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# Monitoring of Downstream Salmon and Steelhead Trout at Federal Hydroelectric Facilities

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MONITORING OF DOWNSTREAM SALMON AND STEELHEAD  
AT FEDERAL HYDROELECTRIC FACILITIES - 1985

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## INTRODUCTION

Juvenile salmonids were monitored on their seaward migration at three key sites on the Snake-Columbia River system by the National Marine Fisheries Service (NMFS). This was a part of the total monitoring effort in the Water Budget Center's (WBC) smolt monitoring program on Columbia Basin salmonid stocks. In addition to the three key sites, the NMFS also initiated a sampling effort at Lower Monumental Dam. Funding was provided by the Bonneville Power Administration (BPA).

The major sampling sites were at Lower Granite, McNary, and John Day Dams: sampling at these sites provided data primarily for evaluation of smolt survival, travel time, and migrational timing as required by the WBC. At Lower Monumental Dam catch data was to provide a general indication of smolt passage and comparison with the hydroacoustics passage index as determined by Bio-Sonics of Seattle, WA. To achieve these goals it was necessary to monitor and index salmonid smolt passage at the three major sites. This involved: 1) the systematic sampling of the smolt migration from 27 March to 23 July at Lower Granite Dam, 29 March to 26 September at McNary Dam, 28 March to 1 April, 20-22 April, and 27 April to 29 October at John Day Dam; 2) recovering and recording brands; 3) providing the WBC with a daily index of smolt passage at Lower Granite and McNary Dams and daily sample numbers at John Day Dam; and 4) providing the WBC with daily summaries of brand recapture data. Daily catch and brand recapture data from Lower Monumental Dam was reported to the WBC as required during the sampling season, 23 May through 9 July.

## METHODS AND MATERIALS

As in 1984 (Johnsen, et. al., 1984), monitoring the smolt migration at Lower Granite and McNary Dams was by sampling, by time, a portion of the total number of smolts from the gatewell collection system. The target rate was the lesser of 3% of the estimated weekly outmigration or 10% of the weekly total of smolts collected or bypassed (FTOT Annual Work Plan, 1985). At John Day Dam initially (28 March to 1 April), sampling was identical to 1984 using the airlift pump system in Unit 3, gatewells B and C; this was prior to installation and testing of the submerged traveling screens (STS). Sampling at John Day Dam after 20 April was with the STS installed; samples from 20-22 April were from dipnetting Unit 3, and from 27 April to the end of the season were from the airlift pump system in gatewell B of Unit 3. Samples at Lower Monumental Dam were obtained with a specially constructed gatewell dipnet fished in the bulkhead gate slot. Sample numbers were relative because gatewell cleanout was not possible - a stored operating gate prevented dipnetting the total gatewell area available to fish. Gatewells A, B, and C of Unit 2 were dipnetted until the unit went out of service on 16 June; gatewells A, B and C of Unit 3 were fished thereafter.

The sampling schedule at each site was typically as follows:

<u>Site</u>	<u>Frequency</u>
Lower Granite Dam	Daily: 24-hour cumulative sample
McNary Dam	Daily: 24-hour cumulative sample
John Day Dam	Daily: 24-hourly samples
Lower Monumental Dam	5 days per week: 8 hours per day

Reporting of data was daily or as requested by the WBC. To efficiently accomplish this, an IBM-PC transmission system (via phone line), was established by the WBC at the three main sites. Data from Lower Monumental Dam was reported weekly from the Rufus Field Station. Confirmation of data transmitted was for the most part an on-going joint effort between personnel from the sample site and the WBC as the season progressed. To take advantage of all possible brand recapture data, some follow-up verification was necessary by the NMFS staff to categorize reportings of partial or faded brands. This may at times be vital for statistical validation of certain mark groups by increasing the number of usable recoveries.

Analysis and evaluation of these monitoring data are being performed by the WBC. Detailed data from each sample site will be available in their 1985 smolt monitoring activities report.

#### RESULTS AND DISCUSSION

A summary of sampling results are presented in Table 1. In addition to the numbers of fish by species sampled at each site are the total numbers of branded fish captured, estimated numbers collected, and the number of days each species appeared in the sample. Figure 1 shows the portion of the season each species was found in the sample.

