981, respectively. Mortality averaged 0.5 percent for all chinook (0.4 for yearlings and 0.7 for subyearling chinook) and 0.1 percent for steelhead. Chinook mortality dropped approximately 40 percent from the previous 4-year average (Table 11).

Table 11. Collection mortality rates at Lower Granite juvenile facility from 1980-84. Yearling chinook mortalities were not figured separately until 1983.

Species	1984	1983	1982	1981	1980
Total Chinook	0.5	0.7	0.8	0.7	0.6
Yearlings	0.4	0.3	----	----	----
Subyearlings	0.7	2.0	----	----	----
Steelhead	0.1	0.2	0.1	0.1	0.3

Collection mortality totals include those recorded by barge crews during the initial two hours after departure from the juvenile facility. This mortality was 0.4 percent for chinook and less than 0.1 percent for steelhead. Barge mortality for the remainder of the trip was 0.7 percent and 0.1 percent for chinook and steelhead, respectively. Barge mortality of direct-loaded fish is compared with barge mortality of fish held in facility raceways prior to loading (raceway-loaded) in Table 12. Direct comparison between the two mortality rates may be biased in favor of raceway held fish since all injured and moribund juveniles that come across the separator would be recovered from the barge tanks during the direct-loaded periods. In 1984, direct-loaded chinook had a slightly higher mortality rate (0.8 percent) than raceway-loaded fish (0.7 percent). Direct-loaded steelhead had a mortality rate of 0.1 percent, approximately half of the 0.2 percent rate for raceway-loaded steelhead. A beneficial effect of direct loading may be indicated. Direct loading also appeared to reduce barge mortality of both species in 1983.

Table 12. Barge mortality rates (2 hours after departure until release) of direct-loaded and raceway-loaded juveniles during 1984 (22 trips) and 1983 (10 barge trips).

	Chinook		Steelhead	
Loading Type	1984	1983	1984	1983
Direct-load fish	0.8	0.3	0.1	0.1
Raceway-load fish	0.7	0.3	0.2	0.1

TRANSPORT/BYPASS OPERATIONS - LITTLE GOOSE DAM 1984

The 1984 juvenile fish transport season at Little Goose Dam was very successful. Fish were collected in greater numbers and better condition than in previous years. Problems that forced early shutdown in 1983 were apparently corrected with interim modifications completed during the off-season.

MODIFICATIONS

In 1983 a combination of high dissolved gas levels, high mortality rates, and overall poor fish condition forced facility outages and, ultimately, its early closure. Several interim modifications were made to reduce the problems until a new juvenile fish facility is constructed.

Orifice Modifications

Twenty-four of the thirty-six gatewell orifices were modified to reduce descaling and/or eliminate pressure changes (Table 13). In each gatewell of Units 5 and 6, the #1 orifices (south) had a plate with an 8-inch hole on the gatewell side opening into a 14-inch conduit. An 8-inch diameter pipe insert was installed in these slots to match the hole in the plate. The #2 orifice of Units 5 and 6 gatewells (north) had plates with 8-inch holes and a 12-inch diameter pipe insert. The 8-inch hole plate was replaced with one having a 12-inch diameter hole. In addition, these 12 orifices, plus all of the #1 orifices on Units 1 through 4 (all 12-inch diameter holes with 12-inch diameter pipe inserts), had the gatewell entrances grouted with underwater putty and the inserts sandblasted and vinyl-painted.

Table 13. Orifice assembly configuration as of April 1, 1984.

Orifice size x casing size (in.)	Casings vinyl painted and entrances grouted: YES	Casings vinyl painted and entrances grouted: NO
12" x 12" [1]	1AS, 1BS, 1CS, 2AS, 2BS, 2CS, 3AS, 3BS, 3CS, 4AS, 4BS, 4CS 5AS, 5BS, 5CS, 6AS, 6BS, 6CS	1BN, 1CN, 2AN, 2BN
8" x 12"	------------NONE------------	1AN, 2CN, 3AN, 3BN 3CN, 4AN, 4BN, 4CN
8" x 8"	5AN, 5BN, 5CN, 6AN, 6BN, 6CN	-------NONE-------

[1] 1AS = unit 1, slot A, south orifice

Collection Channel Modifications

To reduce descaling potential gas entrainment, and allow the water level to be held higher in the gallery, several modifications were completed. The upper walls and ceiling of the entire collection channel, which had been rough and pitted, were shot-creted to smooth the surface, (Photo 5-6). Because of the higher water level, the overflow weir crest at the north end of the

Photo 5. Collection gallery at 90^{o} turn shows steel baffle plate and rough concrete ceiling at Little Goose Dam.

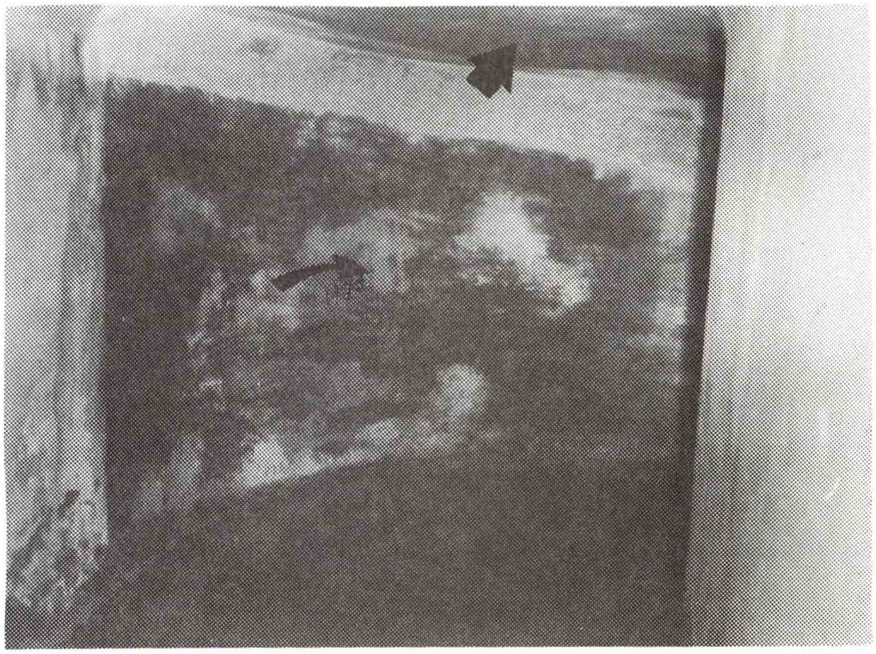


Photo 6. Collection gallery showing gradual 90^{o} turn and smooth shot crete ceiling at Little Goose Dam.

gallery was raised 3½ inches. All orifice lights were raised and the electrical supply conduit was mounted above the ceiling.

At the south end of the channel, several modifications were made at the auxiliary water supply intake. The make-up water enters here at a 90-degree angle to the flow of the collection channel. A metal baffle plate, which had an open chamber behind it, had been installed in 1981 to eliminate a sheer-plane effect. This metal baffle was removed, the chamber filled with concrete, and both the inner and outer corners of the 90-degree bend were rounded. Also, a 4-foot high by 6-foot deep concrete weir that stood at the entrance to the hopper was removed.

Bypass pipe

The 42-inch bypass pipe was realigned to eliminate three 90-degree bends. The new pipe has two 27-degree bends and one 35-degree bend, each on a 105-foot radius. In an attempt to reduce the water velocity and back water up to a higher level in the hopper and collection channel, a restricting pipe was added. This consisted of 160 feet of straight 28-inch diameter pipe. The diameter increases back to 42 inches before entering the upwell structure. The entrance to the upwell was shot-creted to provide a smooth and more gradual transition.

Separator

The separator hopper was modified to reduce holding space for fish by one-half. It was hoped that this would reduce exposure time to water with high dissolved gas concentration.

Distribution and Sampling Systems

In 1983, the chinook and other smaller fish were diverted into a raceway and allowed to migrate volitionally out through the barge-loading line. To provide direct bypass to the river from the distribution flume, the distribution line leading into raceways 1 and 2 was modified. A length of PVC pipe was inserted through the concrete tailrace wall and perpendicular to the heads of the raceways (Photo 7). This pipe then continued down to the water and exited below the barge loading line.

To determine condition and species composition of fish being bypassed, a second sample tank was installed outside the sample building. The same PVC line was used for both tanks, but a rotating lateral Y fitting was installed above the outside tank allowing fish to be diverted into either tank (Photo 8).

COLLECTION OF JUVENILES

Migration and Collection

The Little Goose Dam facility was initially watered up on March 28 for a pre-season inspection by FTOT and project biologists. The facility was again watered up on April 2 and all fish were bypassed to the river until that afternoon. At that time, collection of hourly samples began. The first sample fish were examined on April 3 and were found to be in good condition. The facility was put into full operation. Fish remained in good condition throughout the season until the facility was shut down on July 28 and monitoring terminated.

A total of 2,737,422 juvenile salmonids were collected in 1984. Of these, 786,583 (28.7 percent) were yearling chinook, 243,668 (8.9 percent) were sub-yearling chinook, 1,695,494 (62.0 percent) were steelhead, and 11,677 (0.4 percent) were sockeye (Appendix Table 4).

Numbers of smolts collected in 1984 were higher than previous years. The 1984 total collection of 2,737,422 smolts represented a 274.9 percent increase over 1983 (995,648), a 216.3 percent increase over 1982 (1,265,503), and a 183.7 percent increase over 1981 (1,490,188).

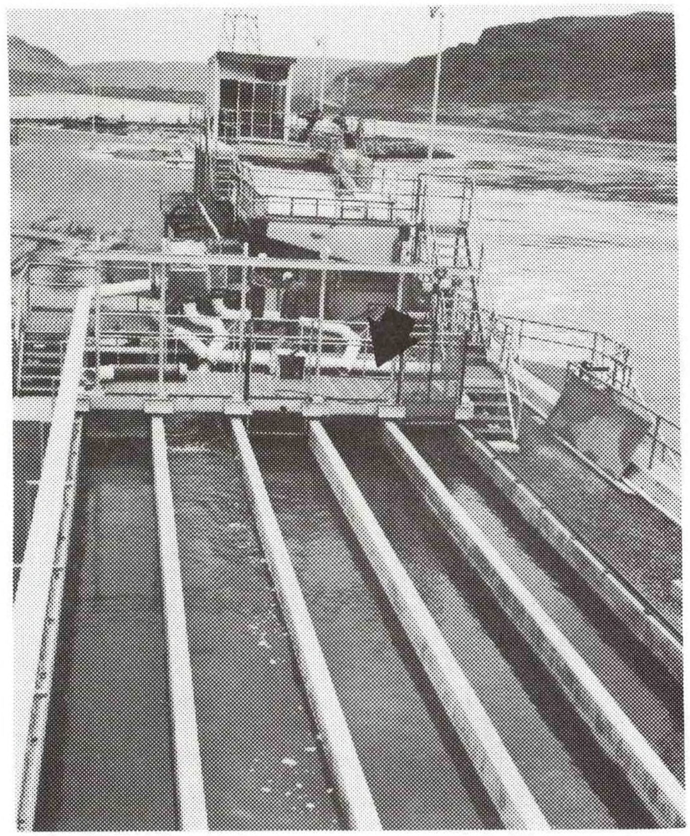


Photo 7. PVC pipe used to bypass fish from the distribution flume direct to the river at Little Goose Dam.

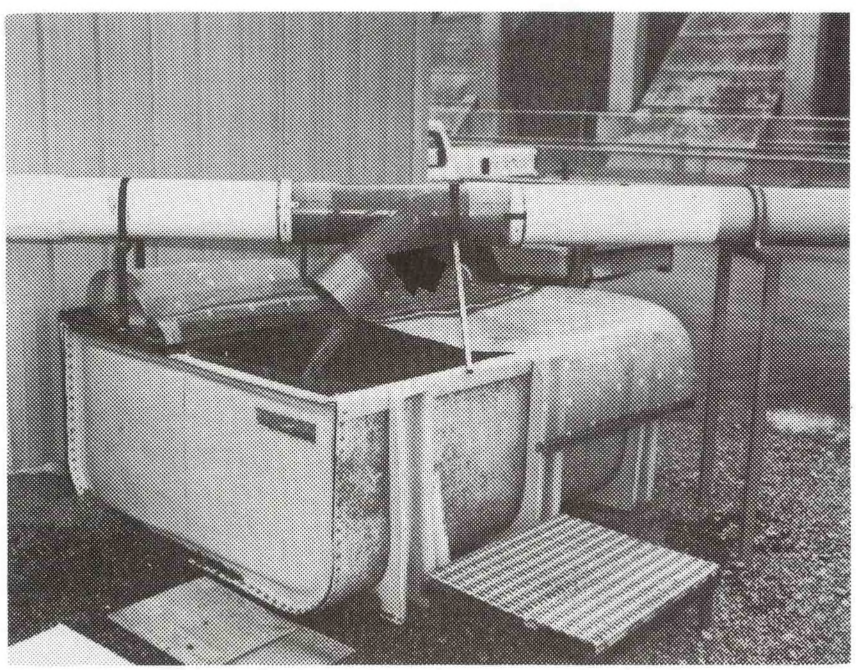


Photo 8. Lateral Y fitting used to sample fish being bypassed to the river.

Daily collection totals at Little Goose were generally higher than at Lower Granite, even after spill had been terminated there. The reason for this is unknown and research will be conducted in 1985 at Lower Granite to determine the cause. The peak daily collection was 101,637 on May 18. This single day total was the highest since 1981 when 238,634 were collected on May 5. The May 18 peak also compares with May 11 in 1983, May 9 in 1982. The progressively later dates for peak collection are similar at Lower Granite and reflect delayed hatchery steelhead releases that were being made to intentionally separate those fish from the earlier migrating chinook.

Yearling chinook daily collection peaked on April 26 at 33,353. Subyearlings peaked on May 7 at 6,881. Comparison with previous year's chinook counts is not valid because of revisions made in 1984 in chinook identification and reporting procedures (see Lower Granite Migration and Collection). Steelhead daily collection peaked on May 18 at 95,652. This compares with 37,006 on May 18, 1983, 37,619 on May 9, 1982, and 171,817 on May 5, 1981. Total sockeye collection in 1984 of 11,677 was considerably higher than in 1983 (3,432) and 1982 (5,031).

Bypass

From initial water-up, until May 12, a portion of the chinook and other small smolts were bypassed to tailrace. At that time, it was determined that over 80 percent of the spring chinook run was past Little Goose and steelhead had predominated the daily collection since May 9. Of 445,922 smolts bypassed, 279,320 (62.6 percent) were yearling chinook; 82,533 (18.5 percent) were subyearling chinook; 77,883 (18.6 percent) were steelhead; and 662 (0.2 percent) were sockeye. When compared to total collection, the percent of each species bypassed was 35.5 percent of the yearling chinook, 33.9 percent of the subyearling chinook, 4.6 percent of the steelhead, and 5.6 percent of the sockeye (Appendix Table 7).

Of 729,562 chinook collected during the bypass period (through May 12), 361,853 (49.6 percent) were returned to the river. Mean length for those bypassed was 117 mm compared with 127 mm for those transported. A total of

591,615 steelhead was collected during the same time with 77,883 (13.2 percent) bypassed and the rest transported. Mean length of the bypassed group was 183 mm and 201 mm for the transport group. Sockeye collection through May 12 totaled 1,593, with 662 (41.5 percent) bypassed.

Based on the above data, separation at Little Goose was considered inadequate. A major reason for this inadequacy was surging of the upwell water across the perforated plate and separator bars that tended to push smaller fish toward the downstream end.

C. Transport Summary

A total of 2,274,307 smolts was transported in 1984, 235,815 (10.4 percent) by truck and 2,038,492 (89.6 percent) by barge (Appendix Tables 5 and 6). These numbers were considerably higher than in 1983 (868,937), 1982 (1,234,110), or 1981 (1,464,991).

The first truck was loaded on April 5 and fish were trucked every other day until April 11 when the first barge arrived. The first three barges were four days apart, and a truck was loaded on April 13 and 17 to avoid holding fish more than 48 hours. Lower Granite was given the extended holding option. Because of Little Goose's questionable operation, holding criteria there were not changed. Barges ran from April 11 to June 15 (Figure 8). At the end of the barge season, trucks hauled fish from Little Goose 10 out of 12 days; in several cases the trucks were loaded to capacity. From June 28 until July 28, trucks ran every other day.

The 1984 collection peak occurred May 16-19. Because of high numbers and large fish size, the possibility of exceeding the Little Goose facility holding capacity was imminent. Therefore, on May 16, raceways were emptied into an upstream-bound barge. This barge was loaded again on its downstream run the next day, exceeding its loading capacity of a ½-per-gallon. The FTOT coordinated approval to load 3/4 pound-per-gallon for this trip if necessary and two compartments were loaded to this increased limit.

Repositioning of the "Operation Fish Run" signs on the new barges and the wall modifications on the older barges helped the loading process at Little Goose during higher tailwater. However, there were still difficulties loading certain barge compartments at Little Goose. In addition, spill created the same hazardous conditions for equipment and personnel as in the past.

FACILITY OPERATIONS AND MAINTENANCE

Debris and Trash Racks

Debris problems at Little Goose in 1984 were not much different than in the past. Gatewell dipping for trash was a daily operation throughout most of the season. Trashracks were raked on three occasions, May 25, June 6 and 7, and June 27. No debris was found during the May raking, although a large amount was removed during June. Gatewell drawdown was never out of criteria in 1984.

Because of the higher gallery water level in 1984, project staff was unable to detect an orifice blockage unless it was seriously plugged. In past years, orifices in Units 1 and 2 were at least partially out of water for visual inspection. These two orifices are most susceptible to plugging by debris.

Debris did not accumulate in the separator hopper to the extent as in past years, and therefore the dump gates were rarely used. The electronic counter tunnels were inspected frequently and cleaned when debris was noted. The perforated plate over the water eliminator valves in the distribution flume required frequent cleaning because of trash accumulation (twigs, grasses, etc).

Raceway cleaning, prior to loading, was accomplished with the same method as in previous years (Delarm et al. 1984). A new stronger debris flap was added at the end of the separator.

Submerged Traveling Screen (STS)

All STSs were installed and operating prior to April 1. Screens were cycled (20 mins. off/4 mins. on) except for the period June 16 to July 15 when mean chinook length was less than 115 mm.

There were several problems with STSs during the season (Table 14). On April 2, two screens developed electrical problems and were pulled for repair. At that time problems were also noted with the plastic rivets. The rivets were failing at the point of overlap of two mesh panels. The rivets were replaced at the splices with the original nylon bumper strips, and screws and no further problems occurred. The new spare STS was pulled on May 19 to repair the link bar attachments. Some of the original attachment bolts were too short and pulled out. When the new STS was checked at Lower Granite, it was found to have a similar problem.

Video inspections were conducted twice during the season, April 19-20 and June 18. Screen 1-A was found torn on the first inspection and it was pulled and replaced with the spare. On the second inspection, screen 1-B had torn mesh and screen 5-C was pulled and placed in slot 1-B.

Table 14. Submerged traveling screen outages and causes at Little Goose Dam, 1984.

Unit	Out of service		In service		Problem
1C	2 Apr	1203	2 Apr	1645	Motor ground out.
4C	2 Apr	1318	2 Apr	1406	Motor problems.
4C	3 Apr	0915	4 Apr	1324	Hole in screen; splice repaired.
5C	4 Apr	1015	6 Apr	1306	splices repaired.
6C	5 Apr	0818	6 Apr	1718	Splices repaired.
5B	6 Apr	1009	9 Apr	1357	Splices repaired.
6A	6 Apr	1315	12 Apr	1533	Splices repaired.
6B	6 Apr	1315	12 Apr	1533	Splices repaired.
1A	19 Apr	1100	19 Apr	1645	Bad link bar.
6A	26 Apr	1215	26 Apr	1545	Motor ground out.
6B	5 Jun	0909	5 Jun	1345	Motor ground out.
1A	11 Jun	1006	11 Jun	1330	Torn screen.
6B	12 Jun	0830	12 Jun	1600	Motor ground out.
1C	14 Jun	0915	14 Jun	1551	Electrical problems.
4A	16 Jun	1039	16 Jun	1815	Torn screen.
1B	18 Jun	1257	18 Jun	1800	Torn screen
5C	18 Jun	1539	19 Jun	1550	Pulled to install in 1B.
4A	24 Jul	1548	26 Jul	0920	Motor problems.
4B	30 Jul	0800	30 Jul	1315	Oil leak.

Collection System

Interim modifications in the gallery and bypass pipe functioned as intended. The reduced diameter of the 160 feet of 28-inch pipe backed water up in the hopper and collection channel. However, because of the reduced flow, only 18 orifices could be operated as compared to 27 in the 1983 season. Only fourteen 12-inch diameter orifices could operate; four of the six on Units 5 and 6 were 8-inch diameter. Because of high water levels, orifices were cycled twice weekly (closed for 10-15 minutes and reopened) in an attempt to float debris and/or tear it loose with initial opening velocity. The system functioned with the make-up water valve on automatic mode and water levels were maintained without problems.

Although dissolved gas concentrations were occasionally high in the forebay (up to 129 percent), the collection system did not seem to appreciably add to those levels as it did in 1983. It appears that elimination of the chamber and metal baffle plate at the entrance of the make-up water in the collection channel prevented the increase in dissolved gas. Dissolved gas concentrations were monitored at five locations: 1) forebay, 2) upwell, 3) raceway, 4) sample tank(s), and 5) tailrace. Stillwells were installed in the upwell and tailrace several weeks into the season and will be placed in the gallery and hopper prior to the 1985 season.

The new pipe configuration did not eliminate, nor even noticeably reduce, surging of water at the upwell structure, as was hoped. Testing prior to initial water-up eliminated a concern about cavitation at the pipe expansion. Cavitation was heard when the water level in the hopper was 4 feet from the top, but seemed to disappear when the level was raised an additional 2 feet. Chunks of the grouting used to smooth pipe joints appeared in the raceways throughout the season, along with paint from the inside of the spiral-weld steel pipe. It is possible that this could be a result of cavitation.

Distribution/Sampling System

The new chinook bypass line, described previously, eliminated the capability to easily load raceway 1. A temporary extension from the raceway 2 and 3 distribution line was built. It was used during the outmigration peak but was not completely satisfactory. A new design is planned for 1985, incorporating the lateral Y system that worked well for the second sample tank. The pipe does not discharge into an ideal location in the tailrace because, during spill conditions, there is turbulence in the area. Until the permanent juvenile fish facility is built, this situation is probably unavoidable.

