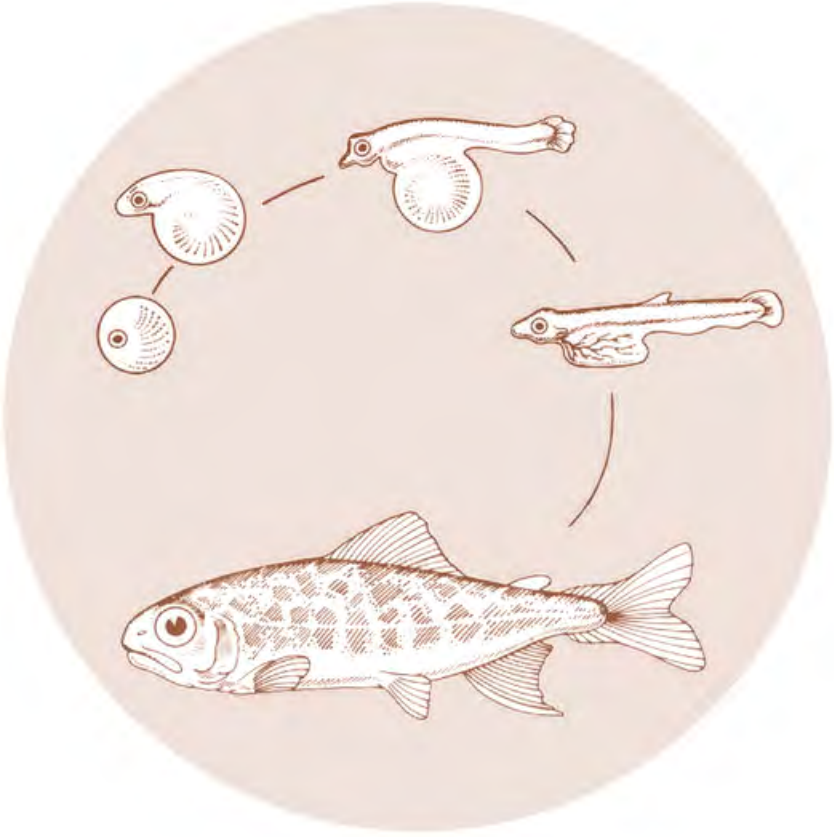
September 1996

TRAPPING AND TRANSPORTATION OF ADULT AND JUVENILE SALMON IN THE LOWER UMATILLA RIVER IN NORTHEAST OREGON

Umatilla River Basin Trap and Haul Program
October 1995 - September 1996

Annual Progress Report



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TRAPPING AND TRANSPORTATION OF ADULT AND JUVENILE SALMON IN THE LOWER UMATILLA RIVER IN NORTHEAST OREGON, 1995-1996

UMATILLA RIVER BASIN TRAP AND HAUL PROGRAM

ANNUAL PROGRESS REPORT
OCTOBER 1995 - SEPTEMBER 1996

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ABSTRACT

Threemile Falls Dam (Threemile Dam), located near the town of Umatilla, is the major collection and counting point for adult salmonids returning to the Umatilla River. Returning salmon and steelhead were collected at Threemile Dam from September 5, 1995 to July 1, 1996. A total of 2,081 summer steelhead (Oncorhvnchus mvkiss); 603 adult, 288 jack, and 338 subjack fall chinook (O. tshawvtscha); 946 adult and 53 jack coho (0. kisutch); and 2,152 adult and 121 jack spring chinook (0. tshawvtscha) were collected. All fish were trapped at the east bank facility.

Of the fish collected, 434 summer steelhead; 16 adult and four jack fall chinook; one adult coho; and 2,114 adult and 82 jack spring chinook were hauled upstream from Threemile Dam. There were 1,433 summer steelhead; 499 adult, 251 jack and 264 subjack fall chinook: 104 adult and 34 jack coho; and 20 adult spring chinook released at Threemile Dam. In addition, 841 adult and 19 jack coho and 133 summer steelhead were hauled to Minthorn for brood.

The Westland Canal juvenile facility (Westland), located near the town of Echo at river-mile (RM) 27, is the major collection point for outmigrating juvenile salmonids and steelhead kelts. The canal was open for a total of 223 days between December 5, 1995 and August 9, 1996. During that period, fish were bypassed back to the river 126 days and were trapped on 62 days. Neither the trap or bypass were operated the remaining 35 days. An estimated 8,715 pounds of juvenile fish were transported from Westland to the Umatilla River boat ramp (RM 0.5). Approximately 94% of the juveniles transported this year were salmonids. No steelhead kelts were hauled from Westland this year.

The Threemile Dam west bank juvenile bypass was operated from September 8 to October 13, 1995 and from March 18 to June 30, 1996. The juvenile trap was operated from July 1 to July 11. Daily operations at the facility were conducted by the ODFW Fish Passage Research project to monitor juvenile outmigration.

INTRODUCTION

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperatively working to rehabilitate runs of coho, fall and spring chinook and summer steelhead in the Umatilla River Basin (Figure 1). The Bonneville Power Administration (BPA) and other federal agencies are funding several projects to accomplish that goal (ODFW 1986). Included among these projects is the Umatilla River Trap and Haul Program (Fish and Wildlife Program measure 1403 [4.21]).

Releases of juvenile salmon and steelhead into the Umatilla River have increased from 27,000 in 1981to a peak of 6,365,000 in 1992. An estimated 5,500,000 juvenile salmon and steelhead were released into the Umatilla River in 1996 and long range production goals call for releasing up to 8,950,000 (CTUIR and ODFW 1989). In addition to increases in artificial production, restoration and rehabilitation projects in the upper basin are expected to have a positive impact on natural production. Although adult returns to the Umatilla River in 1995-96 reached only 6,500 fish, the long range goal for the Umatilla River is for a combined, all species return of 48,000 adult salmonids (CTUIR and ODFW 1989).

The lower 30 miles of the Umatilla River provides an obstacle to migration of both adult and juvenile salmonids during low flow periods. During both juvenile outmigration and adult return periods, parts of the lower river between Threemile and Stanfield dams can be dewatered, stranding migrating salmonids. The U.S. Fish and Wildlife Service (USFWS)(1981) and U.S. Bureau of Reclamation (BOR)(1988) have identified flows ranging from 150 cubic feet per second (cfs) to 300 cfs as being necessary for fish passage through the lower 30 miles of river. Flow enhancement and fish passage improvement projects are being built to improve passage conditions. However, even with these projects in place there are still periods when inadequate passage conditions exist.

The Umatilla River Trap and Haul Program was implemented to assist fish passage. The program goal is to maximize survival of adult and juvenile salmonids through the lower 30 miles of the Umatilla River. The two primary areas of responsibility for the program to meet this goal are: 1) to provide safe transportation for juveniles and adults around this heavily diverted stretch of river and 2) to ensure that fish passage and flow improvement projects are operated in a coordinated manner to facilitate adult and juvenile fish migration.