Sampling at Lower Granite and McNary was routine and essentially identical to 1984; no operational difficulties of significance were encountered.

Sampling at John Day Dam after installation of the STS in Unit 3 did, however, require a significant amount of operational testing, adjustment, and some minor modifications to the airlift pump components; this operational testing was necessary to compensate for the increased upwell flow in the gatewell and its effect on the fish. The search for a suitable funnel operating depth for hydraulic efficiency, while considering the well-being of the fish captured, required numerous changes in the sampling routine. A depth of about 20 feet, to the top of the funnel, was found to

TABLE 1.--Summary of 1985 smolt sampling activities at Lower Granite, Lower Monumental, McNary, and John Day Dams.

Species	Dam	Total number sampled	Total number of brands in sample	Estimated <sup>1/</sup> total number collected	Number of days species occurred in sample
Yearling Chinook	Lower Granite	101,109	2,165	1,742,244	121
	Lower Monumental	5,187	32	5,187	31
	McNary	213,899	8,458	2,952,613	110
	John Day	63,578	1,960	63,578	108
Subyearling Chinook	Lower Granite	3,375	458	44,008	56
	Lower Monumental	3,116	0	3,116	22
	McNary	433,418	1,928	6,562,483	177
	John Day	226,577	80	226,577	179
Steelhead	Lower Granite	106,684	1,647	2,689,579	116
	Lower Monumental	8,347	3,918	8,347	32
	McNary	58,649	7,547	840,493	163
	John Day	36,616	2,113	36,616	150
Coho	Lower Granite	0	0	0	0
	Lower Monumental	0	0	0	0
	McNary	4,653	28	71,752	57
	John Day	600	3	600	51
Sockeye	Lower Granite	324	0	6,467	88
	Lower Monumental	4	0	4	3
	McNary	71,095	1,707	1,030,017	144
	John Day	17,235	334	17,235	98

1/ At John Day and Lower Monumental Dams the sample is the actual collection.