Raceways

Raceway operation remained the same as in past years, with the exception of limited use of raceway 1. However, if the barge had not been loaded on both up and downstream runs on May 16 and 17, total raceway capacity would have been exceeded.

FISH CONDITION

In general, fish arriving at Little Goose were in better condition in 1984 than in 1983. However, as reported for Lower Granite, BKD symptoms were observed in a large number of early arriving chinook. Also, some sockeye arriving later in the season were in poor condition, generally bruised and weak. They were probably Kokanee spilled from Dworshak Reservoir.

On several occasions, when gatewells were being dipped, dazed smolts were observed entering the separator. No physical injuries were observed but these fish acted as though they had been stunned. This problem appeared coincidental with gatewell dipping.

Descaling

Descaling rates among fish collected at Little Goose during 1984 were considerably lower than in previous years. Fish were examined for descaling as they entered the collection system from gatewells and in the daily sample after having passed through the collection/separation system.

Weekly descaling rates for chinook ranged from 2.6 to 13.0 percent with a mean of 7.1 (Table 15). This compares with 19.9 percent in 1983. Steelhead weekly rates ranged from 0.8 to 10.2 percent with a mean of 2.9, also much lower than the 1983 rate of 7.8. Mean descaling rate for wild steelhead was 1.1 percent compared with 3.5 percent for hatchery steelhead.

Fish were sampled from gatewell slots twice per week between April 4 and July 10. Comparisons of descaling rates for chinook and steelhead in 1984 at 7.3 and 3.9 percent, respectively, were lower than in 1983, 10.0 and 6.5 percent. It can be assumed, since facility descaling rates in 1984 were slightly lower than for gatewells, that intrafacility descaling was minimal. Also, fish appeared to be in better condition in 1984 than in 1983.

Table 15. Descaling rates of chinook and steelhead smolts collected at Little Goose Dam by week, 1984.

Week	Chinook		Steelhead	
	Facility	Gatewell	Facility	Gatewell
4/1-7	3.7	5.9	0.9	6.5a
4/8-14	3.9	6.7	0.8	2.9a
4/15-21	4.7	7.7	3.2	4.1a
4/22-28	6.8	4.3	1.7	0.7
4/29-5/5	7.4	7.9	2.4	1.1
5/6-12	9.1	9.5	2.4	4.0
5/13-19	13.0	9.4	2.8	4.4
5/20-26	6.1	8.0	3.3	4.2
5/27-6/2	7.3	3.0	4.4	4.5
6/3-9	10.1	1.9	3.1	3.5
6/10-16	9.8	8.5	3.9	3.7
6/17-23	7.1	7.4	3.6	5.5
6/24-30	6.7	11.8	4.0	2.5
7/1-7	5.0	5.1	4.1	7.5a
7/8-14	3.8	7.4a	10.2a	8.3a
7/15-21	4.7	---	2.3a	---
7/22-28	2.6	---	0.0a	---
Season Average	7.1	7.3	2.9	3.9

[a] Indicates a sample of less than 100 fish.

Mortality Rates

Overall facility mortality for 1984 was 0.7 percent, considerably lower than the 1983 rate of 1.1 and the 1982 rate of 2.1. Of the total number of mortalities in 1984, 11,479 (62.7 percent) were yearling chinook, 3,645 (19.9 percent) were subyearling chinook, 2,524, (13.8 percent) were steelhead, and 659 (3.6 percent) were sockeye. Both the improved fish condition, as evidenced by lower descaling rates in 1984, and lower mortality rates reflect in part improved conditions in the Little Goose facility as a result of the interim modifications described previously. Reduced mortality and descaling rates were also noted at Lower Granite. Daily chinook mortality at Little Goose ranged from 0.3 to 5.8 percent in 1984, as compared with a high of 18.8 percent in 1983. Steelhead ranged from 0.0 to 2.0 percent during the 1984 season.

Gas Bubble Symptoms

Despite high amounts of spill in 1984, impacts of dissolved gas supersaturation in fish were minor. The first symptoms were noted on June 23. The incidence peaked on the following day when 10.4 percent of the chinook, were affected. No symptoms were observed after June 27. In addition, the symptoms noted were only isolated bubbles in the fins. No severe accumulation of bubbles or hemorrhaging were observed similar to symptoms that occurred in 1983. This is further evidence that the interim modifications for the 1984 season were apparently successful. However, it must also be noted that the Lower Granite spill patterns were different. Spill was spread throughout the season in 1984 and over all spillbays. In 1983, there was a fairly long period prior to and during the start of the fish transport season that Lower Granite often spilled through less than eight gates.

MODIFICATIONS FOR 1985

Operations

1. In the event of higher fish numbers, as experienced in the 1984 season (5,000 - 10,000 fish per day upon initial water-up, and still over 1,300 fish per day when the facility was shut down on July 28, because of lack of personnel), extension of the beginning and ending of the season should be considered.

2. Because of relatively high numbers still being collected after the barging season, Little Goose needs a second truck and operator to avoid exceeding criteria and scheduling problems. Otherwise the barging season may need to be extended.

3. A more definitive system for classifying yearling and sub-yearling chinook has been devised and should be used from now on.

4. Because of successful operation with interim modifications, the back-up gatewell dipping plan prepared for 1984 will no longer be necessary.

Facility Modifications

1. The remaining 12 orifices will be modified: the eight with 8-inch diameter hole plates will be converted to 12-inch diameter and those eight, plus another four, will be sandblasted, vinyl-painted, and the entrances grouted with underwater putty.

2. The separator will be modified to increase efficiency of spring chinook separation by extending the A-bars to 2/3 the length of the separator.

3. Stillwells will be installed in the hopper and gallery to monitor dissolved gas concentrations at those locations.

4. A better system to divert fish to raceway 1 will be devised using a lateral Y design similar to the one for the second sample tank.

TRANSPORT/BYPASS OPERATIONS - MCNARY DAM 1984

McNary salmon and steelhead outmigrant collection/bypass facilities were scheduled to begin operation on April 1. Construction problems delayed initial water-up until April 9, at which time design flaws (described in facility modifications section) in the new flume system forced shutdown until April 12. Continuous operation then began. All collected fish were bypassed to tailrace until April 14, when fish collected in the separator's B-tank were first held for transport. The facility continued in this mode until April 19, when insufficient separation of spring chinook and steelhead prompted a return to 100 percent bypass. Monitoring throughout the next week indicated that adequate separation, as outlined in the Detailed Fishery Operating Plan (Anon. 1984), was being achieved, and collection for transport resumed April 27.

On May 29, when subyearling salmon became predominant, bypass ceased and all collected fish were held for transport. Collection continued until September 28, when the outmigration was deemed complete and the 1984 transport season ended.

FACILITY MODIFICATIONS

Major changes occurred at McNary in 1984. A size-separator, designed to allow bypass of spring chinook to the ice-trash sluiceway while retaining steelhead for transport, was constructed and placed in operation. To accomplish separation by size, the existing separator was divided at center into two tanks, A and B, by a wall perpendicular to direction of water flow. A set of round bars was installed in each tank just below intended water surface level and parallel to flow direction. Spacing between bars at the surface of A-tank (bypass side) was .75 inches, wide enough for spring chinook to sound between but presumably too narrow for the larger steelhead to pass through. These fish were expected to swim or be swept by water entering the separator across the divider wall to B-tank (transport side) and there sound. Space between B-tank bars was 1.25 inches.

An unsuccessful attempt was made to increase attraction flows emanating from the separator's attraction bars (located just below the separator bars) by diverting water there from the auxiliary supply line. The effort was abandoned because it reduced water in the fish sample counter tanks to unacceptably low levels.

To inhibit accumulation of large numbers of fish and/or amounts of debris, the separator floor was raised about six inches and angled toward the exits.

Separator redesign required construction of an additional flume network to permit bypass of yearling chinook exiting A-tank (Photo 9-10). An hydraulically operated gate, installed a short distance below the flume's origin at the A-tank exit, facilitated diversion and sampling of fish collected in that side of the separator. During periods when separation into bypass and transport groups was not desired, e.g. after 80 percent of yearling chinook outmigration had passed McNary, the divider wall was removed and all fish were diverted through the B-tank exit.

Because of space limitations the flume is narrow and has some sharp turns. This caused water to overflow at three points, which jeopardized fish and forced system shutdown from April 9 to 12 for repair. Additional modifications included placement of a flume cover at one location, redesign of some wall configurations, and reduction of the A and B tank exit-orifices from 6 x 12 to 6 x 9 inches.

The fish sample-counter tank was partitioned in 1984 to prevent mixing A- and B-tank population samples, routinely collected as per sampling guidelines (Anon. 1984a). Each compartment was supplied by separate water inflow lines and equipped with two tunnel counters for fish enumeration. Because of the center wall, water flowed directly at the tunnel counters, forcing substantial numbers of air bubbles through them and causing inflated sample counts. This

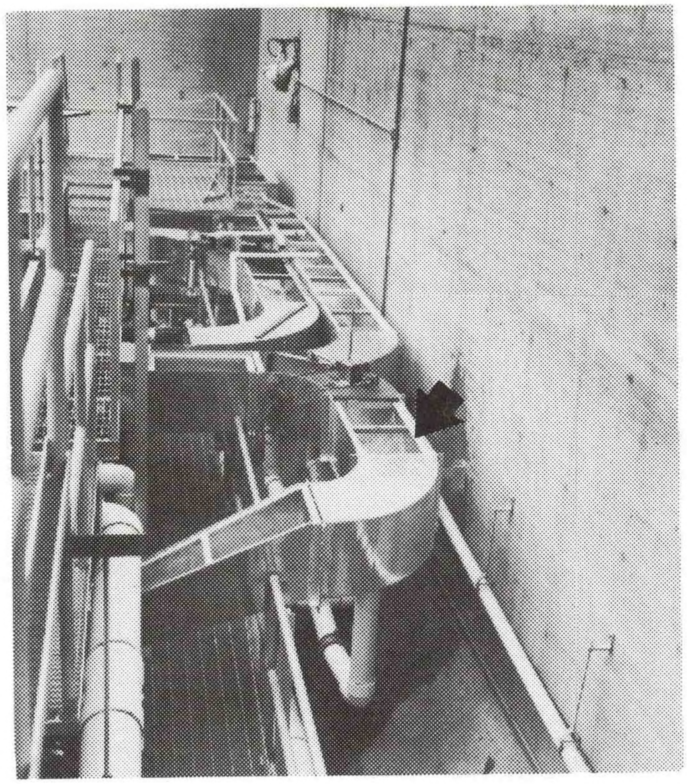


Photo 9. Redesigned bypass flume (foreground) at McNary Dam.

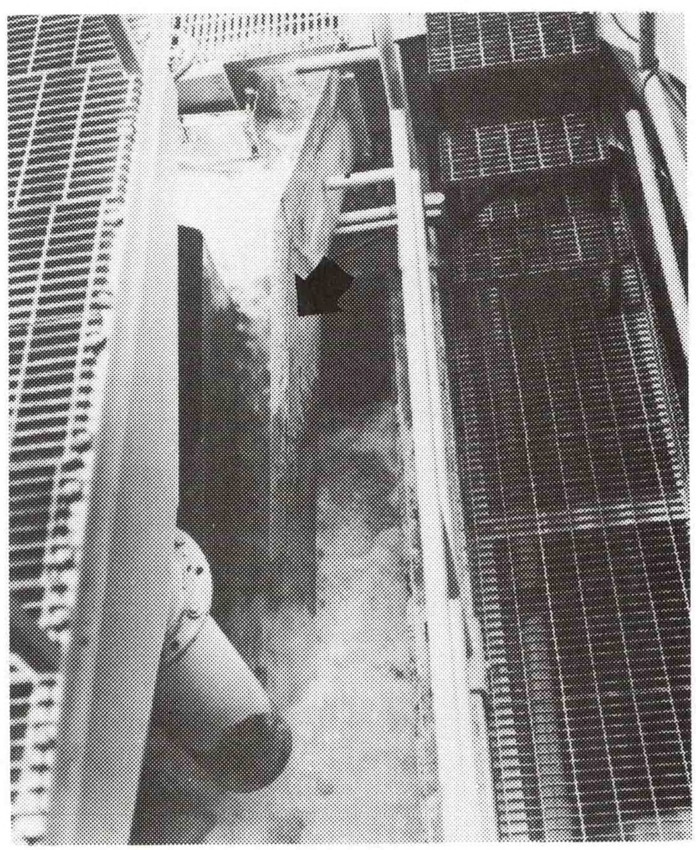


Photo 10. Bypass flume exiting into downwell to tailrace at McNary Dam.

problem was alleviated by raising the tank water level to that of the inflow, which reduced inflow velocity and allowed bubbles to dissipate ahead of the counters. Because drain capacity in the fish sample holding tank was subsequently found to be insufficient to handle inflow through four counters, two were blocked off. As a result, there was occasional debris accumulation in the remaining two counter tunnels, which may have injured fish passing through them.

The six-inch-diameter barge loading line was modified to include a ten-inch-diameter fiberglass header pipe with a smooth inner surface (Photo 11). Instead of sharp bends, the new header pipe has sweeping 45-degree angles to reduce shear forces and incidence of debris buildup.

Material shortages prevented replacement of any additional orifice Ts in 1984, and no further alteration or major maintenance of the bypass flume or pipe was undertaken. Routine system maintenance occurred prior to onset of the operation season.

COLLECTION OF JUVENILES

Migration and Collection

Outmigrants totaling 6,243,776 were collected at McNary in 1984 (Table 1). Barges hauled 4,091,964, and trucks carried another 616,668 to release points below Bonneville Dam. Yearling chinook collection increased 75 percent over 1983 levels to 1,261,187, while subyearling chinook numbers dropped 6.6 percent to 4,098,004. Steelhead increased nearly 45 percent to 610,511; Coho collection dipped 5.2 percent to 82,144; sockeye plummeted more than 27 percent to 191,930.

Peak passage of yearling chinook (58,968), steelhead (31,413), and sockeye (16,189) simultaneously occurred on May 7. Day of peak subyearling chinook passage (254,928) was July 15 (Appendix Table 8). On July 16, 386,861

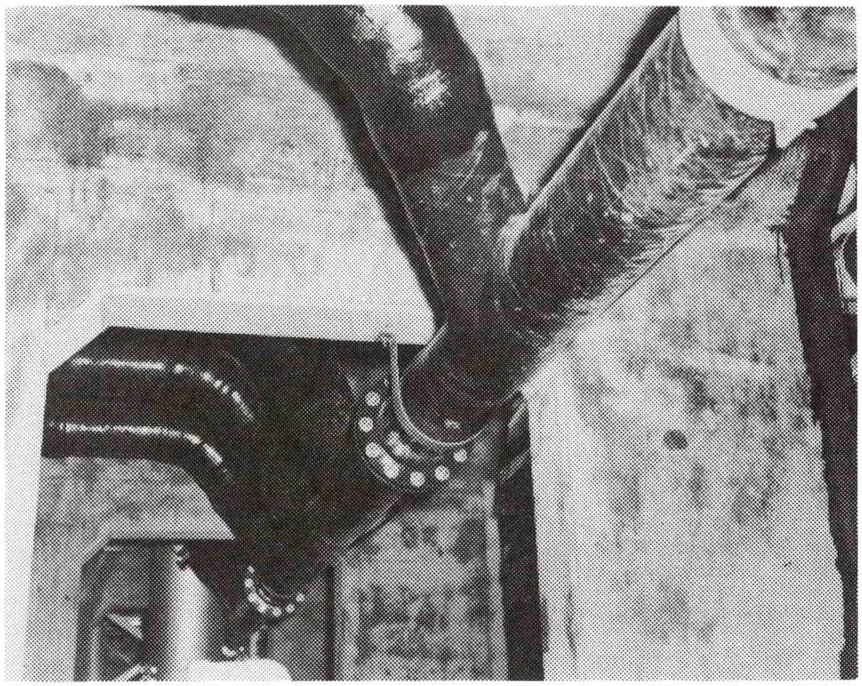


Photo 11. Fiberglass header pipe for the barge loading line at McNary Dam.

smolts were barged from McNary, the largest daily number leaving there in 1984 (Appendix Table 10).

Between April 12 and May 29, when transport of all collected fish began, 1,504,941 smolts were bypassed (Table 16); 62,676 were trucked (Appendix Table 9); and 560,823 were barged (Appendix Table 10).

Table 16. Numbers of fish bypassed through the McNary fingerling facility during April and May 1984.

Month	Yearling chinook	Subyearling chinook	Steelhead	Coho	Sockeye	Total
April	204,993	2,972	71,762	70	10,251	290,048
May	762,700	156,429	172,817	40,680	82,267	1,214,893
Total	967,693	159,401	244,579	40,750	92,518	1,504,941

Barging operations were extended in 1984, beginning April 11 and continuing from McNary until August 13. Throughout this time trucks ran as necessary, hauling fish excess to barge capacity. Beginning June 16 at McNary, a barge was scheduled to leave every other day; and a second barge was on standby for peaks in daily collection. The standby barge made three trips, two between July 15 and 19 and the last on August 4.

Outmigrant Numbers

Juvenile fish counting at McNary began April 13 and extended through September 28. Yearling chinook, typically springs and Snake River summers were predominant early in the season. By May 22, approximately 80 percent of these had passed McNary and by June 1 more than 95 percent had passed (Figure 12). Chinook yearlings counted at the project in 1984 totalled 1,261,187. Of this number, 263,973 (20.9 percent) were transported by barge to below

Bonneville and 28,599 (2.3 percent) were trucked downriver. The remainder were bypassed to tailrace. The increase in yearling chinook passage at McNary probably resulted from intensified efforts to bypass these fish at Lower Granite and Little Goose, coupled with expanded hatchery releases, up 50 percent from 1983 levels (WBC 1984).

Subyearling chinook, typically falls and mid-Columbia summers,[4] became predominant in late May and nearly swamped the facility on July 15, when the count was just under 255,000. Of the total 4,098,004 collected, 3,357,820 (81.9 percent) were barged and 552,163 (13.5 percent) were trucked. Subyearling chinook were collected at McNary throughout the transport season (Figure 12). Eighty percent of the run had passed the project by August 9. An estimated 95 percent had moved through by the third week in August.

The large number of steelhead (610,511) passing McNary in 1984 was probably a reflection of increased hatchery releases. Mid-Columbia hatchery releases were up about 20 percent over 1983 levels; those in the Snake River climbed over 77 percent (WBC 1984). Steelhead were already plentiful when the collection season began on April 12. By late May, 80 percent of the outmigration reaching McNary had passed (Figure 12).

Coho collected at McNary numbered 82,144 in 1984 (Appendix Table 8). Barges hauled 38,633 (47.0 percent) downriver, while trucks carried 1,469 (1.8 percent). Coho first became readily noticeable about mid-May, after which the run rose quickly to an 80 percent passage level on May 30. By mid-June coho passage was virtually complete.

Sockeye entering the collection system numbered 191,930, down noticeably from the 1983 level of 224,494. Sockeye first arrived at McNary in

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[4] In 1984, at least two releases of subyearling spring chinook were made in Idaho -- 300,000 "culls" from IDFG's Rapid River Hatchery, and 400,000 from the USFWS Hagerman facility -- as part of experimentation by Idaho Cooperative Fishery Research Unit.

appreciable numbers in late April, and by late May 80 percent of the run had passed (Figure 12). Some 95,085 (49.7 percent) sockeye were barged downriver; only 4,243 (2.2 percent) were trucked.

Facility Operation and In-Season Adjustment

Initial attempts at separation did not meet criteria set forth in the DFOP (Anon. 1984), and between April 19 to 27 all fish were bypassed. The decision to bypass was made because yearling chinook comprised 48.6 percent of B-tank fish from April 13 to 19. On a daily basis, the yearling chinook transport guidelines of 10 percent or less was met only once, on April 16, during initial operations.

Suspension of transport from April 19 to 27 allowed time for fine tuning of operational procedures. Inflow to the separator was reduced by increasing pinch valve pressure from 9 to 11 pounds. This curbed water surface velocities that could sweep smaller fish (e.g. yearling chinook) over A-tank into B-tank before they could sound.

To abate turbulence caused by separator inflow across A-tank, the lip at the inflow ramp base was curved by attaching a section of plastic pipe parallel to its edge. This broke the straight, downward plunge of inflow water and smoothed the flow. Further, a 1/8-inch thick rubber flap was suspended across the middle of A-tank, the flap's lower edge hanging just below water surface (Photo 12). Fish too large to pass between separator bars in A-tank could easily swim under the flap and enter B-tank. These modifications, coupled with experience gained by project personnel in maintaining proper water level in the separator, increased separation efficiency at the facility.