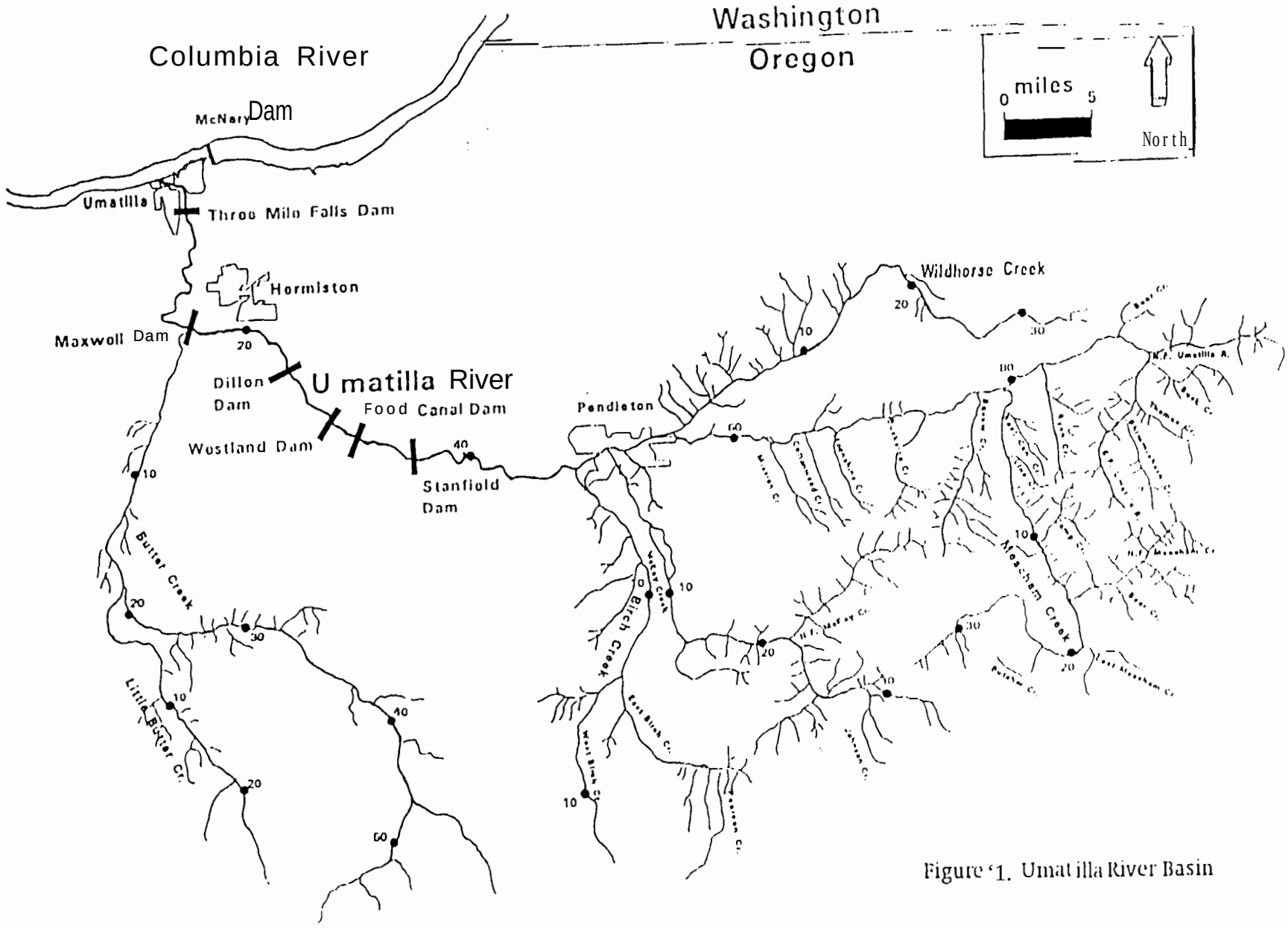

Figure 1. Umatilla River Basin

METHODS

Objective 1 – Passage Conditions Monitoring

Task 1.1 – Monitoring of River Conditions and Operation of Passage Facilities

Temperatures are monitored during the project year to help refine trap and haul operating guidelines. Temperatures are measured daily at Threemile Dam by use of a Ryan TempMentor digital recording thermometer and at loading stations and release sites with hand held thermometers.

Daily river flow is monitored at Pendleton (RM 54), Yoakum (RM 37), Dillon (RM 24.5) and Umatilla (RM 2). Daily irrigation usage is monitored for Stanfield, Westland, and Feed canals. River flow and irrigation usage data is provided by Oregon Department of Water Resources (OWRD) from the Hydromet flow gauging stations.

Coordination with OWRD and BOR is conducted to ensure that the Phase I and II components of the Umatilla Basin Project (UBP), and other flow augmentation efforts, are operated to meet fish passage requirements. The UBP target flows (BOR 1988) and USFWS (1981) minimum flow recommendations are used as general criteria for operation of the flow enhancement projects.

Bypass and ladder operations are coordinated with the Umatilla Passage Facility Operation and Maintenance (UPFO&M) crews using criteria developed for the facilities by National Marine Fisheries Service (NMFS).

Task 1.2 – Inspection of Passage Facilities

Juvenile fish screen and adult ladder facilities, located at five major irrigation diversions and at several smaller diversions, are monitored throughout the year to ensure that adequate passage conditions exist for upstream and downstream migrants. Inspections include checking for proper installation and operation of drum screens, gaps and holes in drum screens or seals, debris buildup on drum screens and trash racks, proper flows to smolt bypasses and adult ladders, adequate access and exit conditions at bypasses and ladders, and signs of fish activity.

Objective 2 – Operation of Adult Trapping Facilities

Task 2.1 – Threemile Dam Adult Trapping

Threemile Dam, located approximately three miles upstream from the mouth of the Umatilla River, is the major collection and counting point for all adults returning to the Umatilla River. The main collection facility is located on the east bank and includes a vertical slot ladder, Denil steeppass, raceway type holding pond

and fish handling and sorting complex (Figures 2 & 3). Captured adults can be directed back into the holding pond, into recovery tanks for release upstream of the dam, directly into the dam forebay or into transport tanks for hauling.

All fish routed through the sorting complex are anesthetized with carbon dioxide (C02) to reduce stress during the handling process. The capability does not exist to anesthetize adults trapped in the ladder.

Data collected during adult trapping operations includes date, number of fish trapped, species, age and sex composition, marks and disposition. Observations are also made of marine mammal damage, net marks, and general fish condition. In addition, fork length, mid-eye/hypural plate (MEHP) length, weight, scales and snouts are collected from a portion of the fish with coded wire tags (CWT.).

Fall and spring chinook are classified as either adults (fork length greater than or equal to 24 inches) or jacks (fork length less than 24 inches) as outlined in ODFW sport fishing regulations. Subjack (or mini-jack) fall chinook are defined as less than 15 inches in fork length based upon historical length frequency data (CTUIR files). Coho adults are defined as fork length greater than or equal to 18 inches and jacks as fork length less than 18 inches based upon historical length frequency data (CTUIR files). Based on scale analysis of Umatilla River summer steelhead, adult summer steelhead are classified as either one ocean (S1, fork length less than 26 inches) or two ocean (S2, fork length greater than or equal to 26 inches) (CTUIR files). Visual determinations are made to differentiate resident rainbow trout from summer steelhead (but generally less than 18 inches). No data are collected from fish designated as resident trout.

