

**Abundance and Run Timing
of Salmonids Collected at
North Fork and River Mill Dam
Juvenile Bypass Facilities
2004-2005**

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1.0 INTRODUCTION

Salmon and steelhead juveniles leaving the upper Clackamas River encounter three mainstem dams during their downstream migration: North Fork (RM 30.1) Faraday Diversion (RM 28.4) and River Mill (RM 23.3). Most juvenile fish pass the dams by way of the North Fork downstream migrant bypass. The bypass carries the fish 1.7 miles down the North Fork fish ladder and then another 5 miles through a pipeline before depositing them in the tailrace of River Mill Dam. A screen (separator) between the ladder and the pipeline, located at (RM 28.3), either diverts the fish into a holding tank (where data can be collected) or immediately into the bypass pipe. Fish that are collected for evaluation are returned to the pipeline to continue their downstream migration.

This report documents abundance and run timing of juvenile salmonids collected at the North Fork and River Mill juvenile bypass facilities in 2004 and 2005. The information is compared with data from passage efficiency studies, adult returns and other related studies to determine whether juvenile salmonids are migrating effectively through the North Fork and River Mill juvenile bypass facilities.

1.1 Smolt Bypass Facilities

Studies have shown that the majority of the downstream migrating fish above North Fork Dam utilize the North Fork juvenile bypass. The juvenile migrants that do not utilize the bypass at North Fork Dam may either pass through the spillway during high water or pass through the turbines. Fish that are naturally produced between the North Fork Powerhouse and the Faraday Diversion Dam either pass downstream by way of spill gates or pass through the turbines at the Faraday Powerhouse.

Once the fish reach the River Mill forebay, they may enter another bypass system located at River Mill Dam. Downstream juveniles pass through the head racks and into a holding facility where they are enumerated by species. The examined fish are then released into the River Mill fish ladder where they can continue downstream. Fish that do not utilize the River Mill bypass either pass through the turbines or are spilled during high flows.

2.0 METHODS

All fish collected at the bypass facilities were anesthetized, identified to species, and enumerated. Fish arriving during the peak downstream migration period from April through June were counted daily, including weekends. Fish arriving in March through November were only counted from Monday through Friday. Fish captured during other months were counted two or three times a week, depending on the number of fish for that period.

The North Fork facility can sample at a variable rate depending on the number of migrating fish. The variable sampling rate is required during the peak migration to reduce fish handling, delay and possible mortality due to fish crowding in the holding tank. Thus, during peak migration the sampler is set to target no more than 500 fish per day at the North Fork juvenile bypass. Counts were expanded based on the duration of

time the sampler was in bypass mode or sample mode. For example, counts were expanded five times if the sample duration was set to bypass for 4 minutes and sample for 1 minute. For a complete description of the counting facilities and procedures, see Boettcher and Cramer 1997.

Fish were counted at the River Mill juvenile bypass on most days during April, May and June, and about twice a week in other months. The bypass is closed during the months of December through March due to debris loading.

3.0 RESULTS

3.1 Juvenile Abundance

A total of 41,322 unmarked chinook, 5,837 marked Chinook, 41,859 steelhead, and 144,885 coho juveniles passed through the North Fork and River Mill juvenile bypass facilities in 2004 and 2005 combined (Table 1) (Table 2). Most of the fish migrated down the North Fork bypass, including 41,108 unmarked chinook, 5,800 marked Chinook, 41,757 steelhead and 144,571 coho. This confirmed previous findings that the North Fork bypass system is effectively attracting and carrying most juvenile salmonids around the North Fork hydroelectric system. Our estimates suggest that about 90% of the fish are bypassed around the complex through the North Fork bypass system. The River Mill bypass also attracted a number of downstream migrants. However, efficiency tests at River Mill bypass suggest that a sizeable number of juveniles may pass the dam during spill or through the turbines.

Downstream juvenile unmarked chinook counted at the North Fork and River Mill bypass facilities totaled 16,871 fish in 2002 and 2003 combined, compared to the 41,322 that were counted in 2004 and 2005. Previous years' estimates for the two facilities indicate that juvenile passage at both bypass facilities totaled approximately 40,054 chinook in 2001, 12,557 chinook in 2000, and 4305 chinook in 1999. In 2002 and 2003 all chinook counted were of wild origin.

During the 2004 juvenile chinook migration, 15,000 hatchery reared juvenile chinook from the Clackamas River fish hatchery were released 18.5 miles upstream of North Fork Dam at Indian Henry Campground to ensure there would be an ample number of smolts available for radio tagging during the North Fork Dam bypass radio telemetry research project. Approximately 5,837 out of the 15,000 marked chinook were evaluated at both the North Fork Evaluator and the River Mill evaluator combined.