Between April 22 and 27, 33.9 percent of the fish collected in B-tank were yearling chinook. Because this amounted to less than 10 percent of total yearling chinook migrating past McNary during that period (including those passed with spill) separation criteria were met and transport resumed. Separation efficiency was best on May 4 when 87.6 percent of yearling chinook

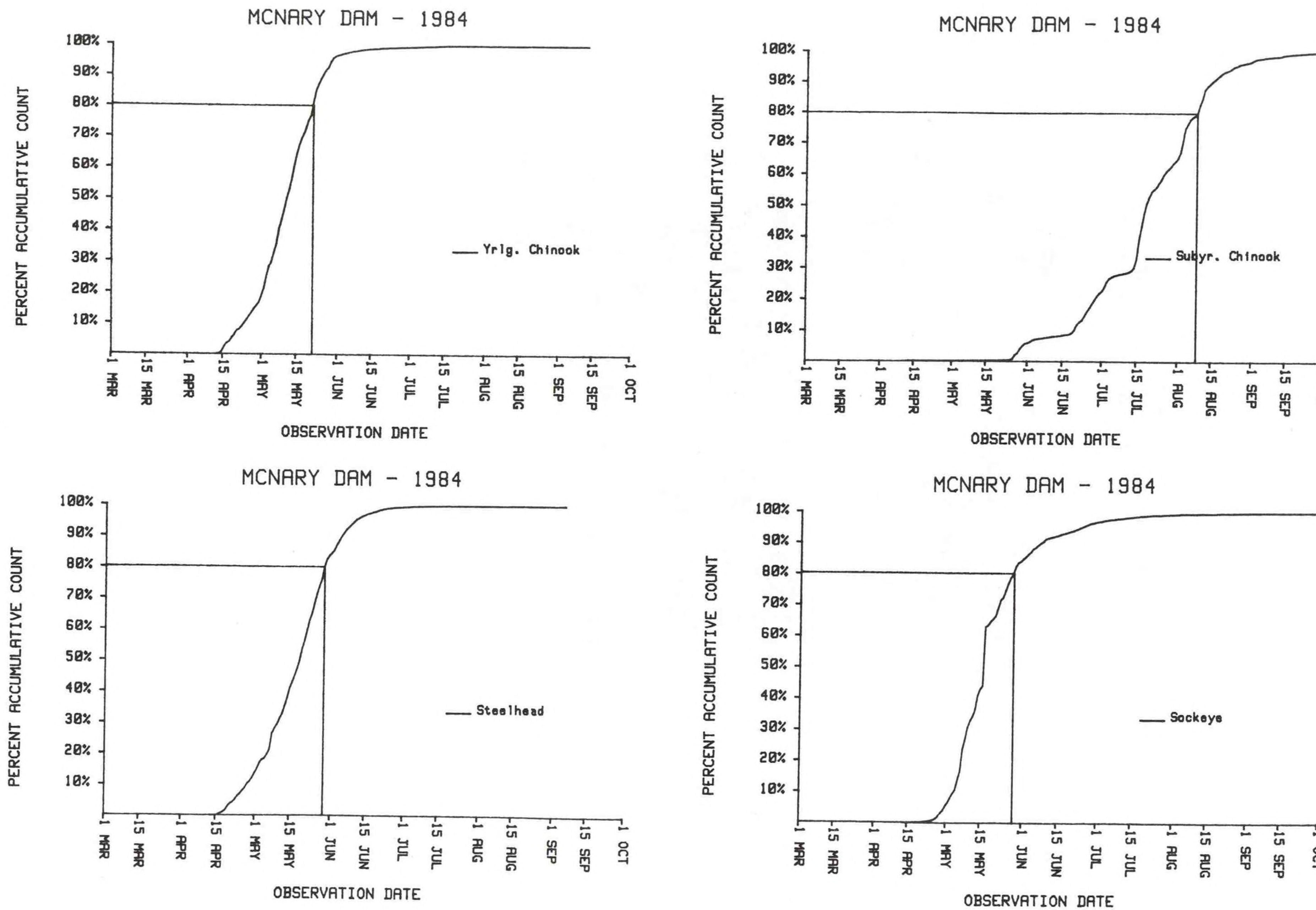

Figure 12. Time frame when 80 percent of yearling chinook, subyearling chinook, steelhead and sockeye were collected at McNary Dam during 1984.

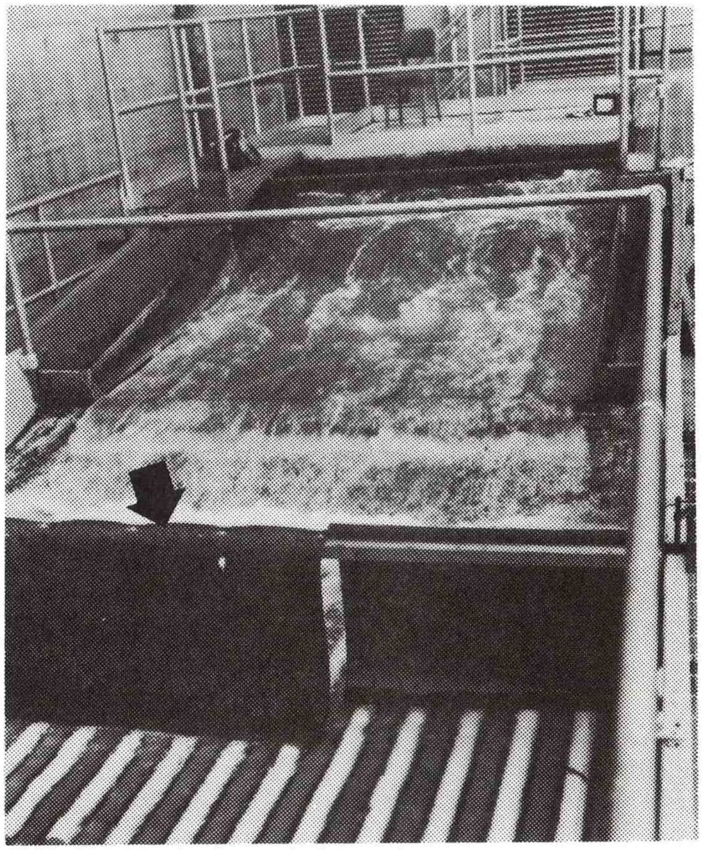

Photo 12. Rubber flap suspended across A-tank of separator at McNary Dam.

collected entered A-tank and only 3.9 percent of all yearling chinook encountering the project were transported. From April 20 to May 29, fully 75.5 percent of collected yearling chinook were bypassed.

Separation was considerably less effective for steelhead than for yearling chinook. Only 51.9 percent of the steelhead collected between April 12 and May 3 entered B-tank and were thus transported. To increase B-tank steelhead numbers, sections of PVC pipe were affixed to every other A-tank separator bars, reducing the space between them an additional 1/8 inch. The effort appeared moderately successful, increasing steelhead transport to 66.7 percent of the total collected between May 4 and 29.

FACILITY OPERATIONS AND MAINTENANCE

Trash Removal

The trashrack cleaning schedule has been noted in concert with outmigrant descaling. All trash raking in 1984 was achieved through use of the trash knife, as in past years. The new trash rake is being modified and is expected to be usable in 1985.

Forebay trash was cleared twice, first in late February and again in early April. Debris was dipped from gatewell slot 2B on June 26.

Submersible Traveling Screens

Submersible traveling screens were in place in all units by March 29. All operated in cyclic mode (15 mins off/2 mins on) from installation through

April 26. On that date, priority units 4 through 10 began constant operation because of numerous subyearling chinook fry in the system.[5] After May 4, these screens returned to cyclic operation. Cycling ceased May 29 when subyearling chinook dominated the outmigration. Screens were then run continuously until July 20 when cycling resumed.

Three video inspections of operating STSs occurred in 1984: May 7-24, June 11-22 and August 28 - September 7. Twenty five instances of torn mesh were recorded. All damaged screens were either removed and replaced with spares or pulled, repaired on site, and then returned to service. Five mechanical failures were corrected. Two screens fitted with new plastic rivets (Christmas tree clips) were pulled and inspected after rivet failures were observed at Little Goose and Lower Granite dams. All loose or missing rivets were replaced with the original nylon strips and stainless steel screws.

The Corps initiated a systematic STS overhaul program in 1984 with the intention of fully rebuilding one third of the screens on hand each year. Because this was the first year of the new maintenance plan, two out of three screens had already seen extensive use, and many screen malfunctions were attributed to failures of worn parts. Fewer breakdowns are anticipated in coming years.

Orifice Maintenance

The gallery was inspected daily for blocked orifices. To prevent blockages, the north orifice was cycled by closing it for about 20 minutes every day to allow debris to drift away from its entrance. Initially, one unit per day was cycled, but that number was doubled as fish numbers increased. High descaling rate in mid-May caused a short interlude of cycling

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[5] By agency/Corps agreement, screen cycling must end when fish 115 mm or smaller predominate at McNary.

three units per day. When those rates declined, cycling returned to two units per day, at which pace the entire powerhouse was cycled weekly.

In mid-August, after foul water was suspected in a south orifice pipe, project personnel began regularly flushing them for 24 hour periods as had been done in the past (Mobbs Pers. comm.). Routine flushing, it was believed, would prevent potential water quality problems from developing by providing regular water exchange through the pipe. This procedure occurred in conjunction with cycling to remove debris.

Prior to systematic cycling, two blocked orifices were discovered and four more blockages were found during the remainder of the collection season. Interrupting orifice cycling schedules to accommodate STS video inspections may have contributed to these problems by allowing debris to build up.

Bypass Flume

The flume's fixed screens were inspected twice, on March 24 and July 10. Some corrosion was observed, and affected screens will be replaced before the 1985 season.

Pinch Valve

As noted previously, pressure in the pinch valve was increased from 9 to 11 psi to reduce separator inflow. The valve was flushed frequently during the season. While no definite debris blocks were found, at least one partial block was indicated when high fish descaling rates coincided with unusual separator inflow patterns.

Separator

Debris in the separator continued to cause problems in 1984, typically accumulating in the southwest corner. Debris removal usually did not require separator shutdown and was accomplished by pushing the material toward the exit with a steel rod. When heavy debris accumulation and high descaling rates coincided, the separator was closed for inspection and cleaning.

Raceways

Raceway debris was removed as in past years, by sweeping it over the outfall weir with a modified fish crowding screen.

Tables 17 and 18 show descaling data for samples taken from the fingerling collection facility and the gatewell. Gatewells were dipped weekly beginning April 27. After August 16, adult shad in the gatewells precluded further dipping. Their presence during the process was considered harmful to smolts.

Sampling included fork length measurement of all species collected. Data compiled by NMFS personnel for yearling chinook, steelhead, coho, and sockeye are depicted in Figures 13 through 16. Because subyearling chinook migration occurs throughout the collection season, the mean fork length changes considerably through this time (Figure 17).

System Mortality

Because yearling chinook and steelhead were not separated until 1984, collection facility mortalities (Table 19) are not comparable to those seen previously. Sample tank mortalities, however, are comparable (Table 20) and show a decrease in yearling chinook and steelhead losses and an increase in subyearling chinook, coho, and sockeye losses.

The abrupt doubling in collection facility mortality of subyearling chinook, from 0.5 percent in June to 1.0 percent in July, is at least partially attributable to the accidental asphyxiation of 2,962 smolts in raceway 8 on July 19. The incident occurred following failure to increase inflow to the raceway after loading. (All remaining fish from raceway 8 were subsequently loaded into a separate compartment on the next barge and no

Table 17. Fingerling Facility Descaling Rate at McNary Dam, 1984

Month	Yrlng. ch.		Sub-yrlng. ch.		Steelhead		Coho		Sockeye		Total	
	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)
April	1,479	175(11.8)	0		1,270	39(3.1)	0		287	10(3.5)	3,036	224(7.4)
May	2,900	376(13.0)	400	10(2.5)	2,892	169(5.8)	640	18(2.8)	1,132	140(12.4)	7,964	713(9.0)
June	200	24(12.0)	2,600	85(3.3)	200	5(2.5)	136	4.(2.9)	140	19(13.6)	3,276	137(4.2)
July			3,100	96(3.1)							3,100	96(3.1)
August			2,700	36(1.3)							2,700	36(1.3)
September			466	8(1.7)							466	8(1.7)
Totals	4,579	575(12.6)	9,266	235(2.5)	4,362	213(4.9)	776	22(2.8)	1,559	169(10.8)	20,542	1,214(5.9)

Table 18. Gatewell Descaling Rates at McNary Dam, 1984

Month	Yrlng. ch.		Sub-yrlng. ch.		Steelhead		Coho		Sockeye		Total	
	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)	Sampled	Desc. (%)
April	400	40(10.0)	0		121	7(5.8)	0		48	1(2.1)	569	48(8.4)
May	824	84(10.2)	300	4(1.3)	260	13(5.0)	22	5(22.7)	210	15(7.1)	1,616	121(7.5)
June	30	2(6.7)	500	9(1.8)	58	5(8.6)	15	0	30	5(16.7)	633	21(3.3)
July			672	18(2.7)							672	18(2.7)
August			374	6(1.6)								
Totals	1,254	126(10.0)	1,846	37(2.0)	439	25(5.7)	37	5(13.5)	288	21(7.3)	3,864	214(5.5)

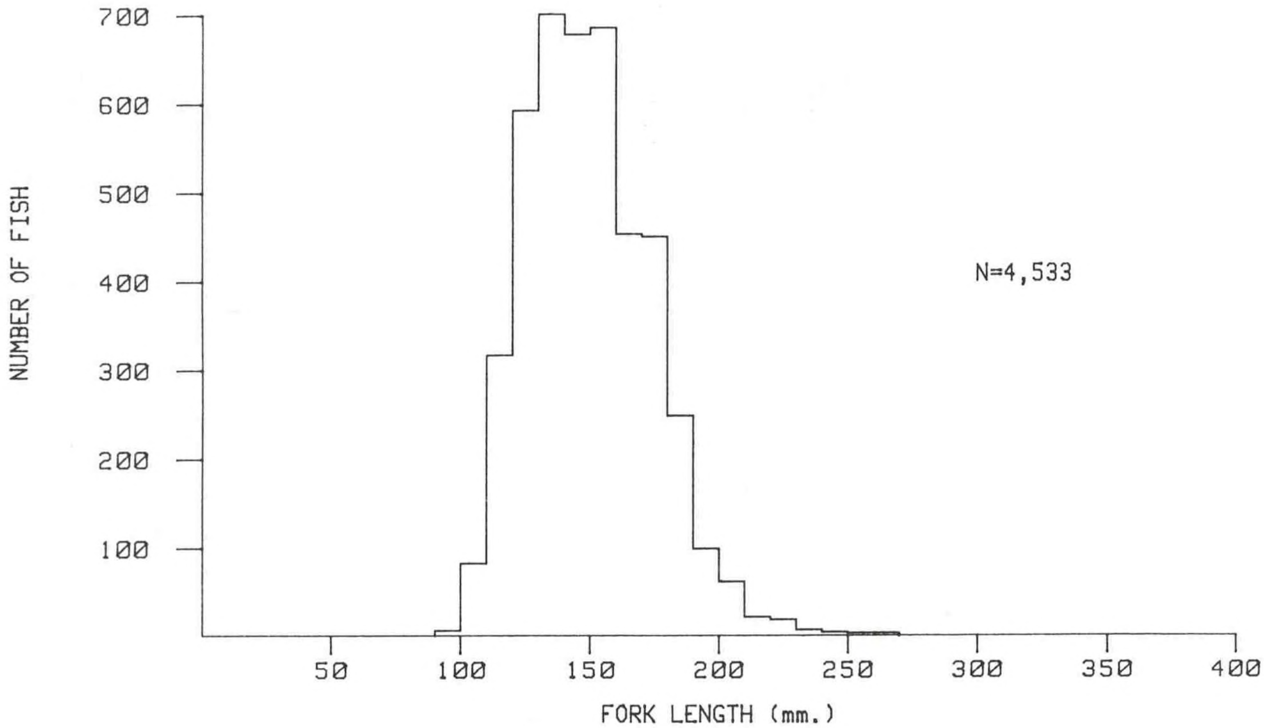

Figure 13.-- Yearling Chinook Length Frequencies, McNary Dam, 1984.

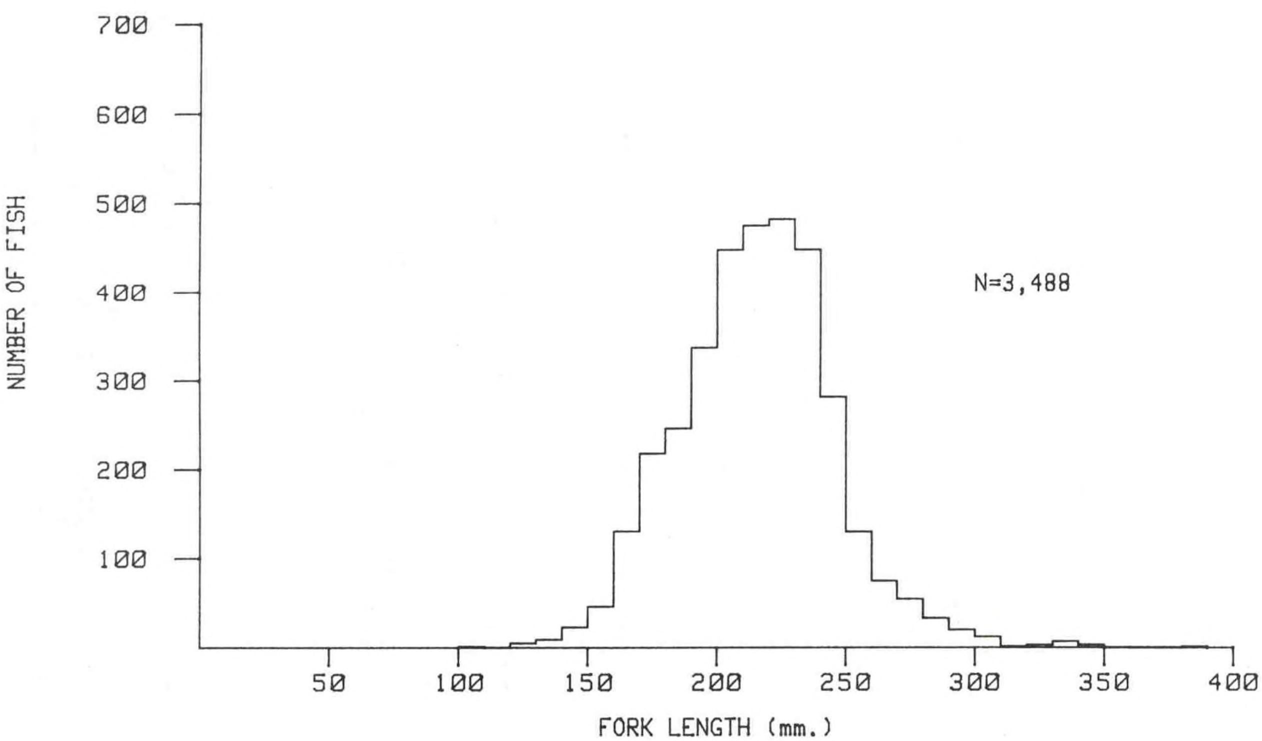

Figure 14.-- Steelhead Length Frequencies, McNary Dam, 1984.

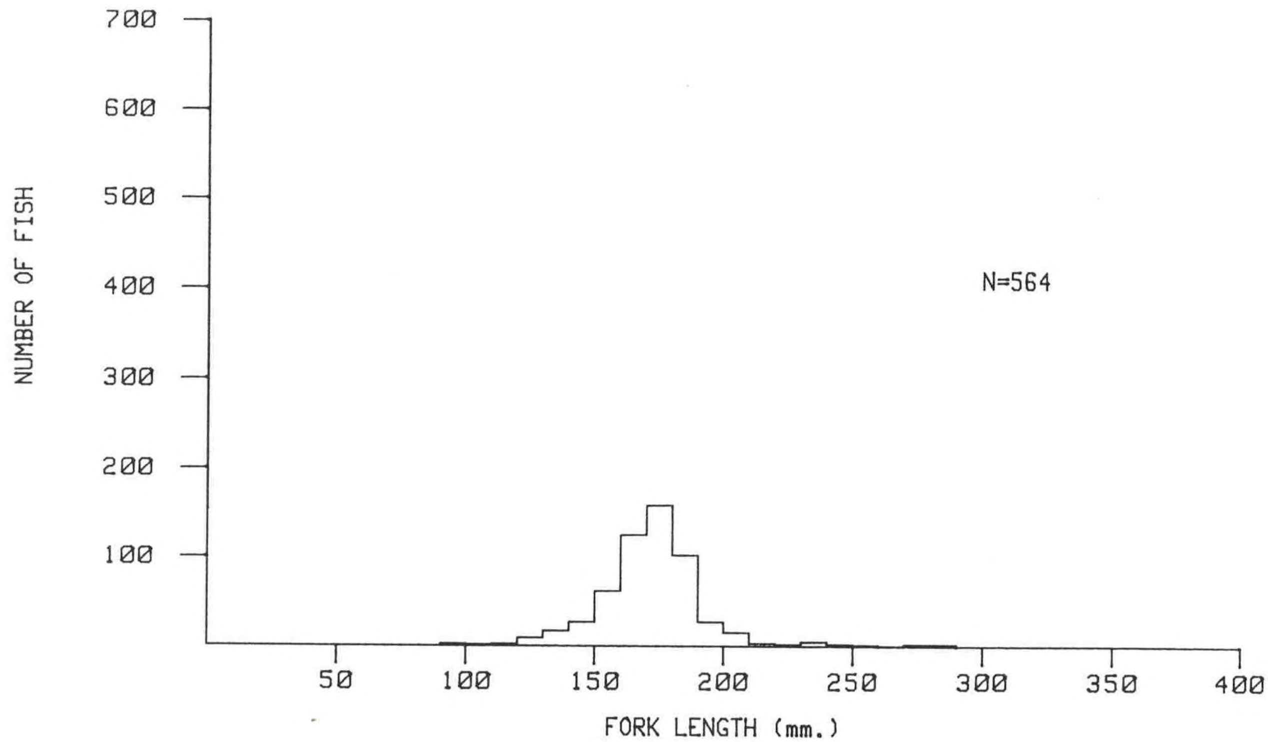

Figure 15.-- Coho Length Frequencies, McNary Dam, 1984.