The east bank facility is to be manned 24 hours a day during the adult capture season. A trailer is provided by BPA for on-site housing. Permanent housing became available for on-site personnel in February when the Threemile Dam Adult Holding and Spawning Satellite Facility was completed. In addition to providing security, watch personnel monitor facility operations, assist trap and haul operations, and make observations of fish activity.

The west bank at Threemile Dam also has an adult collection facility (Figure 4). It consists of a vertical slot ladder, a combination V-trap/holding pond, and fish loading apparatus. The trap/holding pond and fish loading complex have no enumeration or sorting capabilities. The ladder was designed with the ability to enumerate fish using video equipment.

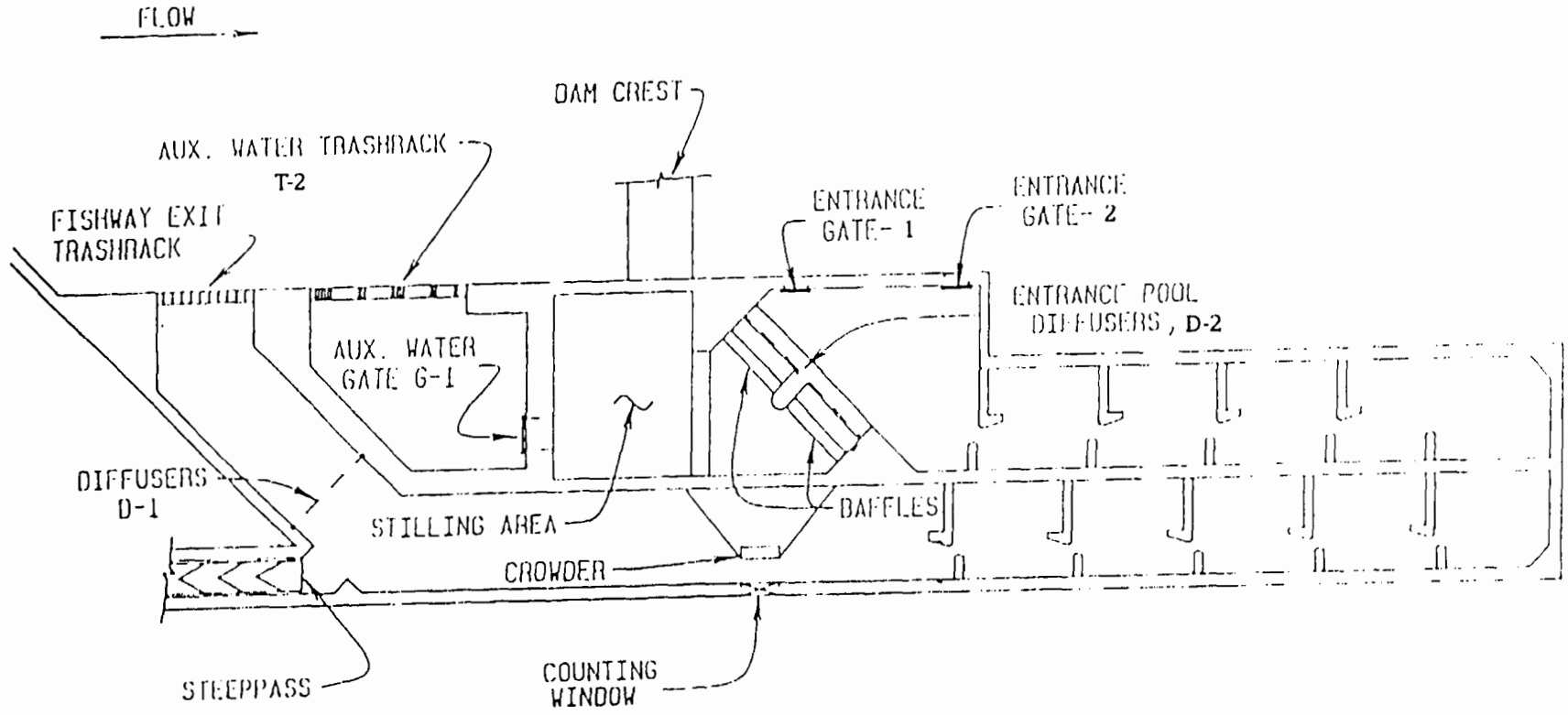

Figure 2. Threemile Dam East Bank Ladder

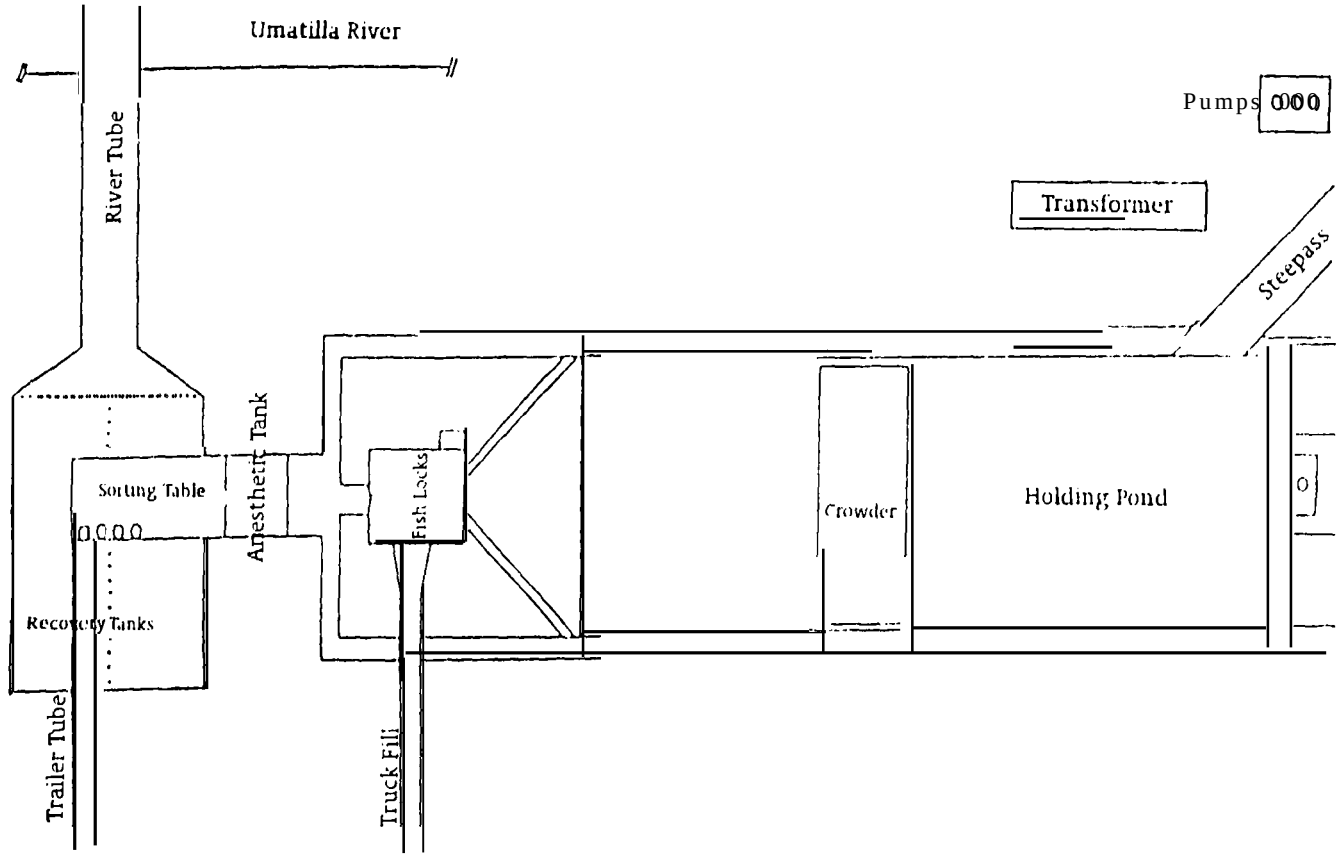

Figure 3. Threemile Dam East Bank Adult Facility

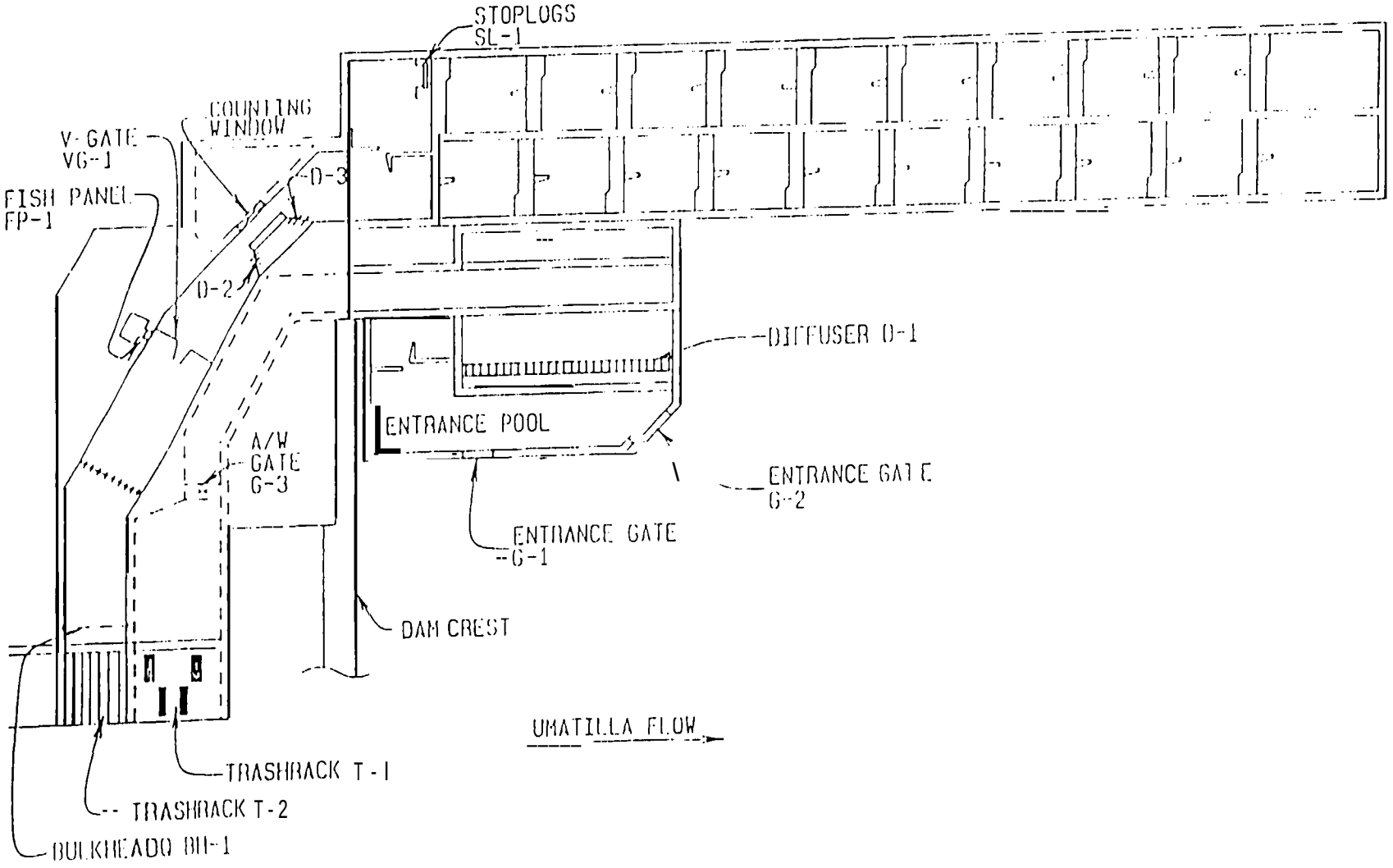

Figure 4. Threemile Dam West Bank Ladder and Adult Facility

Objective 3 – Operation of Juvenile Trapping Facilities

Task 3.1 – Westland Juvenile Facility Operation

The Westland Canal juvenile facility (Figure 5), is the major collection point for outmigrating juvenile salmonids. It is intended to be operated whenever Westland Canal is delivering water. The facility consists of rotary drum screens, fish bypass, fish trap, adult/juvenile separator (horizontal bar grader), and adult and juvenile holding ponds.