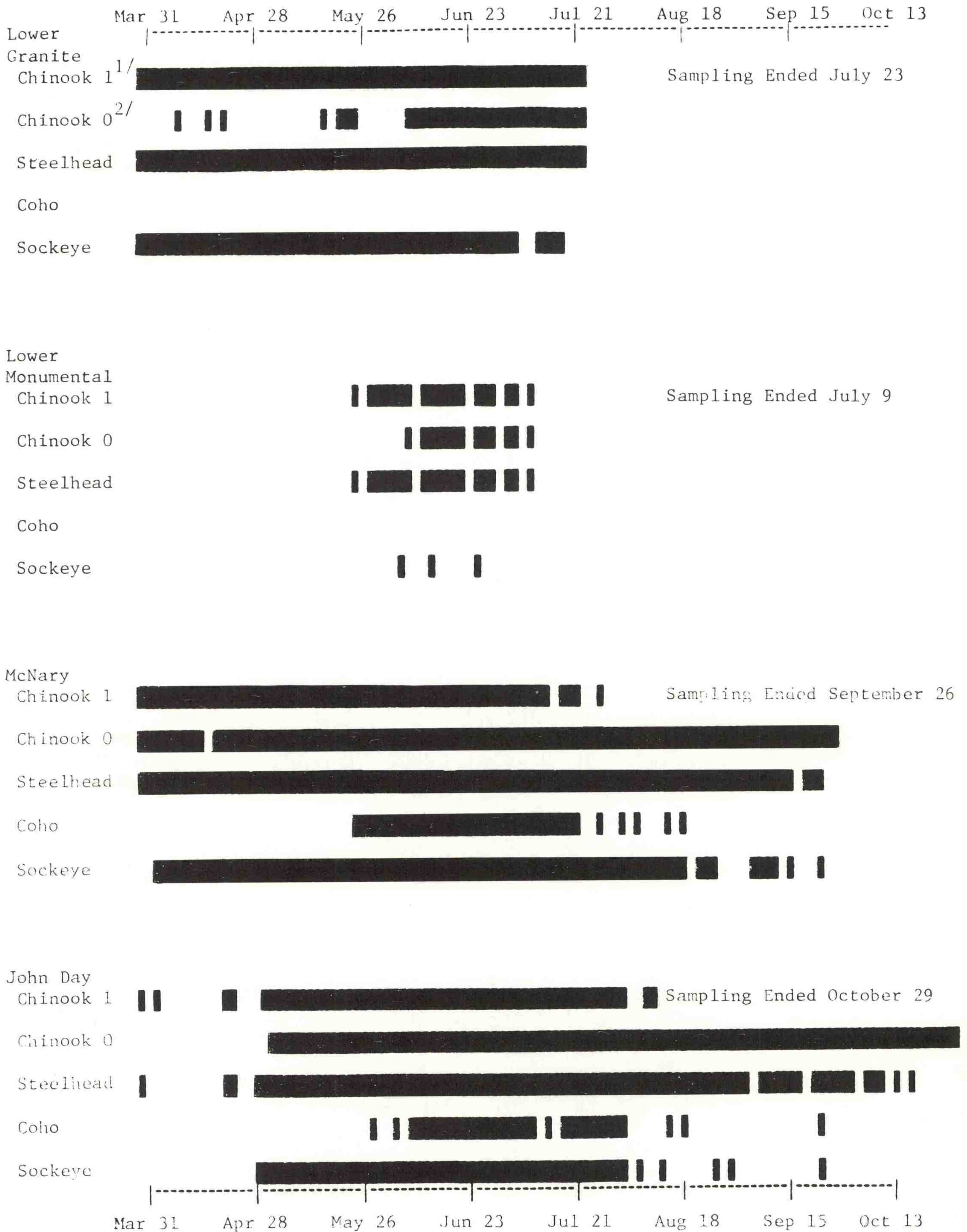


Figure 1.--Species represented during the 1985 smolt sampling season at Lower Granite, Lower Monumental, McNary, and John Day Dams.

1/ Yearling Chinook  
 2/ Sub-Yearling Chinook



be a suitable depth for sampling spring migrants and was later confirmed as suitable for summer migrants as well. With the late April STS installation date and the airlift operational testing, a consistent sampling mode was not possible until the spring migration was nearly at mid-point.

Sampling at Lower Monumental Dam commenced about three weeks later than the anticipated first of May. Preparatory effort in fabrication of the gatewell dipnet, refurbishing the portable fish handling buildings and construction of the safety handrails around the open gatewells, was more time-consuming than expected. Concurrent sampling with the Bio-Sonics hydroacoustics unit was consequently reduced to about one week. Their diel passage profile indicated major passage during the night hours - primarily before 0200 hours<sup>1/</sup>. We therefore adjusted our dipnet schedule to conform to this, working 1800-0230 hours. Except for unexpected turbine shutdowns, once operational our sampling activities proceeded exceptionally well the remainder of the season.

Supplemental sampling results at Lower Granite and McNary Dams during the month of October are found in Appendix A. These data were collected by the U.S. Army Corps of Engineers dipnetting selected turbine gatewells at these two sites with support provided by various fishery agencies, including NMFS.

#### SUMMARY

The smolt monitoring project of the National Marine Fishery Service provided data on the seaward migration of juvenile salmon and steelhead at Lower Granite, McNary, John Day, and Lower Monumental Dams during 1985. The numbers of fish sampled by species and brand recaptures were provided to the Water Budget Center for the purpose of evaluating smolt survival, travel time and migrational timing.

#### RECOMMENDATIONS

1. Coordination of all activities affecting sampling/monitoring with those individuals or groups directly involved in the sampling programs is of continuing importance.
2. Timely distribution of mark release information to each sampling site is vital.
3. Good quality brands on the fish at release will improve potential recognition at recapture sites. This cannot be over-emphasized.

1/ Personal communication with Bio-Sonics operators at Lower Monumental Dam.

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Appendix A. 1985 post-season gatewell dipping results at Lower Granite and McNary Dams.<sup>1/</sup>

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Dam	Juvenile salmon		
	Chinook	Steelhead	Sockeye
Lower Granite	1520	21	7
McNary	2312	5	3

1/ Obtained from U.S. Army Corps of Engineers.