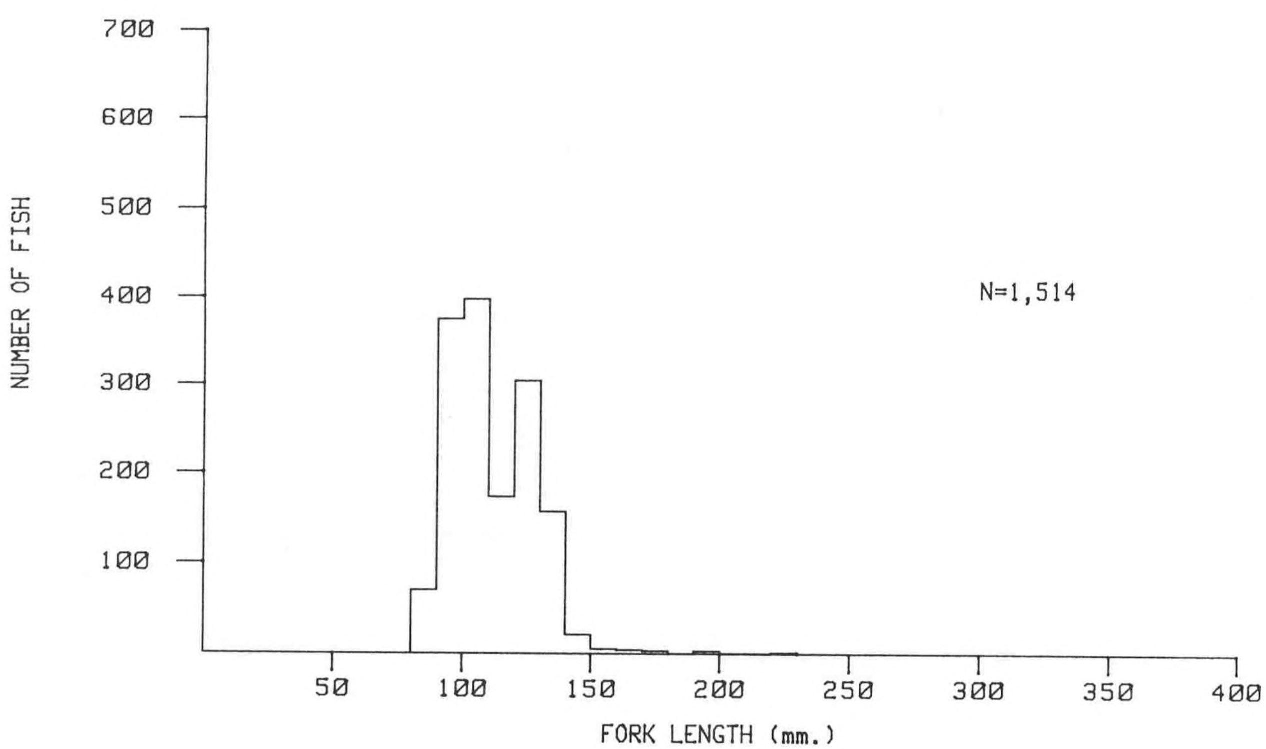

Figure 16.-- Sockeye Length Frequencies, McNary Dam, 1984.

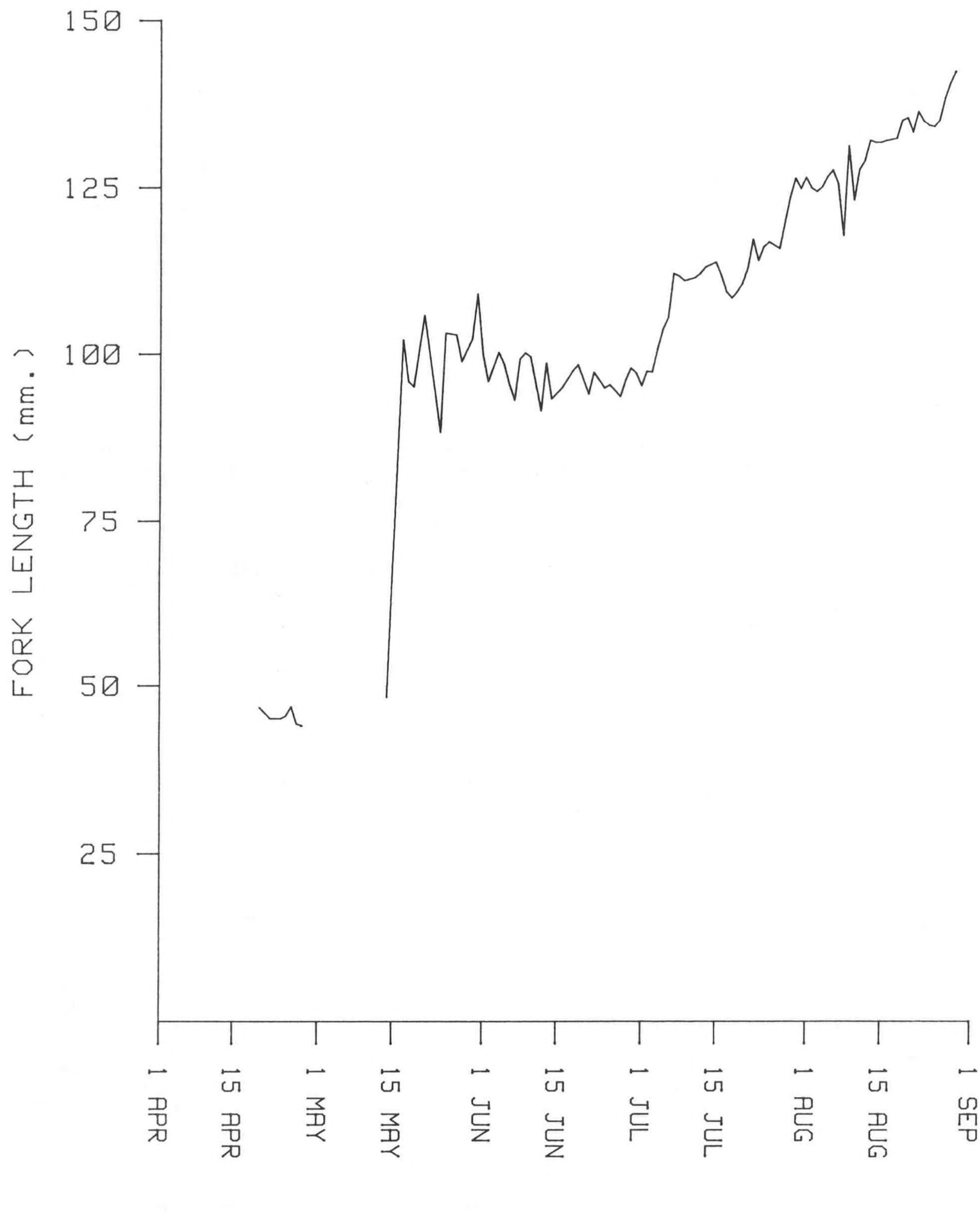

Figure 17.-- Sub-Yearling Chinook Mean Length, McNary Dam 1984.

Table 19. Collection System Mortality at McNary Dam, 1984

Month	Yrlng. ch.	Sub-yrlng. ch.	Steelhead	Coho	Sockeye	Total
	Mort. (%)	Mort. (%)	Mort. (%)	Mort. (%)	Mort. (%)	Mort. (%)
April	724 (.3)	95 (2.9)	46 (0.1)	0 0	42 (0.3)	907 (.3)
May	2,867 (0.3)	930 (0.4)	766 (0.2)	36 (0.1)	836 (0.6)	5,435 (.3)
June	240 (0.7)	3,607 (0.5)	549 (0.6)	4 (0.1)	247 (0.9)	4,647 (0.5)
July	11 (0.2)	17,756 (1.0)	28 (1.2)	0 0	0 0	17,795 (1.0)
August	0 0	12,299 (1.0)	4 (1.4)	0 0	3 (0.3)	12,306 (1.0)
September	0 0	882 (0.8)	0 0	0 0	0 0	882 (0.8)
Totals	3,842 (0.3)	35,569 (0.9)	1,393 (0.2)	40 (0.1)	1,128 (0.6)	41,972 (0.7)

Table 20. Sample Tank Mortality at McNary Dam, 1984

Month	Yrlng. ch.		Sub-yrlng. ch.		Steelhead		Coho		Sockeye		Total	Total
	Sample	Mort. (%)	Sample	Mort. (%)	Sample	Mort. (%)	Sample	Mort. (%)	Sample	Mort. (%)	Sample	Mort. (%)
April	21,847	275 (1.26)	320	5 (1.56)	7,962	14 (0.18)	7	0	1,289	29 (2.25)	31,425	323 (1.03)
May	93,722	695 (0.74)	20,922	106 (0.51)	41,709	114 (0.27)	6,831	23 (0.34)	13,749	383 (2.78)	176,933	1,321 (0.75)
June	3,222	19 (0.59)	41,565	273 (0.66)	8,520	37 (0.43)	1,146	0	2,322	30 (1.29)	56,775	359 (0.63)
July	609	3 (0.49)	130,713	1,798 (1.38)	200	1 (0.50)	30	0	467	0	132,019	1,802 (1.36)
August	65	0	90,164	1,252 (1.39)	25	1 (4.0)	1	0	86	3 (3.49)	90,341	1,256 (1.39)
September	18	0	7,730	84 (1.09)	2	0	0		24	0	7,774	84 (1.08)
Totals	119,483	992(0.83)	291,414	3,518 (1.21)	58,418	167 (0.29)	8,015	23 (0.29)	17,937	445 (2.48)	495,267	5,145 (1.04)

delayed mortality was observed during transport.) A low water alarm system, scheduled for installation in 1985, should alleviate similar problems in the future.

Research

Research at McNary was reduced in 1984. No fish were marked and mark recovery from upriver releases was the primary research activity. As a result, less than half the number of fish handled in 1983 were handled this year.

Oregon State University researchers completed their work on stress levels associated with subyearling chinook collection and transport. Studies by the U.S. Fish and Wildlife Service on fish condition and yearling chinook stress levels continued, as did NMFS research on subyearling chinook guidance and orifice passage.

FISH CONDITION

Descaling

Descaling rates in 1984 were comparable to those of 1983 (Table 21) Yearling chinook and sockeye scale losses were more frequent than in the previous year, while those of steelhead, subyearling chinook and coho were less so. Numbers of descaled yearling chinook began to increase in the facility about April 24. When the April 27 gatewell sample showed similar scale losses, trashrack cleaning was formally requested.

Table 21. Comparison of descaling rates at McNary Dam fish facility, 1983 and 1984.

Species	1983 Range	1983 Season	1984 Range	1984 Season
Yrlng. ch.	2.3 - 23.0	11.6	3.0 - 23.0	12.6
Sub-yrlng. ch.	0 - 14.0	3.9	0 - 7.0	2.5
Steelhead	0 - 15.0	5.6	0 - 14.0	4.9
Coho	0 - 15.0	4.2	0 - 8.3	2.8
Sockeye	0 - 27.5	9.8	0 - 30.0	10.8

Following the request for trash rack cleaning, high yearling chinook descaling rates continued, affecting at least 20 percent of sampled fish on six occasions. Sockeye descaling rates also began to climb, reaching 30 percent on May 18. Trashracks on all operating units were cleaned between May 17 and May 23. Although descaling was reduced, it remained above 5 percent for yearling chinook and above 10 percent for sockeye until virtually the end of the outmigration. On July 6, an increase in subyearling chinook descaling prompted cleaning of trashracks in units 1 and 2 and slot 4A.

MODIFICATIONS FOR 1985

1. All ongoing and new modification and maintenance programs (e.g. replacement of orifice Ts, installation of raceway low-water alarms, repair of corroded flume screens, etc.), scheduled for completion by the onset of 1985 transportation/bypass operations, need to be accomplished as planned.

2. McNary needs a second auxiliary water supply line to alleviate water supply and fluctuation problems. Water level fluctuation and associated problems in the sample collection tanks would be reduced, and more water would be available for supplying fish attraction bars in the separator.

Further, as additional holding capacity becomes necessary at McNary, a new water source could supply some if not all of its needs.

3. To reduce surging and turbulence in and across the separator, a water elimination system in the upwell is required. The system could enhance separation by providing a calmer surface in the separator. It also would allow lower pressure settings in the pinch valve, which would reduce the potential for debris blockage and associated descaling.

4. Changes are needed in the separator outfall to facilitate passage of large fish entering the collection system (e.g. steelhead kelts, sturgeon, suckers, and shad). The outfall slope should be increased and the opening from the outfall floor enlarged. Further, the loose rubber flap that pads the outfall floor, and under which fish often become trapped, needs to be permanently fastened in place.

5. Holding and transporting kelts needs to be evaluated. Transport may benefit this segment of the steelhead population just as it does the smolts, therefore, some effort on their behalf should be initiated.

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Appendix Tables 1-11

Appendix Table 1.-- Daily Collection Counts of Chinook, Coho, Steelhead, and Sockeye, Facility Mortalities, and Daily River Flows and Spills During 1984, at Lower Granite Dam.

DATE	YEARLING CHINOOK	SUB-YEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY		RIVER FLOW IN CFS	SPILL	
							NUMBER	PERCENT		TOTAL	PERCENT
Mar 31	1,588	0	0	141	35	1,764	4	.23	97,200	10,000	10.29
Apr 1	2,068	0	0	184	46	2,298	41	1.78	90,800	1,000	1.10
Apr 2	2,616	0	0	175	31	2,822	8	.28	96,300	10,800	11.21
Apr 3	2,875	0	0	192	34	3,101	31	1.00	90,400	14,900	16.48
Apr 4	3,053	0	0	176	36	3,265	13	.40	95,000	8,200	8.63
Apr 5	3,539	757	0	248	50	4,594	23	.50	89,600	9,900	11.05
Apr 6	4,580	938	0	332	71	5,921	23	.39	91,500	9,900	10.82
Apr 7	2,482	545	0	353	17	3,397	13	.38	101,600	9,900	9.74
Apr 8	3,623	850	0	426	54	4,953	13	.26	99,500	9,900	9.95
Apr 9	3,898	634	0	289	73	4,894	69	1.41	104,400	9,800	9.39
Apr 10	4,423	781	0	829	18	6,051	67	1.11	99,800	9,900	9.92
Apr 11	4,802	534	0	342	23	5,701	22	.39	102,800	9,700	9.44
Apr 12	5,528	826	0	465	21	6,840	21	.31	101,700	9,900	9.73
Apr 13	4,488	555	0	427	0	5,470	36	.66	101,300	9,800	9.67
Apr 14	4,532	560	0	431	0	5,523	36	.65	101,300	35,900	35.44
Apr 15	4,713	96	0	414	21	5,244	28	.53	102,400	49,100	47.95
Apr 16	5,507	545	0	520	6	6,578	6	.09	109,400	16,000	14.63
Apr 17	8,924	0	0	728	48	9,700	11	.11	134,600	42,100	31.28
Apr 18	14,174	143	0	997	15	15,329	7	.05	140,500	42,700	30.39
Apr 19	15,039	792	0	2,688	7	18,526	27	.15	143,700	38,400	26.72
Apr 20	17,704	543	0	5,459	24	23,735	15	.06	141,000	40,700	28.87
Apr 21	20,672	1,320	0	9,439	31	31,462	21	.07	141,900	49,700	35.02
Apr 22	20,203	842	0	7,249	20	28,314	2	.01	134,400	49,900	37.13
Apr 23	17,196	716	0	6,170	17	24,099	39	.16	132,600	51,300	38.69
Apr 24	21,711	443	0	8,331	31	30,516	24	.08	138,300	70,800	51.19
Apr 25	24,622	761	0	4,379	6	29,768	58	.19	134,400	58,700	43.68
Apr 26	40,555	4,011	0	9,560	24	54,150	95	.18	130,200	40,800	31.34
Apr 27	34,651	3,013	0	5,925	6	43,595	107	.25	126,400	44,000	34.81
Apr 28	34,921	5,218	0	14,824	52	55,015	42	.08	111,100	25,200	22.68
Apr 29	31,937	2,404	0	11,486	38	45,865	143	.31	119,000	25,900	21.76
Apr 30	26,495	1,395	0	13,820	42	41,752	11	.03	117,600	13,400	11.39
May 1	22,522	460	0	13,989	37	37,008	16	.04	90,200	10,000	11.09
May 2	68,781	5,981	0	18,831	94	93,687	252	.27	104,800	20,200	19.27
May 3	13,572	277	0	5,712	0	19,561	60	.31	97,300	13,500	13.87
May 4	12,953	975	0	21,962	108	36,003	20	.06	111,500	33,300	29.87
May 5	16,530	689	0	13,802	45	31,066	32	.10	97,900	24,300	24.82
May 6	25,002	1,042	0	22,359	80	48,483	48	.10	118,300	32,200	27.22
May 7	14,226	593	0	33,231	96	48,146	113	.23	111,500	22,600	20.27
May 8	7,782	79	0	27,392	74	35,327	16	.05	111,400	31,200	28.01
May 9	8,400	171	0	25,712	78	34,361	10	.03	118,700	30,500	25.70
May 10	12,992	684	0	36,115	30	49,821	144	.29	123,200	33,300	27.03
May 11	9,071	683	0	26,884	114	36,752	115	.31	120,700	0	0.00
May 12	15,154	631	0	34,249	51	50,085	40	.08	122,100	3,300	2.70
May 13	12,208	1,062	0	36,453	32	49,755	172	.35	131,900	11,500	8.72
May 14	17,202	351	0	63,760	83	81,396	83	.10	156,800	38,200	24.36
May 15	14,535	1,264	0	79,282	95	95,176	306	.32	194,400	80,900	41.62
May 16	10,721	332	0	49,557	122	60,732	148	.24	200,400	79,300	39.57
May 17	9,318	701	0	80,195	45	90,259	209	.23	186,300	60,500	32.47

Appendix Table 1.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
May 18	6,363	406	0	49,679	147	56,595	34	.06	172,600	46,300	26.83
May 19	7,087	788	0	32,734	137	40,746	9	.02	158,400	32,000	20.20
May 20	5,497	1,126	0	22,104	83	28,810	5	.02	166,500	40,900	24.56
May 21	4,534	1,064	13	20,484	65	26,160	33	.13	188,600	69,400	36.80
May 22	4,469	1,335	0	32,077	429	38,310	61	.16	189,000	64,500	34.13
May 23	3,385	1,129	29	18,288	304	23,135	20	.09	182,800	59,900	32.77
May 24	2,934	683	0	20,007	269	23,898	51	.21	197,000	74,800	37.97
May 25	3,305	494	11	21,317	445	25,572	23	.09	186,700	66,500	35.62
May 26	1,948	720	0	14,626	223	17,517	45	.26	176,300	55,500	31.48
May 27	1,998	438	22	11,609	161	14,228	48	.34	180,200	55,900	31.02
May 28	1,823	484	16	11,410	342	14,075	42	.30	180,000	56,300	31.28
May 29	2,027	476	17	14,504	120	17,144	21	.12	182,400	60,400	33.11
May 30	1,711	540	13	13,193	252	15,709	34	.22	205,400	80,100	39.00
May 31	735	195	11	6,724	95	7,760	4	.05	247,900	122,000	49.21
Jun 1	1,738	237	7	9,549	86	11,617	57	.49	229,000	103,200	45.07
Jun 2	1,803	223	0	12,357	135	14,518	39	.27	208,800	82,000	39.27
Jun 3	1,892	565	0	10,023	88	12,573	33	.26	196,200	68,900	35.12
Jun 4	1,199	539	12	7,098	90	8,938	25	.28	182,800	56,200	30.74
Jun 5	1,189	418	0	4,998	116	6,721	30	.45	183,100	54,200	29.60
Jun 6	1,320	464	0	6,403	356	8,543	28	.33	183,500	54,800	29.86
Jun 7	727	269	0	4,733	200	5,929	94	1.59	180,400	51,500	28.55
Jun 8	1,345	358	22	5,298	195	7,218	31	.43	185,800	58,900	31.70
Jun 9	888	251	0	4,323	331	5,793	65	1.12	178,400	52,800	29.60
Jun 10	1,047	215	0	5,077	136	6,475	54	.83	171,600	44,600	25.99
Jun 11	1,255	441	0	4,450	310	6,456	71	1.10	166,300	38,000	22.85
Jun 12	1,421	231	0	4,226	305	6,183	40	.65	169,500	40,400	23.83
Jun 13	1,772	796	8	4,959	515	8,050	88	1.09	173,700	45,600	26.25
Jun 14	1,840	614	24	4,915	324	7,717	57	.74	178,000	51,400	28.88
Jun 15	1,383	778	8	3,434	140	5,743	88	1.53	182,000	55,900	30.71
Jun 16	3,658	3,659	25	4,816	314	12,472	113	.91	191,900	76,900	40.07
Jun 17	3,216	3,090	0	4,215	183	10,704	78	.73	196,500	97,300	49.52
Jun 18	1,515	3,219	0	1,926	187	6,847	85	1.24	197,400	75,600	38.30
Jun 19	3,835	959	0	2,274	259	7,327	246	3.36	191,000	80,100	41.94
Jun 20	3,600	1,075	0	2,165	242	7,082	57	.80	187,200	72,000	38.46
Jun 21	1,932	1,134	0	2,166	133	5,365	33	.62	205,400	88,000	42.84
Jun 22	1,463	1,297	0	2,209	139	5,108	25	.49	213,000	87,500	41.08
Jun 23	3,235	913	0	2,241	172	6,561	29	.44	186,200	60,400	32.44
Jun 24	1,808	1,738	0	1,507	52	5,105	80	1.57	178,200	53,000	29.74
Jun 25	2,779	1,776	18	1,469	120	6,162	22	.36	179,600	52,900	29.45
Jun 26	2,330	777	0	1,611	79	4,797	39	.81	183,300	58,300	31.81
Jun 27	2,400	933	0	920	128	4,381	31	.71	177,600	53,600	30.18
Jun 28	3,406	748	0	1,153	114	5,421	59	1.09	172,700	59,600	34.51
Jun 29	2,000	1,174	0	1,034	32	4,240	50	1.18	167,400	50,300	30.05
Jun 30	2,022	1,292	0	696	193	4,203	56	1.33	152,600	36,700	24.05
Jul 1	1,158	1,255	0	776	63	3,252	19	.58	134,900	33,400	24.76
Jul 2	1,126	1,321	0	710	25	3,182	48	1.51	126,500	30,900	24.43
Jul 3	513	534	0	534	41	1,622	16	.99	108,200	6,400	5.91
Jul 4	958	921	0	574	63	2,516	110	4.37	113,500	28,000	24.67