During periods of flow adequate for downstream migration, the facility is designed to operate in the bypass mode. In this mode, fish that enter the irrigation canal are shunted directly back to the river without entering the holding ponds. During periods of inadequate flow the facility is designed to trap fish, separate juveniles from adults, and direct them to their respective holding units. Juveniles can then be loaded onto trucks or trailers for transport downstream.

Information collected at Westland includes dates of both canal operation and facility operational modes. Westland is manned on a 24 hour basis from April 1 through the end of June. A trailer is provided by BPA for on-site housing and watch personnel are involved with the same general activities as watch personnel at Threemile Dam east bank.

Task 3.2 – Threemile Dam Juvenile Facility Operation

A juvenile collection facility is also located at Threemile Dam west bank (Figure 6). This facility consists of rotary drum screens, fish bypass channel, fish trap, sampling station and holding tote. It is designed to bypass outmigrating juveniles during periods of adequate flow or to trap them during low flow periods. The trapping portion of this facility was designed as a sampling and evaluation station rather than a production trap and haul facility and can be used for sampling during bypass periods.

The Threemile Dam west bank juvenile facility was operated by ODFW Fish Passage Research (FPR) this year to monitor juvenile outmigration. They were responsible for all operations at the facility while there. Trap and Haul involvement at the facility was limited to periods when ODFW FPR was not conducting operations.