There were 63,205 estimated wild coho that passed the North Fork and River Mill facilities in 2004 and approximately 81,635 in 2005. Previous years' counts include 106,645 wild coho in 2002 and approximately 111,624 wild coho in 2003. Year 2003 was the 5th highest downstream migration since 1959.

A combined total of approximately 41,859 unmarked steelhead juveniles used the North Fork and River Mill bypass facilities during 2004 and 2005. Previous years-combined passage at both facilities included 24,541 in 2003 and 33,703 juveniles in 2002.

Table 1. Total number of downstream juveniles estimated at the North Fork Bypass and counted at River Mill Bypass, 2004.

Month	North Fork Juvenile Bypass					River Mill Juvenile Bypass				
	Wild Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead	Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead
January	42	0	27	0	15	1	0	0	0	0
February	0	0	18	0	3	0	0	0	0	0
March	41	0	96	0	107	0	0	0	0	0
April	479	1415	2381	0	6609	21	9	9	0	24
May	2943	4384	42160	0	13540	23	22	164	0	45
June	688	1	15707	0	423	7	6	42	0	10
July	424	0	942	0	17	2	0	2	0	1
August	26	0	12	0	0	1	0	0	0	0
September	82	0	6	0	4	18	0	1	0	0
October	1574	0	104	0	74	9	0	0	0	0
November	11514	0	1032	0	291	36	0	1	0	1
December	3602	0	491	0	716	0	0	0	0	0
Total	21,415	5,800	62,976	0	21,799	118	37	219	0	81

Table 2. Total number of downstream juveniles estimated at the North Fork Bypass and counted at River Mill Bypass, 2005.

Month	North Fork Juvenile Bypass					River Mill Juvenile Bypass				
	Wild Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead	Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead
January	351	0	223	0	67	11	0	0	0	2
February	14	0	8	0	0	1	0	0	0	1
March	220	0	34	0	105	3	0	0	0	1
April	746	0	491	0	3860	14	0	5	0	8
May	9667	0	41867	0	14188	46	0	31	0	7
June	1432	0	35538	0	296	10	0	4	0	2
July	188	0	900	0	11	0	0	0	0	0
August	23	0	11	0	0	0	0	0	0	0
September	19	0	0	0	0	0	0	0	0	0
October	422	0	60	0	16	0	0	0	0	0
November	5799	0	2083	0	1129	0	0	0	0	0
December	812	0	380	0	286	11	0	0	0	0
Total	19,693	0	81,595	0	19,958	96	0	40	0	21

4.0 RUN TIMING

As in past years, the juvenile coho and steelhead migrations peaked from mid April through June (Table 3)(Table 4). Wild chinook maintained a bimodal migration with smolts leaving in the spring (April through June) and the fall (October through December).

Table 3. Actual number of juveniles and miscellaneous fish handled at North Fork and River Mill bypass facilities, 2004.

Month	Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead	Rainbow Trout	Hatchery Trout	Cutthroat	Sculpin	Lamprey
January	15	0	9	0	5	0	1	0	0	0
February	0	0	6	0	1	0	0	0	0	0
March	19	0	56	0	89	0	0	0	0	0
April	450	1259	1534	0	5291	0	0	0	0	0
May	795	1196	9658	0	3677	16	55	0	1	2
June	253	7	5379	0	148	0	93	0	0	5
July	374	0	919	0	16	0	25	0	0	17
August	14	6	0	0	0	0	0	0	1	2
September	59	0	4	0	2	0	2	0	2	1
October	796	0	52	0	37	0	0	2	0	0
November	5533	0	511	0	145	0	0	14	0	1
December	2499	0	379	0	679	0	1	13	0	6
Total	10,807	2,468	18,507	0	10,090	16	177	29	4	34

Table 4. Actual number of juveniles and miscellaneous fish handled at North Fork and River Mill bypass facilities, 2005.

Month	Chinook	Hatchery Chinook	Coho	Hatchery Coho	Steelhead	Rainbow Trout	Hatchery Trout	Cutthroat	Sculpin	Lamprey
January	217	0	164	0	49	0	1	0	0	2
February	1	0	8	0	1	0	0	0	0	1
March	3	0	34	0	106	7	1	0	1	14
April	565	0	371	0	3145	3	0	1	1	1
May	2353	0	8245	0	5018	3	8	0	4	4
June	480	0	10983	0	121	3	30	0	0	1
July	180	0	884	0	11	0	2	0	1	0
August	8	0	4	0	0	0	1	0	0	0
September	9	0	0	0	0	0	0	0	0	0
October	211	0	30	0	8	1	2	0	0	0
November	2325	0	834	0	525	0	1	30	2	0
December	559	0	154	0	30	32	4	1	0	0
Total	6,911	0	21,711	0	9,014	49	50	32	9	22