Appendix Table 1.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
Jul 5	720	590	0	322	24	1,656	17	1.03	107,300	19,000	17.71
Jul 6	760	506	0	461	8	1,735	22	1.27	99,800	0	0.00
Jul 7	1,749	901	0	482	0	3,132	16	.51	100,800	0	0.00
Jul 8	2,087	733	0	403	0	3,223	31	.96	90,000	0	0.00
Jul 9	2,324	1,093	0	301	11	3,729	24	.64	84,700	0	0.00
Jul 10	3,335	1,570	0	603	0	5,508	37	.67	78,900	0	0.00
Jul 11	2,738	684	0	315	11	3,748	17	.45	77,300	0	0.00
Jul 12	1,504	614	0	326	9	2,453	20	.82	71,800	0	0.00
Jul 13	1,513	378	0	265	13	2,169	13	.60	69,200	0	0.00
Jul 14	1,389	226	0	132	9	1,756	17	.97	64,700	0	0.00
Jul 15	1,754	217	0	192	0	2,163	16	.74	47,200	0	0.00
Jul 16	1,361	151	0	212	16	1,740	31	1.78	58,100	0	0.00
Jul 17	1,083	76	0	126	13	1,298	7	.54	56,300	0	0.00
Jul 18	1,580	49	0	95	0	1,724	14	.81	41,900	0	0.00
Jul 19	1,312	55	0	76	9	1,452	14	.96	53,000	0	0.00
Jul 20	1,343	27	0	57	0	1,427	21	1.47	42,700	0	0.00
Jul 21	878	26	0	39	0	943	15	1.59	39,300	0	0.00
Jul 22	1,510	15	0	69	0	1,594	25	1.57	39,100	0	0.00
Jul 23	880	62	0	40	10	992	9	.91	28,800	0	0.00
Jul 24	1,147	308	0	67	0	1,522	14	.92	38,400	0	0.00
Jul 25	694	7	0	53	0	754	5	.66	42,900	0	0.00
Jul 26	989	52	0	20	0	1,061	9	.85	42,000	0	0.00
TOTAL	828,332	97,639	256	1,114,740	11,152	2,052,119	5,660	.28			

APPENDIX TABLE 2.-- 1984 TRUCK TRANSPORTATION REPORT
AT LOWER GRANITE

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
1/ 4	3,637	0	0	322	58	4,017	3,637	0	0	322	58	4,017
2/ 4	0	0	0	0	0	0	3,637	0	0	322	58	4,017
3/ 4	5,475	0	0	364	45	5,884	9,112	0	0	686	103	9,901
4/ 4	0	0	0	0	0	0	9,112	0	0	686	103	9,901
5/ 4	6,571	757	0	423	72	7,823	15,683	757	0	1,109	175	17,724
6/ 4	0	0	0	0	0	0	15,683	757	0	1,109	175	17,724
7/ 4	7,042	1,483	0	678	80	9,283	22,725	2,240	0	1,787	255	27,007
8/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
9/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
10/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
11/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
12/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
13/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
14/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
15/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
16/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
17/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
18/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
19/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
20/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
21/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
22/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
23/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
24/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
25/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
26/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
27/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
28/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
29/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
30/ 4	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
1/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
2/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
3/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
4/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
5/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
6/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
7/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
8/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
9/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
10/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
11/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
12/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
13/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
14/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
15/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
16/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
17/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
18/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007

APPENDIX TABLE 2.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
19/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
20/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
21/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
22/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
23/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
24/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
25/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
26/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
27/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
28/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
29/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
30/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
31/ 5	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
1/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
2/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
3/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
4/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
5/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
6/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
7/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
8/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
9/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
10/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
11/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
12/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
13/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
14/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
15/ 6	0	0	0	0	0	0	22,725	2,240	0	1,787	255	27,007
16/ 6	3,618	3,615	25	4,802	299	12,359	26,343	5,855	25	6,589	554	39,366
17/ 6	3,195	3,047	0	4,204	180	10,626	29,538	8,902	25	10,793	734	49,992
18/ 6	1,464	3,204	0	1,921	173	6,762	31,002	12,106	25	12,714	907	56,754
19/ 6	3,766	879	0	2,226	210	7,081	34,768	12,985	25	14,940	1,117	63,835
20/ 6	3,580	1,048	0	2,163	234	7,025	38,348	14,033	25	17,103	1,351	70,860
21/ 6	1,921	1,124	0	2,159	128	5,332	40,269	15,157	25	19,262	1,479	76,192
22/ 6	1,456	1,282	0	2,206	139	5,083	41,725	16,439	25	21,468	1,618	81,275
23/ 6	0	0	0	0	0	0	41,725	16,439	25	21,468	1,618	81,275
24/ 6	5,003	2,607	0	3,740	207	11,557	46,728	19,046	25	25,208	1,825	92,832
25/ 6	0	0	0	0	0	0	46,728	19,046	25	25,208	1,825	92,832
26/ 6	5,088	2,531	18	3,073	188	10,898	51,816	21,577	43	28,281	2,013	103,730
27/ 6	0	0	0	0	0	0	51,816	21,577	43	28,281	2,013	103,730
28/ 6	5,787	1,645	0	2,053	227	9,712	57,603	23,222	43	30,334	2,240	113,442
29/ 6	0	0	0	0	0	0	57,603	23,222	43	30,334	2,240	113,442
30/ 6	3,985	2,432	0	1,705	215	8,337	61,588	25,654	43	32,039	2,455	121,779
1/ 7	0	0	0	0	0	0	61,588	25,654	43	32,039	2,455	121,779
2/ 7	2,262	2,557	0	1,471	77	6,367	63,850	28,211	43	33,510	2,532	128,146
3/ 7	0	0	0	0	0	0	63,850	28,211	43	33,510	2,532	128,146
4/ 7	1,434	1,414	0	1,083	81	4,012	65,284	29,625	43	34,593	2,613	132,158
5/ 7	0	0	0	0	0	0	65,284	29,625	43	34,593	2,613	132,158
6/ 7	1,468	1,084	0	771	29	3,352	66,752	30,709	43	35,364	2,642	135,510

APPENDIX TABLE 2.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
7/ 7	0	0	0	0	0	0	66,752	30,709	43	35,364	2,642	135,510
8/ 7	3,823	1,611	0	878	0	6,312	70,575	32,320	43	36,242	2,642	141,822
9/ 7	0	0	0	0	0	0	70,575	32,320	43	36,242	2,642	141,822
10/ 7	5,632	2,652	0	888	0	9,172	76,207	34,972	43	37,130	2,642	150,994
11/ 7	0	0	0	0	0	0	76,207	34,972	43	37,130	2,642	150,994
12/ 7	4,232	1,282	0	634	16	6,164	80,439	36,254	43	37,764	2,658	157,158
13/ 7	0	0	0	0	0	0	80,439	36,254	43	37,764	2,658	157,158
14/ 7	2,896	587	0	392	20	3,895	83,335	36,841	43	38,156	2,678	161,053
15/ 7	0	0	0	0	0	0	83,335	36,841	43	38,156	2,678	161,053
16/ 7	3,101	357	0	385	13	3,856	86,436	37,198	43	38,541	2,691	164,909
17/ 7	0	0	0	0	0	0	86,436	37,198	43	38,541	2,691	164,909
18/ 7	2,656	115	0	219	11	3,001	89,092	37,313	43	38,760	2,702	167,910
19/ 7	0	0	0	0	0	0	89,092	37,313	43	38,760	2,702	167,910
20/ 7	2,645	69	0	123	7	2,844	91,737	37,382	43	38,883	2,709	170,754
21/ 7	0	0	0	0	0	0	91,737	37,382	43	38,883	2,709	170,754
22/ 7	2,375	26	0	101	0	2,502	94,112	37,408	43	38,984	2,709	173,256
23/ 7	0	0	0	0	0	0	94,112	37,408	43	38,984	2,709	173,256
24/ 7	2,014	364	0	104	4	2,486	96,126	37,772	43	39,088	2,713	175,742
25/ 7	0	0	0	0	0	0	96,126	37,772	43	39,088	2,713	175,742
26/ 7	1,681	51	0	69	0	1,801	97,807	37,823	43	39,157	2,713	177,543

APPENDIX TABLE 3.-- 1984 BARGE TRANSPORTATION REPORT
AT LOWER GRANITE

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
11/ 4	16,628	2,799	0	1,852	149	21,428	16,628	2,799	0	1,852	149	21,428
12/ 4	0	0	0	0	0	0	16,628	2,799	0	1,852	149	21,428
13/ 4	0	0	0	0	0	0	16,628	2,799	0	1,852	149	21,428
14/ 4	0	0	0	0	0	0	16,628	2,799	0	1,852	149	21,428
15/ 4	19,144	2,037	0	1,733	42	22,956	35,772	4,836	0	3,585	191	44,384
16/ 4	0	0	0	0	0	0	35,772	4,836	0	3,585	191	44,384
17/ 4	0	0	0	0	0	0	35,772	4,836	0	3,585	191	44,384
18/ 4	0	0	0	0	0	0	35,772	4,836	0	3,585	191	44,384
19/ 4	43,598	1,480	0	4,929	75	50,082	79,370	6,316	0	8,514	266	94,466
20/ 4	0	0	0	0	0	0	79,370	6,316	0	8,514	266	94,466
21/ 4	38,344	1,868	0	14,894	55	55,161	117,714	8,184	0	23,408	321	149,627
22/ 4	0	0	0	0	0	0	117,714	8,184	0	23,408	321	149,627
23/ 4	37,360	1,558	0	13,417	37	52,372	155,074	9,742	0	36,825	358	201,999
24/ 4	0	0	0	0	0	0	155,074	9,742	0	36,825	358	201,999
25/ 4	46,252	1,204	0	12,709	37	60,202	201,326	10,946	0	49,534	395	262,201
26/ 4	0	0	0	0	0	0	201,326	10,946	0	49,534	395	262,201
27/ 4	75,004	7,024	0	15,485	30	97,543	276,330	17,970	0	65,019	425	359,744
28/ 4	0	0	0	0	0	0	276,330	17,970	0	65,019	425	359,744
29/ 4	66,677	7,622	0	26,306	90	100,695	343,007	25,592	0	91,325	515	460,439
30/ 4	0	0	0	0	0	0	343,007	25,592	0	91,325	515	460,439
1/ 5	48,540	1,855	0	27,809	79	78,283	391,547	27,447	0	119,134	594	538,722
2/ 5	0	0	0	0	0	0	391,547	27,447	0	119,134	594	538,722
3/ 5	82,078	6,258	0	24,506	94	112,936	473,625	33,705	0	143,640	688	651,658
4/ 5	12,939	975	0	21,961	108	35,983	486,564	34,680	0	165,601	796	687,641
5/ 5	16,501	689	0	13,799	45	31,034	503,065	35,369	0	179,400	841	718,675
6/ 5	0	0	0	0	0	0	503,065	35,369	0	179,400	841	718,675
7/ 5	39,074	1,635	0	55,584	175	96,468	542,139	37,004	0	234,984	1,016	815,143
8/ 5	7,774	79	0	27,384	74	35,311	549,913	37,083	0	262,368	1,090	850,454
9/ 5	8,392	171	0	25,710	78	34,351	558,305	37,254	0	288,078	1,168	884,805
10/ 5	0	0	0	0	0	0	558,305	37,254	0	288,078	1,168	884,805
11/ 5	21,854	1,367	0	62,949	144	86,314	580,159	38,621	0	351,027	1,312	971,119
12/ 5	15,126	631	0	34,237	51	50,045	595,285	39,252	0	385,264	1,363	1,021,164
13/ 5	12,056	1,062	0	36,433	32	49,583	607,341	40,314	0	421,697	1,395	1,070,747
14/ 5	17,130	351	0	63,749	83	81,313	624,471	40,665	0	485,446	1,478	1,152,060
15/ 5	14,261	1,264	0	79,251	94	94,870	638,732	41,929	0	564,697	1,572	1,246,930
16/ 5	0	0	0	0	0	0	638,732	41,929	0	564,697	1,572	1,246,930
17/ 5	19,758	1,033	0	129,676	167	150,634	658,490	42,962	0	694,373	1,739	1,397,564
18/ 5	6,344	406	0	49,664	147	56,561	664,834	43,368	0	744,037	1,886	1,454,125
19/ 5	7,084	788	0	32,728	137	40,737	671,918	44,156	0	776,765	2,023	1,494,862
20/ 5	5,493	1,126	0	22,103	83	28,805	677,411	45,282	0	798,868	2,106	1,523,667
21/ 5	4,509	1,064	13	20,477	64	26,127	681,920	46,346	13	819,345	2,170	1,549,794
22/ 5	4,433	1,335	0	32,053	428	38,249	686,353	47,681	13	851,398	2,598	1,588,043
23/ 5	3,375	1,129	29	18,279	303	23,115	689,728	48,810	42	869,677	2,901	1,611,158
24/ 5	2,906	688	0	19,984	269	23,847	692,634	49,498	42	889,661	3,170	1,635,005
25/ 5	3,293	494	11	21,306	445	25,549	695,927	49,992	53	910,967	3,615	1,660,554
26/ 5	0	0	0	0	0	0	695,927	49,992	53	910,967	3,615	1,660,554
27/ 5	3,899	1,158	22	26,194	379	31,652	699,826	51,150	75	937,161	3,994	1,692,206
28/ 5	1,795	484	16	11,397	341	14,033	701,621	51,634	91	948,558	4,335	1,706,239

APPENDIX TABLE 3.-- Continued

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
29/ 5	0	0	0	0	0	0	701,621	51,634	91	948,558	4,335	1,706,239
30/ 5	3,721	1,016	30	27,666	366	32,799	705,342	52,650	121	976,224	4,701	1,739,038
31/ 5	0	0	0	0	0	0	705,342	52,650	121	976,224	4,701	1,739,038
1/ 6	2,456	424	18	16,241	177	19,316	707,798	53,074	139	992,465	4,878	1,758,354
2/ 6	0	0	0	0	0	0	707,798	53,074	139	992,465	4,878	1,758,354
3/ 6	3,677	773	0	22,351	218	27,019	711,475	53,847	139	1,014,816	5,096	1,785,373
4/ 6	0	0	0	0	0	0	711,475	53,847	139	1,014,816	5,096	1,785,373
5/ 6	2,378	948	12	12,067	199	15,604	713,853	54,795	151	1,026,883	5,295	1,800,977
6/ 6	0	0	0	0	0	0	713,853	54,795	151	1,026,883	5,295	1,800,977
7/ 6	1,997	713	0	11,095	545	14,350	715,850	55,508	151	1,037,978	5,840	1,815,327
8/ 6	0	0	0	0	0	0	715,850	55,508	151	1,037,978	5,840	1,815,327
9/ 6	2,204	589	22	9,595	505	12,915	718,054	56,097	173	1,047,573	6,345	1,828,242
10/ 6	0	0	0	0	0	0	718,054	56,097	173	1,047,573	6,345	1,828,242
11/ 6	2,271	644	0	9,474	417	12,806	720,325	56,741	173	1,057,047	6,762	1,841,048
12/ 6	0	0	0	0	0	0	720,325	56,741	173	1,057,047	6,762	1,841,048
13/ 6	3,151	1,004	8	9,154	797	14,114	723,476	57,745	181	1,066,201	7,559	1,855,162
14/ 6	0	0	0	0	0	0	723,476	57,745	181	1,066,201	7,559	1,855,162
15/ 6	3,181	1,357	32	8,317	428	13,315	726,657	59,102	213	1,074,518	7,987	1,868,477

Appendix Table 4.-- Daily Collection Counts of Chinook, Coho, Steelhead, and Sockeye, Facility Mortalities, and Daily River Flows and Spills During 1984, at Little Goose Dam.

DATE	YEARLING CHINOOK	SUB-YEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY		RIVER FLOW IN CFS	SPILL	
							NUMBER	PERCENT		TOTAL	PERCENT
Apr 3	8,178	4,552	0	2,739	126	15,595	9	.06	95,900	15,000	15.64
Apr 4	3,682	2,143	0	717	0	6,542	213	3.26	96,500	8,300	8.60
Apr 5	5,185	4,174	0	950	49	10,358	243	2.35	90,800	10,100	11.12
Apr 6	2,125	1,711	0	630	110	4,576	110	2.40	91,700	10,100	11.01
Apr 7	2,363	1,902	0	782	30	5,077	127	2.50	98,000	10,100	10.31
Apr 8	4,734	3,690	0	1,004	98	9,526	127	1.33	92,300	10,100	10.94
Apr 9	4,954	3,860	0	1,527	67	10,408	107	1.03	104,400	10,100	9.67
Apr 10	9,611	4,863	0	1,585	20	16,079	124	.77	98,700	10,100	10.23
Apr 11	6,392	3,235	0	1,130	0	10,757	190	1.77	100,100	10,000	9.99
Apr 12	4,930	2,495	0	3,123	104	10,652	92	.86	100,000	10,000	10.00
Apr 13	6,351	4,182	0	2,298	33	12,864	161	1.25	100,000	10,100	10.10
Apr 14	8,272	5,446	0	2,362	178	16,258	133	.82	98,500	36,800	37.36
Apr 15	4,740	3,121	0	718	0	8,579	150	1.75	104,700	50,900	48.62
Apr 16	6,770	2,221	0	814	121	9,926	110	1.11	110,900	15,000	13.53
Apr 17	7,911	2,595	0	1,310	73	11,889	124	1.04	131,700	33,500	25.44
Apr 18	14,382	4,717	0	2,134	69	21,302	197	.92	132,900	42,700	32.13
Apr 19	19,558	6,415	0	1,965	0	27,938	176	.63	140,900	42,400	30.09
Apr 20	17,686	5,743	0	6,212	0	29,641	247	.83	140,000	47,600	34.00
Apr 21	12,839	4,211	0	16,803	0	33,853	203	.60	138,400	50,800	36.71
Apr 22	8,285	2,717	0	18,605	0	29,607	173	.58	131,400	51,000	38.81
Apr 23	8,260	2,709	0	18,089	0	29,058	144	.50	133,400	46,100	34.56
Apr 24	7,585	1,245	0	22,231	0	31,061	151	.49	133,900	28,500	21.28
Apr 25	21,128	3,468	0	22,493	0	47,089	369	.78	133,500	34,000	25.47
Apr 26	33,353	5,475	0	18,999	117	57,944	429	.74	131,700	40,400	30.68
Apr 27	14,812	2,593	0	13,469	149	31,023	266	.86	125,300	38,700	30.89
Apr 28	15,469	2,709	0	13,026	41	31,245	211	.68	114,200	16,300	14.27
Apr 29	19,856	3,477	0	18,053	163	41,549	175	.42	116,600	23,100	19.81
Apr 30	27,409	4,799	0	25,702	0	57,910	240	.41	117,700	11,000	9.35
May 1	28,800	4,342	0	23,915	0	57,057	516	.90	100,000	10,000	10.00
May 2	29,101	4,387	0	15,969	0	49,457	224	.45	104,200	9,800	9.40
May 3	22,987	3,465	0	25,199	97	51,748	313	.60	94,800	13,200	13.92
May 4	19,576	4,562	0	25,668	0	49,806	206	.41	95,400	19,200	20.13
May 5	22,606	5,268	0	22,568	0	50,442	150	.30	102,800	18,000	17.51
May 6	22,444	5,230	0	24,434	0	52,108	151	.29	123,300	28,800	23.36
May 7	29,527	6,881	0	24,035	0	60,443	229	.38	107,300	18,200	16.96
May 8	29,738	4,132	0	28,987	0	62,857	238	.38	101,100	18,400	18.20
May 9	18,715	2,600	0	42,262	0	63,577	260	.41	119,300	18,600	15.59
May 10	22,404	3,113	0	35,166	0	60,683	247	.41	113,500	12,900	11.37
May 11	11,954	1,661	0	56,846	0	70,461	433	.61	121,200	11,900	9.82
May 12	17,710	1,071	0	48,720	0	67,501	665	.99	125,900	16,800	13.34
May 13	11,856	717	0	46,496	0	59,069	458	.78	131,100	24,500	18.69
May 14	13,684	827	0	45,770	0	60,281	421	.70	156,500	46,000	29.39
May 15	9,121	697	0	37,330	190	47,333	223	.47	192,200	80,600	41.94
May 16	5,566	425	0	51,596	0	57,587	202	.35	200,700	88,500	44.10
May 17	10,100	772	0	79,912	0	90,784	270	.30	184,300	72,800	39.50
May 18	5,171	814	0	95,652	0	101,637	403	.40	172,100	65,200	37.88
May 19	3,901	614	0	86,466	0	90,981	255	.28	157,500	46,400	29.46
May 20	9,389	1,478	0	70,292	509	81,668	238	.29	164,900	54,900	33.29

Appendix Table 4.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
May 21	5,529	870	0	48,476	0	54,875	142	.26	188,700	69,300	36.72
May 22	3,410	1,605	0	38,867	90	43,972	201	.46	188,500	58,200	30.88
May 23	3,760	1,770	0	40,220	378	46,128	146	.32	176,900	56,400	31.88
May 24	3,341	1,572	0	37,912	0	42,825	130	.30	197,500	68,100	34.48
May 25	2,826	2,408	0	31,938	611	37,783	172	.46	190,900	62,900	32.95
May 26	1,760	1,500	0	22,758	760	26,778	169	.63	175,100	40,300	23.02
May 27	1,906	1,623	0	23,613	1,176	28,318	312	1.10	164,500	31,100	18.91
May 28	2,526	2,152	0	31,818	557	37,053	185	.50	181,600	47,400	26.10
May 29	1,449	870	0	18,815	130	21,264	130	.61	179,600	45,200	25.17
May 30	1,538	923	0	21,880	0	24,341	109	.45	201,500	66,400	32.95
May 31	1,746	1,047	0	22,472	231	25,496	84	.33	248,000	112,800	45.48
Jun 1	1,583	950	0	21,409	348	24,290	87	.36	225,300	91,300	40.52
Jun 2	2,724	1,635	0	22,158	639	27,156	61	.22	209,900	73,800	35.16
Jun 3	2,009	1,206	0	23,660	367	27,242	191	.70	193,200	54,600	28.26
Jun 4	919	551	0	23,200	254	24,924	121	.49	178,200	43,400	24.35
Jun 5	1,605	535	0	17,481	121	19,742	152	.77	179,300	46,200	25.77
Jun 6	1,729	576	0	17,707	141	20,153	78	.39	179,800	50,800	28.25
Jun 7	1,269	423	0	14,200	81	15,973	150	.94	179,400	53,800	29.99
Jun 8	1,322	440	0	9,931	130	11,823	77	.65	185,600	52,300	28.18
Jun 9	895	298	0	6,453	0	7,646	52	.68	181,700	48,200	26.53
Jun 10	527	277	0	7,593	336	8,733	83	.95	171,000	37,600	21.99
Jun 11	1,814	412	0	10,267	270	12,763	192	1.50	166,600	35,800	21.49
Jun 12	1,445	386	0	5,973	192	7,996	85	1.06	162,500	30,900	19.02
Jun 13	1,900	304	0	6,860	333	9,397	181	1.93	167,000	29,700	17.78
Jun 14	1,953	733	0	7,853	152	10,691	128	1.20	175,200	46,200	26.37
Jun 15	2,715	1,115	0	6,097	163	10,090	85	.84	179,900	54,200	30.13
Jun 16	2,239	871	0	5,337	0	8,447	80	.95	188,800	70,800	37.50
Jun 17	1,414	2,326	0	4,940	134	8,814	74	.84	202,400	102,800	50.79
Jun 18	1,273	1,203	0	2,771	66	5,313	61	1.15	200,600	95,900	47.81
Jun 19	1,301	1,159	0	3,522	42	6,024	89	1.48	182,700	52,500	28.74
Jun 20	3,744	2,485	0	4,181	63	10,473	221	2.11	197,000	59,100	30.00
Jun 21	2,985	1,292	0	4,051	260	8,588	183	2.13	201,100	69,100	34.36
Jun 22	1,870	3,955	0	3,601	299	9,725	185	1.90	217,000	82,600	38.06
Jun 23	3,219	4,147	0	2,616	31	10,013	345	3.45	181,300	47,100	25.98
Jun 24	3,884	4,451	0	4,896	107	13,338	425	3.19	177,600	43,100	24.27
Jun 25	3,603	2,144	0	2,077	40	7,864	160	2.03	169,000	39,500	23.37
Jun 26	4,568	1,647	0	2,083	112	8,410	211	2.51	184,700	52,600	28.48
Jun 27	2,638	1,077	0	1,334	0	5,049	175	3.47	175,300	56,200	32.06
Jun 28	4,688	3,098	0	1,091	0	8,877	267	3.01	173,900	50,800	29.21
Jun 29	3,777	2,908	0	705	84	7,474	272	3.64	170,700	67,900	39.78
Jun 30	1,515	849	0	969	0	3,333	41	1.23	150,700	39,900	26.48
Jul 1	1,986	1,705	0	1,232	75	4,998	49	.98	132,700	35,100	26.45
Jul 2	2,780	1,376	0	559	82	4,797	49	1.02	116,000	24,100	20.78
Jul 3	3,454	1,835	0	415	65	5,769	129	2.24	109,500	0	0.00
Jul 4	3,118	1,943	0	358	22	5,441	52	.96	113,000	28,500	25.22
Jul 5	991	1,341	0	241	106	2,679	15	.56	109,700	19,000	17.32
Jul 6	1,911	1,453	0	554	37	3,955	30	.76	103,400	0	0.00
Jul 7	2,444	1,904	0	116	18	4,482	14	.31	100,100	0	0.00