Objective 4 – Adult and Juvenile Transportation

Task 4.1 – Threemile Dam Adult Hauling

The Trap and Haul program has one 3,000 gallon and two 370 gallon fish liberation units. The 3,000 gallon unit is a diesel operated tractor-trailer equipped with a 12 inch discharge opening and two holding chambers capable of isolating two groups in the

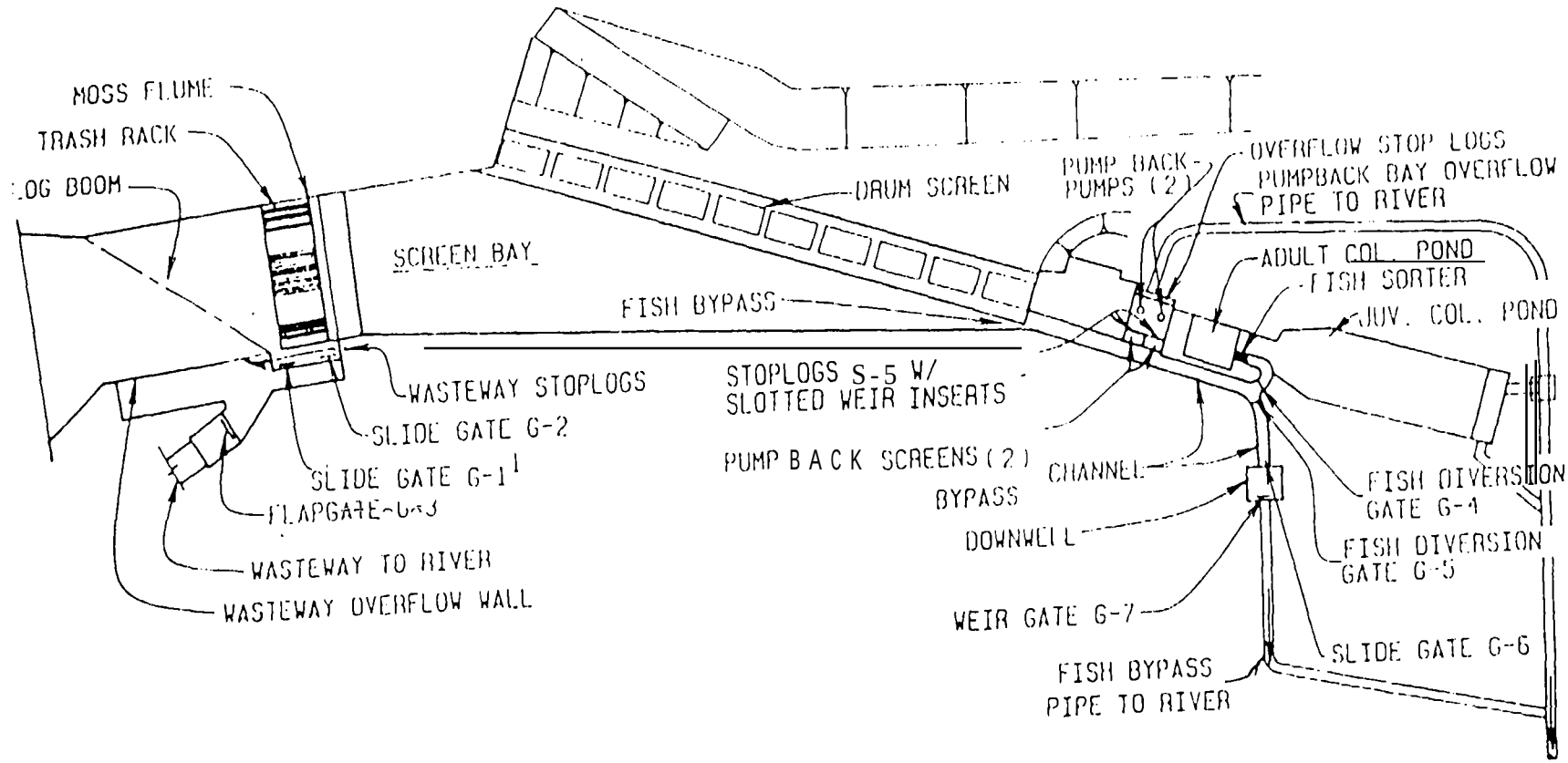

Figure 5. Westland Canal Juvenile Facility

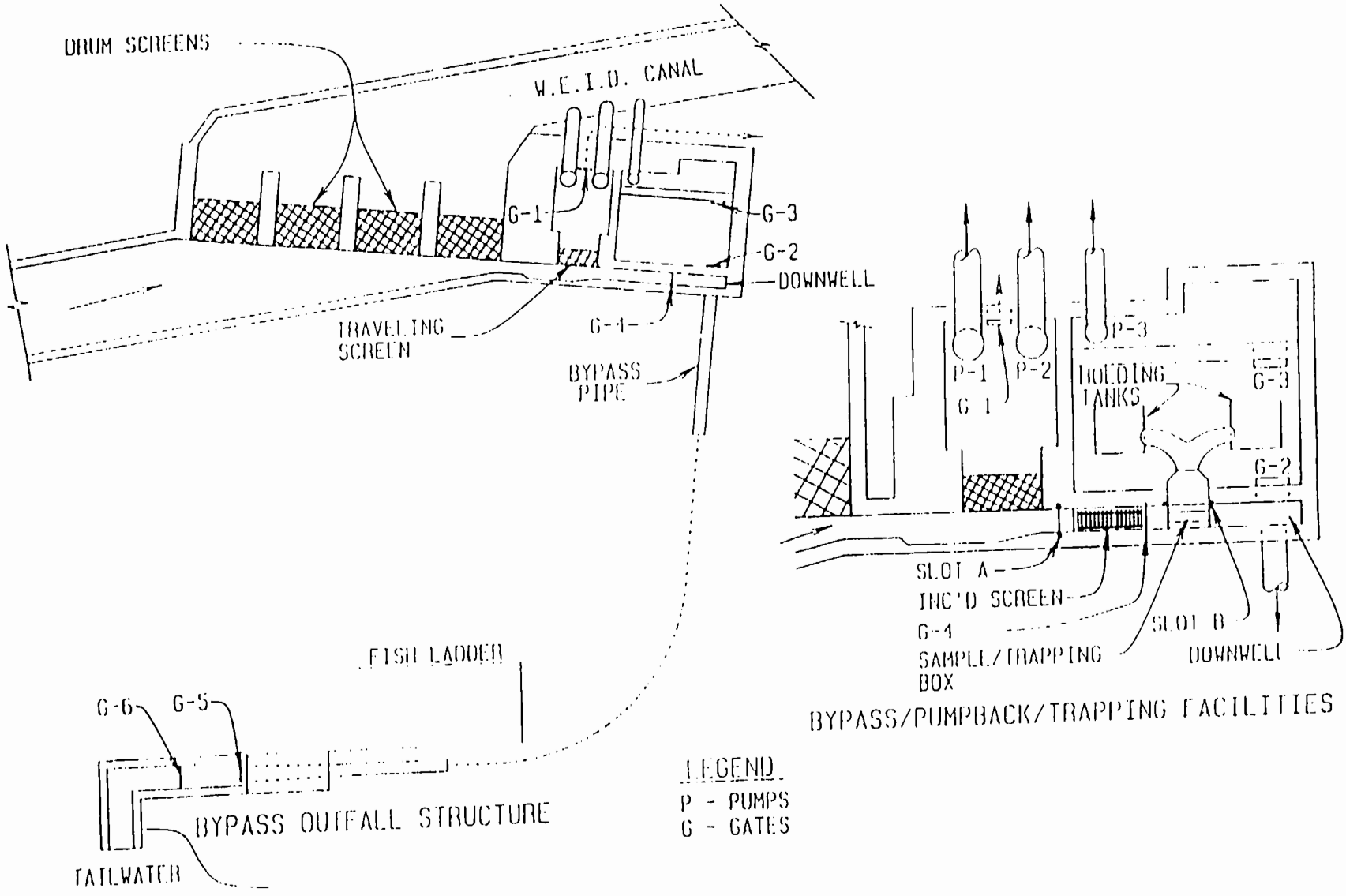

Figure 6. Threemile Dam West Bank Juvenile Facility

same load. The unit is also equipped with both liquid oxygen and electric aeration to reduce fish stress during transport. The two 370 gallon transport tanks are mounted on dual axle trailers and are pulled by pick-up trucks. Each unit is equipped with both compressed oxygen aeration and a re-circulation system, Both units have an eight inch discharge opening. ODFW liberation protocols are used as the basic guideline for -adult hauling operations.

Adult transportation requirements are based on flow criteria outlined in the 1981 USFWS study and past observations of salmon migrations in the Umatilla River. The Umatilla Hatchery and Basin Annual Operations Plan (AOP)(CTUIR and ODFW 1995) also identifies criteria for transportation of adults collected at Threemile Dam. Generally, returning adults are to be hauled whenever flows in the Umatilla River are projected to fall below 150 cfs at Dillon within 30 days. Trap and Haul personnel are also responsible for collection and.transportation of broodstock designated for Umatilla River production.

The AOP outlines release locations for adults hauled upstream from Threemile Dam. Fall chinook and coho are to be released at Barnhart (RM 42). Summer steelhead releases are to be alternated between Barnhart and Nolin (RM 33). Spring chinook and summer steelhead are to be released at Barnhart through May 15 or until flows at Pendleton dropped below 150 cfs. Releases are then to be alternated between Thornhollow (RM 73.5) and Imeques C-mem-ini-kern (Imeques)(RM 80). Spring chinook released below Pendleton are given a differential mark (caudal punch) to evaluate impact of release location on fallback and prespawn survival rates.

Returning adults are to be released at Threemile Dam whenever flows at Dillon were anticipated to remain above 150 cfs for a minimum of 30 days after release. However, the AOP identified the following groups for release at Threemile Dam regardless of flow condition: fall chinook minijacks; excess fall chinook jacks; excess coho adults and jacks; and radio tagged passage evaluation fish of all species. Fish released at Threemile Dam received a caudal fin punch to identify fallbacks.

Task 4.2 - Westland Kelt Hauling

The Westland Canal juvenile facility is also the major capture point for outmigrating summer steelhead kelts. The facility is designed to either bypass kelts directly back to the river or to trap them. Kelts entering the trap are separated from juveniles by a horizontal bar grader and then proceed into an adult holding pond. Kelts can then be loaded onto tanks for hauling downstream. Kelts are to be released at the Umatilla River boat ramp as outlined in the AOP.

Task 4.3 - Westland Juvenile Hauling

A standard Neilson impellor fish pump was borrowed from. Lookinglass Hatchery and stationed at Westland for loading juveniles captured at the Westland trap. In addition, there is an experimental Pescalator rotary auger pump located at the facility.

Juvenile transportation requirements are also based on flow criteria outlined in the 1981 USFWS study and past observations of salmon migrations in the Umatilla River. In the past, 'downstream migrants (both juveniles and kelts) were to be hauled whenever flow conditions in the Umatilla River were projected to drop below 150 cfs at Dillon within 10 days. With flow enhancement now available to assist downstream migration, hauling of‘juveniles is coordinated with fish passage flow releases.