Appendix Table 4.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
Jul 8	1,718	3,771	0	152	42	5,683	33	.58	94,700	0	0.00
Jul 9	1,371	2,914	0	132	55	4,472	20	.45	91,900	0	0.00
Jul 10	1,116	1,820	0	194	47	3,177	43	1.35	76,300	0	0.00
Jul 11	708	1,849	0	131	20	2,708	12	.44	76,800	0	0.00
Jul 12	703	1,861	0	131	0	2,695	41	1.52	67,200	0	0.00
Jul 13	943	1,098	0	18	18	2,077	25	1.20	73,300	0	0.00
Jul 14	619	1,123	0	83	16	1,841	46	2.50	68,900	0	0.00
Jul 15	823	833	0	61	10	1,727	22	1.27	37,100	0	0.00
Jul 16	967	745	0	68	0	1,780	41	2.30	66,800	0	0.00
Jul 17	1,295	710	0	122	0	2,127	26	1.22	61,700	0	0.00
Jul 18	1,401	484	0	42	0	1,927	49	2.54	34,900	0	0.00
Jul 19	693	322	0	24	0	1,039	4	.38	45,900	0	0.00
Jul 20	649	273	0	13	0	935	21	2.25	43,200	0	0.00
Jul 21	931	104	0	101	0	1,136	15	1.32	40,100	0	0.00
Jul 22	916	119	0	11	0	1,046	31	2.96	40,900	0	0.00
Jul 23	677	144	0	41	0	862	11	1.28	31,000	0	0.00
Jul 24	1,275	185	0	0	0	1,460	18	1.23	39,900	0	0.00
Jul 25	1,207	132	0	0	0	1,339	26	1.94	37,300	0	0.00
Jul 26	1,328	117	0	91	11	1,547	32	2.07	39,300	0	0.00
Jul 27	1,176	88	0	66	11	1,341	25	1.86	44,300	0	0.00
Jul 28	1,295	102	0	0	0	1,397	33	2.36	52,300	0	0.00
TOTAL	786,583	243,668	0	1,695,494	11,677	2,737,422	18,307	.67			

APPENDIX TABLE11.-- 1984 BYPASS REPORT
AT MCNARY

	DAILY #'S BYPASSED						ACCUM. #'S BYPASSED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
13/ 4	1,990	0	0	49	21	2,060	1,990	0	0	49	21	2,060
14/ 4	11,331	48	0	466	95	11,940	13,321	48	0	515	116	14,000
15/ 4	8,565	55	0	509	41	9,170	21,886	103	0	1,024	157	23,170
16/ 4	7,876	0	0	992	72	8,940	29,762	103	0	2,016	229	32,110
17/ 4	3,652	9	0	942	37	4,640	33,414	112	0	2,958	266	36,750
18/ 4	8,343	0	0	1,587	50	9,980	41,757	112	0	4,545	316	46,730
19/ 4	7,057	18	0	1,700	35	8,810	48,814	130	0	6,245	351	55,540
20/ 4	26,424	229	0	13,266	277	40,196	75,238	359	0	19,511	628	95,736
21/ 4	4,167	293	0	2,471	49	6,980	79,405	652	0	21,982	677	102,716
22/ 4	11,953	161	0	5,423	303	17,840	91,358	813	0	27,405	980	120,556
23/ 4	13,912	149	0	6,860	319	21,240	105,270	962	0	34,265	1,299	141,796
24/ 4	12,911	142	0	4,387	320	17,760	118,181	1,104	0	38,652	1,619	159,556
25/ 4	16,336	138	0	5,829	737	23,040	134,517	1,242	0	44,481	2,356	182,596
26/ 4	12,950	110	40	5,470	720	19,290	147,467	1,352	40	49,951	3,076	201,886
27/ 4	15,250	430	0	8,180	1,960	25,820	162,717	1,782	40	58,131	5,036	227,706
28/ 4	10,391	565	20	2,878	1,633	15,487	173,108	2,347	60	61,009	6,669	243,193
29/ 4	10,788	422	0	5,119	1,338	17,667	183,896	2,769	60	66,128	8,007	260,860
30/ 4	21,097	203	10	5,634	2,244	29,188	204,993	2,972	70	71,762	10,251	290,048
1/ 5	26,837	54	0	5,561	1,651	34,103	231,830	3,026	70	77,323	11,902	324,151
2/ 5	38,773	106	41	8,327	2,249	49,496	270,603	3,132	111	85,650	14,151	373,647
3/ 5	33,217	44	0	5,257	1,800	40,318	303,820	3,176	111	90,907	15,951	413,965
4/ 5	15,489	302	2	1,222	1,794	18,809	319,309	3,478	113	92,129	17,745	432,774
5/ 5	32,609	77	30	3,064	4,267	40,047	351,918	3,555	143	95,193	22,012	472,821
6/ 5	28,596	94	0	4,214	4,235	37,139	380,514	3,649	143	99,407	26,247	509,960
7/ 5	46,915	511	0	9,076	10,476	66,978	427,429	4,160	143	108,483	36,723	576,938
8/ 5	29,030	552	1	4,165	3,975	37,723	456,459	4,712	144	112,648	40,698	614,661
9/ 5	32,145	485	0	3,560	5,401	41,591	488,604	5,197	144	116,208	46,099	656,252
10/ 5	37,611	372	51	5,263	2,960	46,257	526,215	5,569	195	121,471	49,059	702,509
11/ 5	24,935	204	29	3,748	1,893	30,809	551,150	5,773	224	125,219	50,952	733,318
12/ 5	35,616	657	100	6,746	2,565	45,684	586,766	6,430	324	131,965	53,517	779,002
13/ 5	38,265	678	205	6,062	4,759	49,969	625,031	7,108	529	138,027	58,276	828,971
14/ 5	35,540	485	230	6,734	2,330	45,319	660,571	7,593	759	144,761	60,606	874,290
15/ 5	30,515	214	187	5,350	1,520	37,786	691,086	7,807	946	150,111	62,126	912,076
16/ 5	22,721	432	171	5,401	1,640	30,365	713,807	8,239	1,117	155,512	63,766	942,441
17/ 5	15,314	189	371	4,874	827	21,575	729,121	8,428	1,488	160,386	64,593	964,016
18/ 5	21,770	919	1,368	6,872	1,417	32,346	750,891	9,347	2,856	167,258	66,010	996,362
19/ 5	23,408	740	2,021	9,636	1,137	36,942	774,299	10,087	4,877	176,894	67,147	1,033,304
20/ 5	15,466	965	1,257	6,615	1,307	25,610	789,765	11,052	6,134	183,509	68,454	1,058,914
21/ 5	42,297	757	2,151	8,386	3,434	57,025	832,062	11,809	8,285	191,895	71,888	1,115,939
22/ 5	36,486	847	4,147	8,710	3,605	53,795	868,548	12,656	12,432	200,605	75,493	1,169,734
23/ 5	18,992	1,134	3,139	5,555	1,230	30,050	887,540	13,790	15,571	206,160	76,723	1,199,784
24/ 5	14,358	1,155	2,566	6,084	3,092	27,255	901,898	14,945	18,137	212,244	79,815	1,227,039
25/ 5	14,188	7,474	6,927	7,341	3,194	39,124	916,086	22,419	25,064	219,585	83,009	1,266,163
26/ 5	13,122	43,728	6,013	6,072	2,821	71,756	929,208	66,147	31,077	225,657	85,830	1,337,919
27/ 5	8,175	17,990	2,233	4,611	1,832	34,841	937,383	84,137	33,310	230,268	87,662	1,372,760
28/ 5	17,822	44,643	5,286	8,716	3,218	79,685	955,205	128,780	38,596	238,984	90,880	1,452,445
29/ 5	12,488	30,621	2,154	5,595	1,638	52,496	967,693	159,401	40,750	244,579	92,518	1,504,941

APPENDIX TABLE 5.-- 1984 TRUCK TRANSPORTATION REPORT
AT LITTLE GOOSE

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
5/ 4	5,717	3,624	0	1,084	40	10,465	5,717	3,624	0	1,084	40	10,465
6/ 4	0	0	0	0	0	0	5,717	3,624	0	1,084	40	10,465
7/ 4	2,340	1,484	0	1,015	72	4,911	8,057	5,108	0	2,099	112	15,376
8/ 4	0	0	0	0	0	0	8,057	5,108	0	2,099	112	15,376
9/ 4	5,923	3,052	0	1,903	109	10,987	13,980	8,160	0	4,002	221	26,363
10/ 4	0	0	0	0	0	0	13,980	8,160	0	4,002	221	26,363
11/ 4	0	0	0	0	0	0	13,980	8,160	0	4,002	221	26,363
12/ 4	0	0	0	0	0	0	13,980	8,160	0	4,002	221	26,363
13/ 4	4,625	2,479	0	2,869	47	10,020	18,605	10,639	0	6,871	268	36,383
14/ 4	0	0	0	0	0	0	18,605	10,639	0	6,871	268	36,383
15/ 4	0	0	0	0	0	0	18,605	10,639	0	6,871	268	36,383
16/ 4	0	0	0	0	0	0	18,605	10,639	0	6,871	268	36,383
17/ 4	6,548	1,389	0	1,288	54	9,279	25,153	12,028	0	8,159	322	45,662
18/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
19/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
20/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
21/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
22/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
23/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
24/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
25/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
26/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
27/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
28/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
29/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
30/ 4	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
1/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
2/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
3/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
4/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
5/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
6/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
7/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
8/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
9/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
10/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
11/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
12/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
13/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
14/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
15/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
16/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
17/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
18/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
19/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
20/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
21/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
22/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662

APPENDIX TABLE 5.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
23/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
24/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
25/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
26/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
27/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
28/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
29/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
30/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
31/ 5	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
1/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
2/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
3/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
4/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
5/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
6/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
7/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
8/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
9/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
10/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
11/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
12/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
13/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
14/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
15/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
16/ 6	0	0	0	0	0	0	25,153	12,028	0	8,159	322	45,662
17/ 6	1,921	747	0	4,631	0	7,299	27,074	12,775	0	12,790	322	52,961
18/ 6	1,436	2,362	0	5,083	126	9,007	28,510	15,137	0	17,873	448	61,968
19/ 6	1,227	1,160	0	2,720	57	5,164	29,737	16,297	0	20,593	505	67,132
20/ 6	0	0	0	0	0	0	29,737	16,297	0	20,593	505	67,132
21/ 6	3,342	2,469	0	5,764	33	11,608	33,079	18,766	0	26,357	538	78,740
22/ 6	4,447	1,924	0	6,176	367	12,914	37,526	20,690	0	32,533	905	91,654
23/ 6	1,881	3,980	0	3,731	295	9,887	39,407	24,670	0	36,264	1,200	101,541
24/ 6	3,695	4,760	0	3,131	26	11,612	43,102	29,430	0	39,395	1,226	113,153
25/ 6	3,055	3,051	0	4,044	79	10,229	46,157	32,481	0	43,439	1,305	123,382
26/ 6	3,101	1,845	0	1,826	29	6,801	49,258	34,326	0	45,265	1,334	130,183
27/ 6	6,664	2,055	0	3,125	75	11,919	55,922	36,381	0	48,390	1,409	142,102
28/ 6	0	0	0	0	0	0	55,922	36,381	0	48,390	1,409	142,102
29/ 6	5,934	3,923	0	1,432	0	11,289	61,856	40,304	0	49,822	1,409	153,391
30/ 6	0	0	0	0	0	0	61,856	40,304	0	49,822	1,409	153,391
1/ 7	4,525	3,358	0	1,099	73	9,055	66,381	43,662	0	50,921	1,482	162,446
2/ 7	0	0	0	0	0	0	66,381	43,662	0	50,921	1,482	162,446
3/ 7	5,135	2,901	0	1,479	158	9,673	71,516	46,563	0	52,400	1,640	172,119
4/ 7	6,182	3,553	0	734	84	10,553	77,698	50,116	0	53,134	1,724	182,672
5/ 7	0	0	0	0	0	0	77,698	50,116	0	53,134	1,724	182,672
6/ 7	0	0	0	0	0	0	77,698	50,116	0	53,134	1,724	182,672
7/ 7	2,942	2,977	0	806	168	6,893	80,640	53,093	0	53,940	1,892	189,565
8/ 7	0	0	0	0	0	0	80,640	53,093	0	53,940	1,892	189,565
9/ 7	4,357	5,754	0	273	54	10,438	84,997	58,847	0	54,213	1,946	200,003
10/ 7	0	0	0	0	0	0	84,997	58,847	0	54,213	1,946	200,003

APPENDIX TABLE 5.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
11/ 7	2,452	4,736	0	306	102	7,596	87,449	63,583	0	54,519	2,048	207,599
12/ 7	0	0	0	0	0	0	87,449	63,583	0	54,519	2,048	207,599
13/ 7	1,332	3,496	0	249	16	5,093	88,781	67,079	0	54,768	2,064	212,692
14/ 7	0	0	0	0	0	0	88,781	67,079	0	54,768	2,064	212,692
15/ 7	1,461	2,230	0	121	32	3,844	90,242	69,309	0	54,889	2,096	216,536
16/ 7	0	0	0	0	0	0	90,242	69,309	0	54,889	2,096	216,536
17/ 7	1,740	1,537	0	122	10	3,409	91,982	70,846	0	55,011	2,106	219,945
18/ 7	0	0	0	0	0	0	91,982	70,846	0	55,011	2,106	219,945
19/ 7	2,666	1,159	0	158	0	3,983	94,648	72,005	0	55,169	2,106	223,928
20/ 7	1,298	494	0	36	0	1,828	95,946	72,499	0	55,205	2,106	225,756
21/ 7	0	0	0	0	0	0	95,946	72,499	0	55,205	2,106	225,756
22/ 7	0	0	0	0	0	0	95,946	72,499	0	55,205	2,106	225,756
23/ 7	1,916	232	0	96	0	2,244	97,862	72,731	0	55,301	2,106	228,000
24/ 7	0	0	0	0	0	0	97,862	72,731	0	55,301	2,106	228,000
25/ 7	1,934	323	0	40	0	2,297	99,796	73,054	0	55,341	2,106	230,297
26/ 7	0	0	0	0	0	0	99,796	73,054	0	55,341	2,106	230,297
27/ 7	2,516	207	0	101	16	2,840	102,312	73,261	0	55,442	2,122	233,137
28/ 7	2,418	185	0	64	11	2,678	104,730	73,446	0	55,506	2,133	235,815

APPENDIX TABLE 6.-- 1984 BARGE TRANSPORTATION REPORT
AT LITTLE GOOSE

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
12/ 4	10,388	4,020	0	2,340	0	16,748	10,388	4,020	0	2,340	0	16,748
13/ 4	0	0	0	0	0	0	10,388	4,020	0	2,340	0	16,748
14/ 4	0	0	0	0	0	0	10,388	4,020	0	2,340	0	16,748
15/ 4	0	0	0	0	0	0	10,388	4,020	0	2,340	0	16,748
16/ 4	7,951	4,262	0	3,033	97	15,343	18,339	8,282	0	5,373	97	32,091
17/ 4	0	0	0	0	0	0	18,339	8,282	0	5,373	97	32,091
18/ 4	0	0	0	0	0	0	18,339	8,282	0	5,373	97	32,091
19/ 4	0	0	0	0	0	0	18,339	8,282	0	5,373	97	32,091
20/ 4	24,653	5,230	0	2,986	20	32,889	42,992	13,512	0	8,359	117	64,980
21/ 4	0	0	0	0	0	0	42,992	13,512	0	8,359	117	64,980
22/ 4	18,505	3,925	0	16,899	0	39,329	61,497	17,437	0	25,258	117	104,309
23/ 4	0	0	0	0	0	0	61,497	17,437	0	25,258	117	104,309
24/ 4	8,901	1,888	0	28,380	0	39,169	70,398	19,325	0	53,638	117	143,478
25/ 4	0	0	0	0	0	0	70,398	19,325	0	53,638	117	143,478
26/ 4	17,611	1,065	0	36,618	0	55,294	88,009	20,390	0	90,256	117	198,772
27/ 4	0	0	0	0	0	0	88,009	20,390	0	90,256	117	198,772
28/ 4	24,224	4,275	0	29,522	310	58,331	112,233	24,665	0	119,778	427	257,103
29/ 4	0	0	0	0	0	0	112,233	24,665	0	119,778	427	257,103
30/ 4	15,320	2,703	0	28,479	99	46,601	127,553	27,368	0	148,257	526	303,704
1/ 5	0	0	0	0	0	0	127,553	27,368	0	148,257	526	303,704
2/ 5	27,478	3,782	0	42,234	0	73,494	155,031	31,150	0	190,491	526	377,198
3/ 5	0	0	0	0	0	0	155,031	31,150	0	190,491	526	377,198
4/ 5	22,330	3,074	0	40,858	83	66,345	177,361	34,224	0	231,349	609	443,543
5/ 5	7,361	1,783	0	19,450	0	28,594	184,722	36,007	0	250,799	609	472,137
6/ 5	9,757	2,363	0	19,082	0	31,202	194,479	38,370	0	269,881	609	503,339
7/ 5	0	0	0	0	0	0	194,479	38,370	0	269,881	609	503,339
8/ 5	24,301	5,886	0	43,670	0	73,857	218,780	44,256	0	313,551	609	577,196
9/ 5	12,959	2,826	0	29,262	0	45,047	231,739	47,082	0	342,813	609	622,243
10/ 5	11,271	2,457	0	38,706	0	52,434	243,010	49,539	0	381,519	609	674,677
11/ 5	0	0	0	0	0	0	243,010	49,539	0	381,519	609	674,677
12/ 5	9,602	2,094	0	36,343	0	48,039	252,612	51,633	0	417,862	609	722,716
13/ 5	16,646	1,158	0	98,083	0	115,887	269,258	52,791	0	515,945	609	838,603
14/ 5	11,425	691	0	43,136	0	55,252	280,683	53,482	0	559,081	609	893,855
15/ 5	14,016	847	0	46,878	122	61,863	294,699	54,329	0	605,959	731	955,718
16/ 5	5,951	455	0	43,881	47	50,334	300,650	54,784	0	649,840	778	1,006,052
17/ 5	7,015	536	0	61,453	0	69,004	307,665	55,320	0	711,293	778	1,075,056
18/ 5	7,121	544	0	102,729	0	110,394	314,786	55,864	0	814,022	778	1,185,450
19/ 5	3,205	505	0	65,770	0	69,430	317,991	56,369	0	879,792	778	1,254,930
20/ 5	5,345	841	0	84,242	133	90,561	323,336	57,210	0	964,034	911	1,345,491
21/ 5	8,388	1,320	0	64,668	414	74,790	331,724	58,530	0	1,028,702	1,325	1,420,281
22/ 5	5,601	882	0	50,260	41	56,784	337,325	59,412	0	1,078,962	1,366	1,477,065
23/ 5	3,501	1,648	0	40,500	174	45,823	340,826	61,060	0	1,119,462	1,540	1,522,888
24/ 5	3,410	1,604	0	37,286	279	42,579	344,236	62,664	0	1,156,748	1,819	1,565,467
25/ 5	2,760	2,351	0	35,547	305	40,963	346,996	65,015	0	1,192,295	2,124	1,606,430
26/ 5	2,718	2,315	0	32,001	689	37,723	349,714	67,330	0	1,224,296	2,813	1,644,153
27/ 5	0	0	0	0	0	0	349,714	67,330	0	1,224,296	2,813	1,644,153
28/ 5	3,645	3,105	0	47,637	1,787	56,174	353,359	70,435	0	1,271,933	4,600	1,700,327
29/ 5	2,002	1,705	0	27,876	325	31,908	355,361	72,140	0	1,299,809	4,925	1,732,235