The same transport units used for adults are used'for hauling juveniles. ODFW liberation protocols are also used as the basic guideline for juvenile hauling operations. Data collected for each transport includes date, transport unit, number of pounds hauled, and an estimate of mortality. Umatilla Hatchery Satellite Facility personnel collected information related to smolt outmigration such as size and species composition. Juveniles were to be released at the Umatilla River boat ramp as outlined in the AOP.

Task 4.4 - Threemile Dam Juvenile Hauling

The capability exists at the Threemile Dam west bank juvenile facility to trap and haul small numbers of outmigrants. Fish are to be hauled when Phase I exchange flows are discontinued at the end of June. If coordinated with trap operations at Westland Canal, only small numbers of smolts are present above Threemile Dam when trapping operations begin.

This year, trapping operations at the facility were conducted by ODFW FPR. This included transport of any juveniles collected at the facility. Juveniles were to be released at the Umatilla River boat ramp as outlined ‘in the AOP.

Task 4.5 - Other Hauling Operations

Trap and Haul personnel and equipment were available for other transportation needs related to the Umatilla Basin fisheries restoration program as long as project priorities did not preclude participation.

RESULTS

Objective-1 - Passaae Facility Monitoring

Task 1.1 - Monitoring of River Conditions and Operation of Passage Facilities

Water, temperature and flow, measured at Threemile 'Dam, exhibited extreme seasonal fluctuation during the year. The lowest daily mean temperature recorded was 2.2 C (36.0 F) on both December 8, 1995 and January 19, 1996; the highest daily mean temperature was 25.2 C (77.4 F) on July 15, 1996. The Ryan TempMentor digital recording thermometer stationed at the facility malfunctioned and data from November 7, 1995 through February 26, 1996 was lost. Temperature information available from this period was gathered from instantaneous readings recorded with a hand held thermometer during Trap and Haul operations. Flows at the Umatilla gauging station ranged from a low of less than 1.5 cfs in August to a high of 13,588 cfs in February.

Umatilla River flow at Dillon is affected by McKay Reservoir storage releases, irrigation withdrawals and natural flows. Estimated flows at Dillon'ranged from a low of less than 3 cfs in September to a high of 16,100 cfs in February. Flows at Yoakum ranged from 102 to over 14,100 cfs and flows at Pendleton ranged from 36 to 11,900 cfs. Flow and temperature information for the project year is located in Appendix A.

Phase I of the UBP was operated starting August 15, 1995 to provide flows for fall returning adult salmonids. It'operated until October 14 when exchanges with West Extension Irrigation District (WEID) were discontinued in conjunction with the end of the WEID irrigation season. Phase I exchanges restarted the following spring to help maintain UBP target flows for adult and juvenile salmonids.. It operated from May 10 to May 14, June 10 to June 24, and June 26 to July 1 when exchanges were discontinued for the summer.

Two components of the UBP Phase II project were operated this year. Exchanges with Hermiston Irrigation District (HID) were made periodically from November through May to help maintain UBP target flow levels. A partial exchange of live flow with Stanfield Irrigation District (SID) was implemented from June 1 to June 10 to assist downstream migration of juvenile fall chinook. A partial exchange of stored flow was also conducted with SID to provide additional water in McKay Reservoir for fish passage releases.