APPENDIX TABLE 6.-- Continued

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
30/ 5	0	0	0	0	0	0	355,361	72,140	0	1,299,809	4,925	1,732,235
31/ 5	3,014	1,808	0	41,188	233	46,243	358,375	73,948	0	1,340,997	5,158	1,778,478
1/ 6	0	0	0	0	0	0	358,375	73,948	0	1,340,997	5,158	1,778,478
2/ 6	3,174	1,904	0	42,648	614	48,340	361,549	75,852	0	1,383,645	5,772	1,826,818
3/ 6	0	0	0	0	0	0	361,549	75,852	0	1,383,645	5,772	1,826,818
4/ 6	4,204	2,523	0	46,556	895	54,178	365,753	78,375	0	1,430,201	6,667	1,880,996
5/ 6	0	0	0	0	0	0	365,753	78,375	0	1,430,201	6,667	1,880,996
6/ 6	2,740	914	0	40,468	344	44,466	368,493	79,289	0	1,470,669	7,011	1,925,462
7/ 6	0	0	0	0	0	0	368,493	79,289	0	1,470,669	7,011	1,925,462
8/ 6	2,959	987	0	32,788	165	36,899	371,452	80,276	0	1,503,457	7,176	1,962,361
9/ 6	0	0	0	0	0	0	371,452	80,276	0	1,503,457	7,176	1,962,361
10/ 6	1,836	612	0	13,731	66	16,245	373,288	80,888	0	1,517,188	7,242	1,978,606
11/ 6	0	0	0	0	0	0	373,288	80,888	0	1,517,188	7,242	1,978,606
12/ 6	2,349	717	0	18,386	548	22,000	375,637	81,605	0	1,535,574	7,790	2,000,606
13/ 6	0	0	0	0	0	0	375,637	81,605	0	1,535,574	7,790	2,000,606
14/ 6	3,343	618	0	13,011	480	17,452	378,980	82,223	0	1,548,585	8,270	2,018,058
15/ 6	0	0	0	0	0	0	378,980	82,223	0	1,548,585	8,270	2,018,058
16/ 6	4,789	1,927	0	13,458	260	20,434	383,769	84,150	0	1,562,043	8,530	2,038,492

APPENDIX TABLE 7.-- 1984 BYPASS REPORT
AT LITTLE GOOSE

	DAILY #'S BYPASSED						ACCUM. #'S BYPASSED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
3/ 4	8,178	4,552	0	2,739	126	15,595	8,178	4,552	0	2,739	126	15,595
4/ 4	927	849	0	226	0	2,002	9,105	5,401	0	2,965	126	17,597
5/ 4	1,711	2,269	0	232	0	4,212	10,816	7,670	0	3,197	126	21,809
6/ 4	640	849	0	233	0	1,722	11,456	8,519	0	3,430	126	23,531
7/ 4	928	1,229	0	132	30	2,319	12,384	9,748	0	3,562	156	25,850
8/ 4	1,905	2,337	0	186	19	4,447	14,289	12,085	0	3,748	175	30,297
9/ 4	1,652	2,028	0	430	30	4,140	15,941	14,113	0	4,178	205	34,437
10/ 4	3,872	2,528	0	268	20	6,688	19,813	16,641	0	4,446	225	41,125
11/ 4	2,894	1,890	0	374	0	5,158	22,707	18,531	0	4,820	225	46,283
12/ 4	2,028	1,324	0	784	52	4,188	24,735	19,855	0	5,604	277	50,471
13/ 4	2,970	2,499	0	724	0	6,193	27,705	22,354	0	6,328	277	56,664
14/ 4	4,755	2,549	0	611	121	8,036	32,460	24,903	0	6,939	398	64,700
15/ 4	1,971	1,659	0	329	0	3,959	34,431	26,562	0	7,268	398	68,659
16/ 4	2,991	1,258	0	211	83	4,543	37,422	27,820	0	7,479	481	73,202
17/ 4	3,289	1,383	0	276	45	4,993	40,711	29,203	0	7,755	526	78,195
18/ 4	5,731	2,409	0	579	44	8,763	46,442	31,612	0	8,334	570	86,958
19/ 4	7,667	3,223	0	795	0	11,685	54,109	34,835	0	9,129	570	98,643
20/ 4	7,609	3,199	0	1,161	0	11,969	61,718	38,034	0	10,290	570	110,612
21/ 4	5,462	2,297	0	4,688	0	12,447	67,180	40,331	0	14,978	570	123,059
22/ 4	4,597	1,933	0	3,611	0	10,141	71,777	42,264	0	18,589	570	133,200
23/ 4	3,409	1,434	0	3,932	0	8,775	75,186	43,698	0	22,521	570	141,975
24/ 4	3,512	1,653	0	4,406	0	9,571	78,698	45,351	0	26,927	570	151,546
25/ 4	6,608	3,110	0	3,641	0	13,359	85,306	48,461	0	30,568	570	164,905
26/ 4	11,644	5,480	0	2,146	0	19,270	96,950	53,941	0	32,714	570	184,175
27/ 4	6,734	1,170	0	1,769	0	9,673	103,684	55,111	0	34,483	570	193,848
28/ 4	7,664	1,331	0	1,701	0	10,696	111,348	56,442	0	36,184	570	204,544
29/ 4	13,060	2,269	0	2,589	92	18,010	124,408	58,711	0	38,773	662	222,554
30/ 4	16,024	2,784	0	3,658	0	22,466	140,432	61,495	0	42,431	662	245,020
1/ 5	14,371	2,417	0	1,520	0	18,308	154,803	63,912	0	43,951	662	263,328
2/ 5	13,291	2,236	0	1,842	0	17,369	168,094	66,148	0	45,793	662	280,697
3/ 5	13,980	2,352	0	3,387	0	19,719	182,074	68,500	0	49,180	662	300,416
4/ 5	12,687	2,823	0	4,299	0	19,809	194,761	71,323	0	53,479	662	320,225
5/ 5	11,620	2,585	0	2,487	0	16,692	206,381	73,908	0	55,966	662	336,917
6/ 5	12,601	2,803	0	2,022	0	17,426	218,982	76,711	0	57,988	662	354,343
7/ 5	16,152	3,594	0	3,161	0	22,907	235,134	80,305	0	61,149	662	377,250
8/ 5	12,368	624	0	3,859	0	16,851	247,502	80,929	0	65,008	662	394,101
9/ 5	9,971	503	0	2,785	0	13,259	257,473	81,432	0	67,793	662	407,360
10/ 5	7,626	384	0	5,611	0	13,621	265,099	81,816	0	73,404	662	420,981
11/ 5	7,836	395	0	6,160	0	14,391	272,935	82,211	0	79,564	662	435,372
12/ 5	6,385	322	0	3,843	0	10,550	279,320	82,533	0	83,407	662	445,922

Appendix Table 8.-- Daily Collection Counts of Chinook, Coho, Steelhead, and Sockeye, Facility Mortalities, and Daily River Flows and Spills During 1984, at McNary Dam.

DATE	YEARLING CHINOOK	SUB-YEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
Apr 13	1,990	0	0	49	21	2,060	0	0.00	253,500	74,700	29.47
Apr 14	11,331	48	0	466	95	11,940	37	.31	228,800	52,400	22.90
Apr 15	19,445	42	0	1,203	125	20,820	41	.20	244,200	78,700	32.23
Apr 16	12,686	0	0	2,562	92	15,340	91	.59	242,600	65,300	26.92
Apr 17	6,156	9	0	2,161	84	8,410	51	.61	270,000	106,400	39.41
Apr 18	15,357	0	0	3,936	97	19,390	15	.08	298,100	121,400	40.72
Apr 19	13,781	22	0	8,019	88	21,910	48	.22	298,800	120,600	40.36
Apr 20	16,631	227	0	5,596	204	22,658	16	.07	302,100	127,700	42.27
Apr 21	4,167	293	0	2,471	49	6,980	9	.13	311,000	143,700	46.21
Apr 22	11,953	161	0	5,423	303	17,840	21	.12	312,000	140,500	45.03
Apr 23	13,912	149	0	6,860	319	21,240	18	.08	327,700	150,800	46.02
Apr 24	12,911	142	0	4,387	320	17,760	46	.26	304,500	129,800	42.63
Apr 25	16,336	138	0	5,829	737	23,040	15	.07	310,300	127,200	40.99
Apr 26	12,950	110	40	5,470	720	19,290	33	.17	320,400	137,200	42.82
Apr 27	15,250	430	0	8,180	1,960	25,820	30	.12	304,200	122,200	40.17
Apr 28	13,008	700	21	5,114	2,377	21,220	83	.39	272,600	90,500	33.20
Apr 29	13,290	620	0	7,270	2,040	23,220	142	.61	268,800	88,600	32.96
Apr 30	26,110	230	10	9,000	3,450	38,800	211	.54	273,700	91,100	33.28
May 1	31,130	90	0	8,720	2,650	42,590	137	.32	275,800	94,800	34.37
May 2	46,180	160	50	11,090	3,410	60,890	180	.30	275,700	93,800	34.02
May 3	42,249	52	0	6,324	3,214	51,839	132	.25	281,300	94,200	33.49
May 4	17,560	340	40	2,780	2,820	23,540	221	.94	259,100	68,500	26.44
May 5	38,990	140	30	7,870	7,300	54,330	170	.31	259,100	68,500	26.44
May 6	35,670	130	0	10,190	6,710	52,700	170	.32	262,500	61,300	23.35
May 7	58,968	643	0	31,413	16,189	107,213	262	.24	257,700	69,100	26.81
May 8	37,220	660	10	9,700	7,260	54,850	333	.61	255,200	75,800	29.70
May 9	39,840	620	0	8,060	8,920	57,440	189	.33	254,400	76,600	30.11
May 10	47,520	480	60	11,770	5,210	65,040	184	.28	303,200	121,300	40.01
May 11	33,710	240	110	9,760	3,540	47,360	124	.26	291,300	111,700	38.35
May 12	44,850	720	190	15,800	5,130	66,690	143	.21	269,300	89,800	33.35
May 13	50,730	750	340	14,720	10,240	76,780	203	.26	269,000	89,200	33.16
May 14	46,880	620	590	19,550	4,850	72,490	171	.24	284,800	102,700	36.06
May 15	37,580	520	340	11,920	2,510	52,870	146	.28	353,100	168,500	47.72
May 16	28,130	450	270	12,610	2,720	44,180	183	.41	367,700	181,900	49.47
May 17	20,300	270	830	14,180	1,520	37,100	62	.17	354,300	173,300	48.91
May 18	27,440	1,090	2,340	16,070	2,650	49,590	189	.38	314,900	137,700	43.73
May 19	29,780	1,100	3,560	22,290	1,920	58,650	214	.36	320,700	138,700	43.25
May 20	20,290	1,370	2,310	15,120	2,270	41,360	152	.37	299,600	120,100	40.09
May 21	56,400	1,000	3,690	20,680	5,900	87,670	233	.27	303,500	126,800	41.78
May 22	47,070	1,090	7,270	21,130	6,080	82,640	176	.21	355,300	172,600	48.58
May 23	24,050	1,440	4,840	13,610	2,040	45,980	201	.44	339,900	156,000	45.90
May 24	20,370	1,470	4,600	18,180	5,000	49,620	126	.25	329,200	158,100	48.03
May 25	18,130	10,300	11,850	19,140	5,030	64,450	68	.11	343,300	161,000	46.90
May 26	17,820	56,040	8,830	15,000	4,450	102,140	169	.17	330,200	145,900	44.19
May 27	10,920	23,030	3,880	14,070	2,840	54,740	142	.26	271,000	88,200	32.55
May 28	23,690	56,820	8,310	23,890	5,540	118,250	303	.26	275,300	98,800	35.89
May 29	16,231	37,669	3,263	14,414	2,706	74,283	169	.23	324,600	148,100	45.63
May 30	6,620	20,720	1,080	7,200	1,280	36,900	140	.38	348,600	166,300	47.71

Appendix Table 8.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
May 31	3,658	10,363	893	5,181	1,676	21,771	143	.66	417,000	230,700	55.32
Jun 1	2,950	13,290	800	6,340	1,540	24,920	91	.37	373,200	179,100	47.99
Jun 2	3,640	21,010	1,900	10,390	2,070	39,010	258	.66	320,900	118,600	36.96
Jun 3	2,140	12,620	1,160	8,440	1,490	25,850	193	.75	331,600	133,800	40.35
Jun 4	3,020	8,470	650	8,190	2,360	22,690	224	.99	323,700	149,200	46.09
Jun 5	2,410	4,820	960	6,900	1,150	16,240	108	.67	322,800	144,300	44.70
Jun 6	2,870	4,480	610	7,050	1,680	16,690	95	.57	326,400	152,700	46.78
Jun 7	1,570	6,380	1,190	4,430	1,500	15,070	90	.60	328,500	153,500	46.73
Jun 8	1,280	5,010	1,310	5,140	1,270	14,010	91	.65	329,400	150,700	45.75
Jun 9	1,670	4,220	510	4,450	1,770	12,620	139	1.10	317,300	133,800	42.17
Jun 10	2,300	6,750	520	5,200	640	15,410	131	1.17	317,300	135,200	42.61
Jun 11	1,000	3,200	320	2,690	500	7,710	113	1.47	263,900	85,200	32.28
Jun 12	1,350	3,520	300	2,870	530	8,570	137	1.60	298,700	124,300	41.61
Jun 13	930	4,530	120	2,170	480	8,230	51	.62	328,300	149,200	45.45
Jun 14	760	5,150	170	1,730	590	8,450	71	.84	300,300	120,700	40.19
Jun 15	780	6,650	140	2,020	690	10,280	53	.52	349,900	170,500	48.73
Jun 16	340	4,509	211	1,323	457	6,840	75	1.10	357,500	175,400	49.06
Jun 17	1,160	4,040	120	1,800	520	7,640	68	.89	370,100	191,700	51.80
Jun 18	660	20,740	180	1,200	660	23,440	141	.60	381,300	210,300	55.15
Jun 19	280	40,240	0	1,760	520	42,800	171	.40	373,100	191,500	51.33
Jun 20	360	65,220	100	1,440	580	67,700	360	.53	353,800	172,300	48.70
Jun 21	520	37,680	220	1,140	800	40,360	171	.42	382,600	206,900	54.08
Jun 22	300	19,740	80	960	620	21,700	115	.53	375,600	196,000	52.18
Jun 23	680	59,720	140	900	920	62,360	286	.46	356,100	172,200	48.36
Jun 24	340	87,860	140	600	760	89,700	331	.37	339,300	155,800	45.92
Jun 25	580	49,340	60	620	820	51,420	206	.40	338,600	156,500	46.22
Jun 26	400	48,900	100	560	840	50,800	222	.44	357,100	176,300	49.37
Jun 27	266	51,895	0	267	852	53,280	139	.26	363,300	171,500	47.21
Jun 28	320	53,340	40	280	300	54,280	212	.39	366,400	177,500	48.44
Jun 29	380	39,840	20	280	460	40,980	122	.30	385,800	189,100	49.02
Jun 30	320	28,240	20	240	540	29,360	133	.45	357,300	158,100	44.25
Jul 1	300	45,260	40	260	180	46,040	165	.36	338,100	138,800	41.05
Jul 2	440	74,300	0	300	400	75,440	399	.53	278,000	99,600	35.83
Jul 3	603	44,907	10	378	449	46,347	252	.54	315,000	143,400	45.52
Jul 4	320	21,570	0	140	280	22,310	168	.75	261,400	79,900	30.57
Jul 5	500	14,450	30	210	300	15,490	147	.95	293,600	112,800	38.42
Jul 6	390	9,700	10	150	180	10,430	115	1.10	272,500	92,000	33.76
Jul 7	330	8,730	20	130	300	9,510	107	1.13	254,700	73,500	28.86
Jul 8	189	7,932	9	146	284	8,610	109	1.27	235,300	55,600	23.63
Jul 9	210	6,900	10	90	90	7,300	77	1.05	202,500	39,700	19.60
Jul 10	800	6,760	20	20	220	7,820	100	1.28	216,400	57,800	26.71
Jul 11	496	10,436	11	79	248	11,270	87	.77	210,600	49,500	23.50
Jul 12	844	22,280	0	47	281	23,452	112	.48	206,600	47,000	22.75
Jul 13	346	34,036	35	35	138	34,590	105	.30	211,700	48,100	22.72
Jul 14	448	111,163	0	112	224	111,947	624	.56	189,300	24,100	12.73
Jul 15	281	254,928	0	77	230	255,516	3,954	1.55	164,400	300	.18
Jul 16	168	167,915	0	0	168	168,251	1,842	1.09	202,500	43,400	21.43
Jul 17	141	178,770	0	56	324	179,291	1,568	.87	236,400	76,600	32.40

Appendix Table 8.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY		RIVER FLOW IN CFS	SPILL	
							NUMBER	PERCENT		TOTAL	PERCENT
Jul 18	118	117,294	59	59	117	117,647	622	.53	187,000	21,200	11.34
Jul 19	0	90,480	0	0	91	90,571	3,464	3.82	184,700	21,600	11.69
Jul 20	0	68,867	69	0	208	69,144	251	.36	172,200	9,500	5.52
Jul 21	54	31,625	10	10	172	31,871	222	.70	161,800	0	0.00
Jul 22	0	31,444	0	0	114	31,558	357	1.13	135,500	0	0.00
Jul 23	58	47,686	14	0	86	47,844	188	.39	136,300	0	0.00
Jul 24	46	45,446	46	0	91	45,629	373	.82	142,700	0	0.00
Jul 25	0	65,907	0	0	66	65,973	490	.74	146,600	0	0.00
Jul 26	14	47,154	0	0	90	47,258	390	.83	162,700	0	0.00
Jul 27	15	29,272	0	15	156	29,458	138	.47	163,100	0	0.00
Jul 28	0	32,759	0	0	99	32,858	359	1.09	167,900	0	0.00
Jul 29	58	41,371	0	0	129	41,558	210	.51	109,700	0	0.00
Jul 30	59	32,558	0	13	42	32,672	421	1.29	128,000	0	0.00
Jul 31	29	40,835	0	12	82	40,958	379	.93	143,700	0	0.00
Aug 1	74	74,125	0	0	74	74,273	746	1.00	156,300	0	0.00
Aug 2	46	153,811	0	0	46	153,903	1,337	.87	143,200	0	0.00
Aug 3	96	159,426	0	0	224	159,746	1,064	.67	115,700	0	0.00
Aug 4	0	65,170	0	13	33	65,216	369	.57	116,900	0	0.00
Aug 5	72	55,470	0	28	17	55,587	194	.35	112,500	0	0.00
Aug 6	14	27,415	0	0	0	27,429	146	.53	119,400	0	0.00
Aug 7	20	20,203	0	0	20	20,243	210	1.04	132,900	0	0.00
Aug 8	0	39,987	0	0	0	39,987	486	1.22	163,800	0	0.00
Aug 9	85	106,435	0	0	11	106,531	564	.53	164,300	0	0.00
Aug 10	0	77,644	0	47	39	77,730	444	.57	160,000	0	0.00
Aug 11	12	118,150	0	12	71	118,245	818	.69	136,400	0	0.00
Aug 12	13	44,188	13	58	0	44,272	236	.53	122,200	0	0.00
Aug 13	0	29,114	0	0	29	29,143	545	1.87	130,300	0	0.00
Aug 14	0	30,482	0	30	31	30,543	215	.70	144,100	0	0.00
Aug 15	0	28,330	0	14	14	28,358	369	1.30	137,700	0	0.00
Aug 16	171	28,401	0	0	0	28,572	517	1.81	149,300	0	0.00
Aug 17	61	30,150	0	0	61	30,272	847	2.80	144,200	0	0.00
Aug 18	58	28,769	0	29	145	29,001	527	1.82	141,000	0	0.00
Aug 19	37	18,565	0	38	75	18,715	845	4.52	100,800	0	0.00
Aug 20	10	10,015	0	0	61	10,086	352	3.49	117,400	0	0.00
Aug 21	16	15,979	0	0	48	16,043	195	1.22	140,400	0	0.00
Aug 22	57	19,082	0	0	19	19,158	226	1.18	141,200	0	0.00
Aug 23	0	24,148	0	0	24	24,172	103	.43	147,400	0	0.00
Aug 24	0	13,173	0	13	0	13,186	96	.73	151,000	0	0.00
Aug 25	10	9,731	0	0	59	9,800	65	.66	129,900	0	0.00
Aug 26	0	14,400	0	0	29	14,429	107	.74	106,500	0	0.00
Aug 27	0	6,629	0	0	0	6,629	131	1.98	140,500	0	0.00
Aug 28	0	6,459	0	0	26	6,485	157	2.42	128,800	0	0.00
Aug 29	0	6,900	0	0	0	6,900	89	1.29	149,300	0	0.00
Aug 30	0	8,740	0	0	17	8,757	178	2.03	147,500	0	0.00
Aug 31	0	17,166	0	0	34	17,200	126	.73	117,200	0	0.00
Sep 1	34	16,815	0	0	51	16,900	86	.51	119,200	0	0.00
Sep 2	0	8,854	0	0	18	8,872	54	.61	104,300	0	0.00
Sep 3	0	4,715	0	0	14	4,729	48	1.02	82,200	0	0.00

Appendix Table 8.-- Continued.

DATE	YEARLING CHINOOK	SUBYEARLING CHINOOK	COHO	STEELHEAD	SOCKEYE	DAILY TOTAL	COLLECTION MORTALITY NUMBER	COLLECTION MORTALITY PERCENT	RIVER FLOW IN CFS	SPILL TOTAL	SPILL PERCENT
Sep 4	0	4,199	0	0	30	4,229	70	1.66	111,500	0	0.00
Sep 5	27	6,746	0	27	14	6,814	60	.88	110,200	0	0.00
Sep 6	145	6,727	0	0	28	6,900	62	.90	120,500	0	0.00
Sep 7	0	1,852	0	0	19	1,871	31	1.66	123,800	0	0.00
Sep 8	14	3,457	0	0	0	3,471	43	1.33	112,100	0	0.00
Sep 9	28	2,801	0	0	0	2,829	29	1.03	94,500	0	0.00
Sep 10	0	1,358	0	0	0	1,358	25	1.84	107,200	0	0.00
Sep 11	0	1,771	0	0	0	1,771	19	1.07	114,000	0	0.00
Sep 12	14	6,958	0	0	14	6,986	35	.50	150,000	0	0.00
Sep 13	0	10,458	0	0	42	10,500	37	.35	108,500	0	0.00
Sep 14	0	6,672	0	0	0	6,672	10	.15	117,200	0	0.00
Sep 15	0	3,485	0	0	0	3,485	17	.49	128,300	0	0.00
Sep 16	0	3,273	0	0	13	3,286	20	.61	99,300	0	0.00
Sep 17	0	1,886	0	0	0	1,886	9	.48	114,700	0	0.00
Sep 18	0	1,643	0	0	28	1,671	25	1.50	127,300	0	0.00
Sep 19	0	2,486	0	0	0	2,486	28	1.13	111,800	0	0.00
Sep 20	0	1,771	0	0	0	1,771	35	1.98	116,900	0	0.00
Sep 21	0	3,185	0	0	0	3,185	15	.47	110,800	0	0.00
Sep 22	0	2,215	0	0	0	2,215	20	.90	100,400	0	0.00
Sep 23	0	1,943	0	0	0	1,943	24	1.24	77,800	0	0.00
Sep 24	0	1,515	0	0	0	1,515	25	1.65	121,100	0	0.00
Sep 25	0	1,490	0	0	10	1,500	21	1.40	123,900	0	0.00
Sep 26	0	1,571	0	0	14	1,585	14	.88	131,000	0	0.00
Sep 27	0	771	0	0	0	771	10	1.30	85,800	0	0.00
Sep 28	0	1,233	0	0	24	1,257	5	.40	109,300	0	0.00
TOTAL	1,261,187	4,098,004	82,144	610,511	191,930	6,243,776	41,970	.67			

APPENDIX TABLE 9.-- 1984 TRUCK TRANSPORTATION REPORT
AT MCNARY

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
17/ 4	3,223	0	0	1,369	32	4,624	3,223	0	0	1,369	32	4,624
18/ 4	8,468	0	0	2,841	57	11,366	11,691	0	0	4,210	89	15,990
19/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
20/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
21/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
22/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
23/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
24/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
25/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
26/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
27/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
28/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
29/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
30/ 4	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
1/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
2/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
3/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
4/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
5/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
6/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
7/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
8/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
9/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
10/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
11/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
12/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
13/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
14/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
15/ 5	0	0	0	0	0	0	11,691	0	0	4,210	89	15,990
16/ 5	3,281	8	59	4,369	653	8,370	14,972	8	59	8,579	742	24,360
17/ 5	2,731	7	49	3,637	544	6,968	17,703	15	108	12,216	1,286	31,328
18/ 5	5,292	82	495	9,875	742	16,486	22,995	97	603	22,091	2,028	47,814
19/ 5	4,890	149	832	7,921	1,070	14,862	27,885	246	1,435	30,012	3,098	62,676
20/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
21/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
22/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
23/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
24/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
25/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
26/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
27/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
28/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
29/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
30/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
31/ 5	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
1/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
2/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
3/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676

APPENDIX TABLE 9.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
4/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
5/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
6/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
7/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
8/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
9/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
10/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
11/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
12/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
13/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
14/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
15/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
16/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
17/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
18/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
19/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
20/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
21/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
22/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
23/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
24/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
25/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
26/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
27/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
28/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
29/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
30/ 6	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
1/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
2/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
3/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
4/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
5/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
6/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
7/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
8/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
9/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
10/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
11/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
12/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
13/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
14/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
15/ 7	0	0	0	0	0	0	27,885	246	1,435	30,012	3,098	62,676
16/ 7	29	28,731	0	0	29	28,789	27,914	28,977	1,435	30,012	3,127	91,465
17/ 7	0	0	0	0	0	0	27,914	28,977	1,435	30,012	3,127	91,465
18/ 7	48	48,284	24	24	49	48,429	27,962	77,261	1,459	30,036	3,176	139,894
19/ 7	20	20,395	10	10	20	20,455	27,982	97,656	1,469	30,046	3,196	160,349
20/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
21/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
22/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349

APPENDIX TABLE 9.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
23/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
24/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
25/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
26/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
27/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
28/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
29/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
30/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
31/ 7	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
1/ 8	0	0	0	0	0	0	27,982	97,656	1,469	30,046	3,196	160,349
2/ 8	11	29,334	0	0	13	29,358	27,993	126,990	1,469	30,046	3,209	189,707
3/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
4/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
5/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
6/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
7/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
8/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
9/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
10/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
11/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
12/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
13/ 8	0	0	0	0	0	0	27,993	126,990	1,469	30,046	3,209	189,707
14/ 8	0	23,607	0	23	24	23,654	27,993	150,597	1,469	30,069	3,233	213,361
15/ 8	0	22,857	0	11	11	22,879	27,993	173,454	1,469	30,080	3,244	236,240
16/ 8	78	25,951	0	0	26	26,055	28,071	199,405	1,469	30,080	3,270	262,295
17/ 8	82	41,020	0	0	82	41,184	28,153	240,425	1,469	30,080	3,352	303,479
18/ 8	50	24,846	0	25	125	25,046	28,203	265,271	1,469	30,105	3,477	328,525
19/ 8	45	22,281	0	45	90	22,461	28,248	287,552	1,469	30,150	3,567	350,986
20/ 8	15	14,576	0	0	88	14,679	28,263	302,128	1,469	30,150	3,655	365,665
21/ 8	14	13,598	0	0	41	13,653	28,277	315,726	1,469	30,150	3,696	379,318
22/ 8	53	17,714	0	0	18	17,785	28,330	333,440	1,469	30,150	3,714	397,103
23/ 8	0	22,127	0	0	22	22,149	28,330	355,567	1,469	30,150	3,736	419,252
24/ 8	0	18,132	0	18	0	18,150	28,330	373,699	1,469	30,168	3,736	437,402
25/ 8	10	9,853	0	0	59	9,922	28,340	383,552	1,469	30,168	3,795	447,324
26/ 8	0	12,503	0	0	25	12,528	28,340	396,055	1,469	30,168	3,820	459,852
27/ 8	0	0	0	0	0	0	28,340	396,055	1,469	30,168	3,820	459,852
28/ 8	0	15,947	0	0	32	15,979	28,340	412,002	1,469	30,168	3,852	475,831
29/ 8	0	0	0	0	0	0	28,340	412,002	1,469	30,168	3,852	475,831
30/ 8	0	9,195	0	0	9	9,204	28,340	421,197	1,469	30,168	3,861	485,035
31/ 8	0	15,918	0	0	32	15,950	28,340	437,115	1,469	30,168	3,893	500,985
1/ 9	34	17,159	0	0	52	17,245	28,374	454,274	1,469	30,168	3,945	518,230
2/ 9	0	11,109	0	0	22	11,131	28,374	465,383	1,469	30,168	3,967	529,361
3/ 9	0	0	0	0	0	0	28,374	465,383	1,469	30,168	3,967	529,361
4/ 9	0	9,415	0	0	76	9,491	28,374	474,798	1,469	30,168	4,043	538,852
5/ 9	0	0	0	0	0	0	28,374	474,798	1,469	30,168	4,043	538,852
6/ 9	166	12,558	0	26	38	12,788	28,540	487,356	1,469	30,194	4,081	551,640
7/ 9	0	0	0	0	0	0	28,540	487,356	1,469	30,194	4,081	551,640
8/ 9	17	5,552	0	0	17	5,586	28,557	492,908	1,469	30,194	4,098	557,226
9/ 9	0	0	0	0	0	0	28,557	492,908	1,469	30,194	4,098	557,226

APPENDIX TABLE 9.-- Continued

	DAILY #'s TRUCKED						ACCUM. #'s TRUCKED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
10/ 9	28	5,182	0	0	0	5,210	28,585	498,090	1,469	30,194	4,098	562,436
11/ 9	0	0	0	0	0	0	28,585	498,090	1,469	30,194	4,098	562,436
12/ 9	14	6,865	0	0	14	6,893	28,599	504,955	1,469	30,194	4,112	569,329
13/ 9	0	9,845	0	0	40	9,885	28,599	514,800	1,469	30,194	4,152	579,214
14/ 9	0	7,981	0	0	0	7,981	28,599	522,781	1,469	30,194	4,152	587,195
15/ 9	0	0	0	0	0	0	28,599	522,781	1,469	30,194	4,152	587,195
16/ 9	0	7,404	0	0	15	7,419	28,599	530,185	1,469	30,194	4,167	594,614
17/ 9	0	0	0	0	0	0	28,599	530,185	1,469	30,194	4,167	594,614
18/ 9	0	3,954	0	0	32	3,986	28,599	534,139	1,469	30,194	4,199	598,600
19/ 9	0	0	0	0	0	0	28,599	534,139	1,469	30,194	4,199	598,600
20/ 9	0	4,182	0	0	0	4,182	28,599	538,321	1,469	30,194	4,199	602,782
21/ 9	0	0	0	0	0	0	28,599	538,321	1,469	30,194	4,199	602,782
22/ 9	0	5,415	0	0	0	5,415	28,599	543,736	1,469	30,194	4,199	608,197
23/ 9	0	0	0	0	0	0	28,599	543,736	1,469	30,194	4,199	608,197
24/ 9	0	3,516	0	0	0	3,516	28,599	547,252	1,469	30,194	4,199	611,713
25/ 9	0	0	0	0	0	0	28,599	547,252	1,469	30,194	4,199	611,713
26/ 9	0	3,002	0	0	27	3,029	28,599	550,254	1,469	30,194	4,226	614,742
27/ 9	0	0	0	0	0	0	28,599	550,254	1,469	30,194	4,226	614,742
28/ 9	0	1,909	0	0	17	1,926	28,599	552,163	1,469	30,194	4,243	616,668

APPENDIX TABLE10.-- 1984 BARGE TRANSPORTATION REPORT
AT MCNARY

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
16/ 4	13,999	0	0	1,847	80	15,926	13,999	0	0	1,847	80	15,926
17/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
18/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
19/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
20/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
21/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
22/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
23/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
24/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
25/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
26/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
27/ 4	0	0	0	0	0	0	13,999	0	0	1,847	80	15,926
28/ 4	2,246	118	0	1,912	639	4,915	16,245	118	0	3,759	719	20,841
29/ 4	0	0	0	0	0	0	16,245	118	0	3,759	719	20,841
30/ 4	7,661	232	0	5,633	1,950	15,476	23,906	350	0	9,392	2,669	36,317
1/ 5	0	0	0	0	0	0	23,906	350	0	9,392	2,669	36,317
2/ 5	11,103	75	0	5,618	2,055	18,851	35,009	425	0	15,010	4,724	55,168
3/ 5	0	0	0	0	0	0	35,009	425	0	15,010	4,724	55,168
4/ 5	9,576	66	49	4,353	2,382	16,426	44,585	491	49	19,363	7,106	71,594
5/ 5	5,509	49	0	4,153	2,613	12,324	50,094	540	49	23,516	9,719	83,918
6/ 5	6,906	30	0	5,829	2,414	15,179	57,000	570	49	29,345	12,133	99,097
7/ 5	0	0	0	0	0	0	57,000	570	49	29,345	12,133	99,097
8/ 5	20,091	169	10	27,215	8,978	56,463	77,091	739	59	56,560	21,111	155,560
9/ 5	7,104	117	0	4,152	3,245	14,618	84,195	856	59	60,712	24,356	170,178
10/ 5	9,744	111	0	6,385	2,214	18,454	93,939	967	59	67,097	26,570	188,632
11/ 5	0	0	0	0	0	0	93,939	967	59	67,097	26,570	188,632
12/ 5	10,089	38	95	6,910	1,903	19,035	104,028	1,005	154	74,007	28,473	207,667
13/ 5	17,169	114	189	13,992	6,353	37,817	121,197	1,119	343	87,999	34,826	245,484
14/ 5	11,449	104	234	10,333	3,842	25,962	132,646	1,223	577	98,332	38,668	271,446
15/ 5	10,372	238	285	10,919	1,975	23,789	143,018	1,461	862	109,251	40,643	295,235
16/ 5	0	0	0	0	0	0	143,018	1,461	862	109,251	40,643	295,235
17/ 5	0	0	0	0	0	0	143,018	1,461	862	109,251	40,643	295,235
18/ 5	0	0	0	0	0	0	143,018	1,461	862	109,251	40,643	295,235
19/ 5	6,292	365	1,525	12,520	773	21,475	149,310	1,826	2,387	121,771	41,416	316,710
20/ 5	4,761	404	1,042	8,401	949	15,557	154,071	2,230	3,429	130,172	42,365	332,267
21/ 5	12,029	209	1,307	10,486	2,118	26,149	166,100	2,439	4,736	140,658	44,483	358,416
22/ 5	11,760	256	3,461	13,811	2,756	32,044	177,860	2,695	8,197	154,469	47,239	390,460
23/ 5	5,578	334	1,883	8,903	897	17,595	183,438	3,029	10,080	163,372	48,136	408,055
24/ 5	4,544	236	1,537	9,136	1,435	16,888	187,982	3,265	11,617	172,508	49,571	424,943
25/ 5	5,621	1,775	3,926	13,473	2,098	26,893	193,603	5,040	15,543	185,981	51,669	451,836
26/ 5	4,653	12,237	2,810	8,883	1,632	30,215	198,256	17,277	18,353	194,864	53,301	482,051
27/ 5	0	0	0	0	0	0	198,256	17,277	18,353	194,864	53,301	482,051
28/ 5	8,791	17,582	4,784	25,236	3,409	59,802	207,047	34,859	23,137	220,100	56,710	541,853
29/ 5	3,149	5,501	967	8,404	949	18,970	210,196	40,360	24,104	228,504	57,659	560,823
30/ 5	0	0	0	0	0	0	210,196	40,360	24,104	228,504	57,659	560,823
31/ 5	10,781	32,711	2,033	12,998	3,080	61,603	220,977	73,071	26,137	241,502	60,739	622,426
1/ 6	0	0	0	0	0	0	220,977	73,071	26,137	241,502	60,739	622,426
2/ 6	5,849	30,492	2,385	14,877	3,180	56,783	226,826	103,563	28,522	256,377	63,919	679,209

APPENDIX TABLE10.-- Continued

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
3/ 6	0	0	0	0	0	0	226,826	103,563	28,522	256,379	63,919	679,209
4/ 6	5,861	24,052	2,046	18,965	4,368	55,292	232,687	127,615	30,568	275,344	68,287	734,501
5/ 6	0	0	0	0	0	0	232,687	127,615	30,568	275,344	68,287	734,501
6/ 6	5,508	9,708	1,652	14,596	2,961	34,425	238,195	137,323	32,220	289,940	71,248	768,926
7/ 6	0	0	0	0	0	0	238,195	137,323	32,220	289,940	71,248	768,926
8/ 6	2,737	10,947	2,401	9,188	2,653	27,926	240,932	148,270	34,621	299,128	73,901	796,852
9/ 6	0	0	0	0	0	0	240,932	148,270	34,621	299,128	73,901	796,852
10/ 6	4,162	11,461	1,085	10,084	2,521	29,313	245,094	159,731	35,706	309,212	76,422	826,165
11/ 6	0	0	0	0	0	0	245,094	159,731	35,706	309,212	76,422	826,165
12/ 6	2,470	7,085	652	5,867	1,081	17,155	247,564	166,816	36,358	315,079	77,503	843,320
13/ 6	0	0	0	0	0	0	247,564	166,816	36,358	315,079	77,503	843,320
14/ 6	1,364	7,848	230	3,201	865	13,508	248,928	174,664	36,588	318,280	78,368	856,828
15/ 6	0	0	0	0	0	0	248,928	174,664	36,588	318,280	78,368	856,828
16/ 6	1,382	13,657	419	4,085	1,404	20,947	250,310	188,321	37,007	322,365	79,772	877,775
17/ 6	0	0	0	0	0	0	250,310	188,321	37,007	322,365	79,772	877,775
18/ 6	1,550	20,941	263	2,522	999	26,275	251,860	209,262	37,270	324,887	80,771	904,050
19/ 6	0	0	0	0	0	0	251,860	209,262	37,270	324,887	80,771	904,050
20/ 6	596	94,727	99	2,880	993	99,295	252,456	303,989	37,369	327,767	81,764	1,003,345
21/ 6	0	0	0	0	0	0	252,456	303,989	37,369	327,767	81,764	1,003,345
22/ 6	906	64,472	348	2,370	1,603	69,699	253,362	368,461	37,717	330,137	83,367	1,073,044
23/ 6	0	0	0	0	0	0	253,362	368,461	37,717	330,137	83,367	1,073,044
24/ 6	1,024	141,861	292	1,462	1,609	146,248	254,386	510,322	38,009	331,599	84,976	1,219,292
25/ 6	0	0	0	0	0	0	254,386	510,322	38,009	331,599	84,976	1,219,292
26/ 6	1,057	101,579	106	1,268	1,691	105,701	255,443	611,901	38,115	332,867	86,667	1,324,993
27/ 6	0	0	0	0	0	0	255,443	611,901	38,115	332,867	86,667	1,324,993
28/ 6	515	100,835	103	515	1,030	102,998	255,958	712,736	38,218	333,382	87,697	1,427,991
29/ 6	0	0	0	0	0	0	255,958	712,736	38,218	333,382	87,697	1,427,991
30/ 6	746	72,248	75	522	1,045	74,636	256,704	784,984	38,293	333,904	88,742	1,502,627
1/ 7	0	0	0	0	0	0	256,704	784,984	38,293	333,904	88,742	1,502,627
2/ 7	710	116,515	0	592	592	118,409	257,414	901,499	38,293	334,496	89,334	1,621,036
3/ 7	0	0	0	0	0	0	257,414	901,499	38,293	334,496	89,334	1,621,036
4/ 7	1,048	72,476	0	524	824	74,872	258,462	973,975	38,293	335,020	90,158	1,695,908
5/ 7	0	0	0	0	0	0	258,462	973,975	38,293	335,020	90,158	1,695,908
6/ 7	1,008	27,633	59	415	534	29,649	259,470	1,001,608	38,352	335,435	90,692	1,725,557
7/ 7	0	0	0	0	0	0	259,470	1,001,608	38,352	335,435	90,692	1,725,557
8/ 7	530	16,854	37	274	585	18,280	260,000	1,018,462	38,389	335,709	91,277	1,743,837
9/ 7	0	0	0	0	0	0	260,000	1,018,462	38,389	335,709	91,277	1,743,837
10/ 7	876	14,882	33	146	292	16,229	260,876	1,033,344	38,422	335,855	91,569	1,760,066
11/ 7	0	0	0	0	0	0	260,876	1,033,344	38,422	335,855	91,569	1,760,066
12/ 7	1,171	28,278	0	120	450	30,019	262,047	1,061,622	38,422	335,975	92,019	1,790,085
13/ 7	0	0	0	0	0	0	262,047	1,061,622	38,422	335,975	92,019	1,790,085
14/ 7	608	120,432	0	121	365	121,526	262,655	1,182,054	38,422	336,096	92,384	1,911,611
15/ 7	0	0	0	0	0	0	262,655	1,182,054	38,422	336,096	92,384	1,911,611
16/ 7	387	386,087	0	0	387	386,861	263,042	1,568,141	38,422	336,096	92,771	2,298,472
17/ 7	138	152,695	0	56	306	153,195	263,180	1,720,836	38,422	336,152	93,077	2,451,667
18/ 7	101	100,900	51	51	101	101,204	263,281	1,821,736	38,473	336,203	93,178	2,552,871
19/ 7	0	93,307	0	0	93	93,400	263,281	1,915,043	38,473	336,203	93,271	2,646,271
20/ 7	0	58,176	59	0	175	58,410	263,281	1,973,219	38,532	336,203	93,446	2,704,681
21/ 7	0	0	0	0	0	0	263,281	1,973,219	38,532	336,203	93,446	2,704,681

APPENDIX TABLE10.-- Continued

	DAILY #'s BARGED						ACCUM. #'s BARGED					
	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Daily Total	Yrlg. Chino	Subyr. Chino	Coho	Steelhead	Sockeye	Accum. Total
22/ 7	63	63,048	13	13	292	63,429	263,344	2,036,267	38,545	336,216	93,738	2,768,110
23/ 7	0	0	0	0	0	0	263,344	2,036,267	38,545	336,216	93,738	2,768,110
24/ 7	88	87,532	88	0	176	87,884	263,432	2,123,799	38,633	336,216	93,914	2,855,994
25/ 7	0	0	0	0	0	0	263,432	2,123,799	38,633	336,216	93,914	2,855,994
26/ 7	12	114,952	0	0	161	115,125	263,444	2,238,751	38,633	336,216	94,075	2,971,119
27/ 7	0	0	0	0	0	0	263,444	2,238,751	38,633	336,216	94,075	2,971,119
28/ 7	12	62,030	0	12	262	62,316	263,456	2,300,781	38,633	336,228	94,337	3,033,435
29/ 7	0	0	0	0	0	0	263,456	2,300,781	38,633	336,228	94,337	3,033,435
30/ 7	100	66,328	0	13	153	66,594	263,556	2,367,109	38,633	336,241	94,490	3,100,029
31/ 7	0	0	0	0	0	0	263,556	2,367,109	38,633	336,241	94,490	3,100,029
1/ 8	78	111,424	0	11	134	111,647	263,634	2,478,533	38,633	336,252	94,624	3,211,676
2/ 8	0	0	0	0	0	0	263,634	2,478,533	38,633	336,252	94,624	3,211,676
3/ 8	135	268,852	0	0	215	269,202	263,769	2,747,385	38,633	336,252	94,839	3,480,878
4/ 8	35	88,520	0	18	98	88,671	263,804	2,835,905	38,633	336,270	94,937	3,569,549
5/ 8	29	48,448	0	19	15	48,511	263,833	2,884,353	38,633	336,289	94,952	3,618,060
6/ 8	0	0	0	0	0	0	263,833	2,884,353	38,633	336,289	94,952	3,618,060
7/ 8	20	56,844	0	0	0	56,864	263,853	2,941,197	38,633	336,289	94,952	3,674,924
8/ 8	0	0	0	0	0	0	263,853	2,941,197	38,633	336,289	94,952	3,674,924
9/ 8	100	124,472	0	12	13	124,597	263,953	3,065,669	38,633	336,301	94,965	3,799,521
10/ 8	0	0	0	0	0	0	263,953	3,065,669	38,633	336,301	94,965	3,799,521
11/ 8	20	200,352	0	60	120	200,552	263,973	3,266,021	38,633	336,361	95,085	4,000,073
12/ 8	0	0	0	0	0	0	263,973	3,266,021	38,633	336,361	95,085	4,000,073
13/ 8	0	91,799	0	92	0	91,891	263,973	3,357,820	38,633	336,453	95,085	4,091,964