Water from McKay Reservoir was released. twice during the project year to enhance fish passage. Water was released from September 24 to November 2, 1995 to augment flows for migrating adult salmon and steelhead. Water was also released from June 1 to June 10, 1996 to assist migration of juvenile fall chinook.

Ladders and bypasses were operated in conjunction with flow enhancement efforts to maximize passage conditions for both adult and juvenile salmonids. Daily operations were coordinated with the UPFOCM crews. The magnitude and frequency of flooding in the Umatilla Basin this year in conjunction with inadequate-operation and maintenance of the facilities resulted in extended periods of operation outside of established criteria guidelines.

Task 1.2 - Inspection of Passage Facilities

Monitoring of juvenile and adult passage facilities located at the five major irrigation diversions and several smaller diversions uncovered numerous operational problems. The major problems noted this year included ladder gate mechanical breakdowns, deficient ladder attraction or access, inadequate bypass outfall conditions, improper forebay elevations, and an insufficient level of daily operation and maintenance.

Based on Phase II exchange criteria, Cold Springs Canal turned on and off a number of times during the spring. Juvenile salmonids were usually present in the canal forebay when it was dewatered. The fish were flushed directly back to the river through the bypass by lowering the canal. One adult steelhead was recovered from Westland Canal when it was dewatered in October. It was returned to the river at Westland.

Objective 2 - Operation of Adult Trapping Facilities

Task 2.1 - Threemile Dam Adult Trapping

Threemile Dam east bank ladder opened on August 15, 1995. Fish were trapped in the ladder using a V-trap until the steeppass and trap were opened on September 18. Fish trapped in the ladder were not anesthetized with C02. The ladder and adult facility operated until June 30, 1996. Severe flooding increased the frequency with which the ladder and adult facility were closed this year. The ladder was closed a total of 15 days from November through June including at least one day in every month but March and May. The adult facility was closed a total of 37 days during the same period including every month but May. With the exception of two days in June for repairs on the Phase I intake screens at McNary Dam and a couple days in February due to ice, silt and debris associated with high flow events were the reason for the facility closures.

The first returning salmon and steelhead were collected on September 5, 1995. A total of 2,081 summer steelhead; 603 adult, 288 jack and 338 subjack fall chinook; 946 adult and 53 jack coho; and -2152 adult and 121 jack spring chinook were collected at Threemile Dam. Included in the spring chinook jack total were 20 fish greater than 24 inches in length which were counted as jacks based on mark. All adults were trapped at the east bank facility. The west bank adult facility was not operated again this year.

Summer steelhead were trapped from September 5, 1995 to June 24 1996. Peak return occurred during December when 25.9% (540 of 2,081 fish) of the total return was trapped. Based on historical fork length data, 74.1% of the summer steelhead run was comprised of S1 fish and 25.9% were S2 fish.

Coho were trapped from September 19 to December 5, 1995. Peak return month for adults was November when 64.6% (611 of 946 fish) of the adults were trapped. Peak return month for jacks was September when 43.4% (23 of 53 fish) of the jacks were trapped.

Fall chinook were trapped from September 8 to November 27, 1995. Peak return month for adults was November when 49.8% (300 of 603 fish) of the adults were trapped. Peak return month, for both jacks and subjacks was October. Of the total return, 62.5% (180 of 288 fish) of the jacks and 73.1% (247 of 338 fish) of the subjacks were trapped in October.

Spring chinook were captured from April 15 to July 1, 1996.' Peak return month for both adults and jacks was May. Of the total spring chinook return, 90.3% (1944 of 2152 fish) of the adults and 81.0% (98 of 121 fish) of the jacks were trapped in May.

There were three fall chinook, one coho, 20 spring chinook, and 28 summer steelhead fallbacks (caudal punched) recovered at Threemile Dam. All fallbacks were hauled upriver for release but were not re-recorded in the daily return summaries. Tables 1 through 4 contain a daily record of adults captured during 1995-96.

In addition to capturing adult salmonids, thousands of non-game fish were collected at the east bank facility during the -trapping season. Major species collected were northern sguawfish (Ptychocheilus oregonensis), chiselmouth (Acrocheilus alutaceus), large scale sucker (Catostomus macrocheilus) and bridgelip sucker (C. columbianus). Sguawfish were sacrificed; all other non-game fish were released upstream of the dam. Juvenile salmonids and rainbow trout also entered the adult trap and were'released back to the river. Other species encountered at Threemile Dam were- bull trout (Salvelinus confluentus), whitefish (Prosopium williamsoni), pacific lamprey (Entosphenus tridentatus), and smallmouth bass (Micropterus dolomieui).

Objective 3 - Operation of Juvenile Trapping Facilities

Task 2.1 **- West&a&Juvenile Facility Operation**

Westland Canal was in 'operation for a total of 223 days between December 5, 1995 and August 9, 1996. The juvenile facility operated in the bypass mode for 126 days and in the trapping mode' for 62 days. Neither the trap or bypass were in operation the remaining 35 days that the canal was delivering water.

Table 1. 1995 Fall Chinook Return Disposition

DATE	TRAPPED				SACRIFICED				RELEASED UPSTREAM			RELEASED @ DAM			
	TOTAL	ADULTS	JACKS	SUBJACKS	TOTAL	ADULTS	JACKS	SUBJACKS	TOTAL	ADULTS	JACKS	TOTAL	ADULTS	JACKS	SUBJACKS
9-08	1	1	0	0	0				1	1		0			
9-18	1	0	1	0	0				1		1	0			
9-19	1	0	0	1	0				0			1			1
9-20	1	0	0	1	0				0			1			1
9-21	5	1	2	2	0				3	1	2	2			2
9-22	1	0	1	0	0				0			1		1	
9-25	6	0	2	4	1			1	0			5		2	3
9-26	7	4	1	2	0				4	4		3		1	2
9-27	34	13	12	9	5	1	2	2	11	10	1	18	2	9	7
9-28	61	24	18	19	9	2	2	5	0			52	22	16	14
9-29	40	9	19	12	4	1	2	1	0			36	8	17	11
9-30	27	6	8	13	2			2	0			25	6	8	11
SEPT	185	58	64	63	21	4	6	11	20	16	4	144	38	54	52
10-01	12	1	6	5	0				0			12	1	6	5
10-02	18	3	1	14	5		1	4	0			13	3		10
10-03	13	3	5	5	0				0			13	3	5	5
10-04	26	5	3	18	7			7	0			19	5	3	11
10-05	25	15	4	6	6	4	1	1	0			19	11	3	5
10-06	34	7	11	16	7	2	1	4	0			27	5	10	12
10-07	19	2	9	8	0				0			19	2	9	8
10-09	32	3	8	21	10	1		9	0			22	2	8	12
10-10	10	2	5	3	1		1		0			9	2	4	3
10-11	13	6	5	2	2	1	1		0			11	5	4	2
10-12	20	9	8	3	3	2		1	0			17	7	8	2
10-13	19	4	7	8	1			1	0			18	4	7	7
10-15	18	3	6	9	0				0			18	3	6	9
10-16	17	2	5	10	7	1	1	5	0			10	1	4	5
10-17	40	15	12	13	3		1	2	0			37	15	11	11
10-18	111	62	31	18	19	14	4	1	0			92	48	27	17
10-19	51	14	17	20	13	3	4	6	0			36	11	13	14
10-20	27	7	4	16	4	1		3	0			23	6	4	13
10-22	18	1	7	10	0				0			18	1	7	10
10-23	13	3	2	8	3			3	0			10	3	2	5
10-24	5	1	2	2	2		1	1	0			3	1	1	1
10-25	8	2	1	5	2			2	0			6	2	1	3
10-26	12	9	0	3	1	1			0			11	8		3
10-27	25	12	6	7	3	1	1	1	0			22	11	5	6
10-28	32	20	7	5	0				0			32	20	7	5
10-29	17	14	1	2	0				0			17	14	1	2
10-30	32	18	5	9	14	9	1	4	0			18	9	4	5
10-31	5	2	2	1	1		1		0			4	2	1	1
OCT	672	245	180	247	114	40	19	55	0	0	0	558	205	161	192
11-01	9	1	4	4	0				0			9	1	4	4
11-02	1	0	0	1	0				0			1			1
11-03	2	1	1	0	0				0			2	1	1	
11-07	2	0	1	1	0				0			2		1	1
11-08	7	5	1	1	0				0			7	5	1	1
11-09	27	25	2	0	4	3	1		0			23	22	1	
11-10	43	40	2	1	0				0			43	40	2	1
11-11	38	29	8	1	0				0			38	29	8	1
11-12	29	26	1	2	0				0			29	26	1	2
11-13	56	49	6	4	25	21	2	2	0			31	28	1	2
11-14	37	29	6	2	3	2		1	0			34	27	6	1
11-15	34	27	2	5	8	5	1	2	0			26	22	1	3
11-16	29	19	7	3	8	5	2	1	0			21	14	5	2
11-17	21	19	2	0	3	3			0			18	16	2	
11-18	18	17	0	1	0				0			18	17		1
11-19	3	2	1	0	0				0			3	2	1	
11-20	8	5	2	1	3	1	1	1	0			5	4	1	
11-21	2	1	0	1	2	1		1	0			0			
11-22	1	1	0	0	1	1			0			0			
11-27	5	4	1	0	3	2	1		0			2	2		
NOV	372	300	44	28	60	44	8	8	0	0	0	312	256	36	20
TOTAL	1229	603	288	338	195	88	33	74	20	16	4	1014	499	251	264

Tabb2.1695 **Coho Return Disposition**

DATE	TRAPPED TOTAL	TRAPPED ADULTS	TRAPPED JACKS	SACRIFICED TOTAL	SACRIFICED ADULTS	SACRIFICED JACKS	RELEASE0 UPSTREAM TOTAL	RELEASE0 UPSTREAM ADULTS	RELEASE0 UPSTREAM JACKS	RELEASED @ DAM TOTAL	RELEASED @ DAM ADULTS	RELEASED @ DAM JACKS	BROOD TOTAL	BROOD ADULTS	BROOD JACKS
9-19	1	0	1	0			0			1		1	0		
e-21	1	1	0	0			1	1		0			0		
S-27	2	2	0	0			0			2	2		0		
9-28	53	41	12	0			0			12	2	10	41	39	2
9-29	43	33	10	0			0			17	9	a	26	24	2
O-38	13	11	2	0			0			2		2	11	11	
SEP	113	88	25	0	0	0	1	1	a	34	13	21	78	74	4
10-M	9	8	1	0			0			1		1	6	6	
10-02	4	4	0	0			0			0			4	4	
10-03	3	1	2	0			0			3	1	2	0		
10-04	2	1	1	0			0			1		1	1	1	
10-05	29	26	3	0			0			5	2	3	24	24	
10-06	16	16	0	0			0			2	2		14	14	
10-07	7	6	1	0			0			1		1	6	6	
10-09	4	4	0	0			0			2	2		2	2	
10-10	3	3	0	0			0			0			3	3	
10-11	6		0	0			0			0			6	6	
10-12	6	8	0	0			0			0			6	6	
10-13	6	6	0	0			0			3	3		3	3	
10-15	5	3	2	0			0			2		2	3	3	
10-17	7	7	0	0			0			0			7	7	
10-18	36	36	2	0			0			0				36	2
10-19	13	12	1	0			0			5	5		6	7	1
IO-20	1	1	0	0			0			0			3	1	1
10-23	5	3	2	0			0			3	2	1	0	1	1
10-24	1	1	0	0			0			1	1				
IO-28	3	3	0	0			0			1	1		2	2	
10-26	4	4	0	0			0			0			4	4	
10-27	26	25	1	0			0			0			26	25	1
10-28	38	37	1	0			0			0			36	37	1
10-29	17	17	0	a			0			0			17	17	
10-30	7	7	0	0			0			0			7	7	
10-31	1	1	0	0			0			1	1		0		
OCT	263	246	17	0	0	0	0	0	0	31	20	11	232	226	6
11-02	4	3	1	0			0			0			4	3	1
11-07	1	0	1	0			0			1		1	0		
11-09	38	38	0	0			0			16	16		22	22	
11-10	29	29	0	0			0			29	29		0		
11-11	73	73	0	0			0			1	1		72	72	
11-12	35	34	1	0			0			3	2	1	32	32	
11-13	30	30	0	0			0			0			30	30	
11-14	301	297	4	0			0			3	3		298	294	4
11-15	88	87	1	0			0			2	2		86	85	1
11-16	15	12	3	0			0			11	11		4	1	3
11-17	4	4	0	0			0			2	2		2	2	
				0			0			1	1		0		
				0			0			1	1		0		
11-19				0			0			1	1		0		
11-28	1	1	0	0			0			1	1		0		
NOV	622	611	11	0	0	0	0	0	0	72	70	2	550	541	9
12-05	1	1	0	0			0			1	1		0		
DEC	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0
TOTAL	999	948	53	0	0	0	1	1	0	138	104	34	860	841	19

Table 3. 1995–96 Summer Steelhead Return Disposition

DATE	TRAPPED TOTAL	TRAPPED HATCHERY	TRAPPED WILD	SACRIFICED/MORTALITIES TOTAL	SACRIFICED/MORTALITIES HATCHERY	SACRIFICED/MORTALITIES WILD	RELEASED UPSTREAM TOTAL	RELEASED UPSTREAM HATCHERY	RELEASED UPSTREAM WILD	RELEASED @ DAM TOTAL	RELEASED @ DAM HATCHERY	RELEASED @ DAM WILD	BROOD TOTAL	BROOD HATCHERY	BROOD WIL
9–05	1	1	0	0			1	1		0			0		
S-07	1	1	0	0			1	1		0			0		
9–08	1	1	0	0			2	11		0			0		
S-II	2	2	0	0						0			0		
S-13	1	0	1	0			1		1	0			0		
S-IS	1	0	1	0			1		1	0			0		
9–20	4	0	4	1		1	3		3	0			0		
s-22	1	0	1	0			1		1	0			0		
S-25	1	0	1	0			1			0			0		
S-27	5	4	1	0			5	4	11	0			0		
S-28	17	7	IO	0			0			14	6	8	3	1	
9–29	IS	14	5	1	1		0			18	13	5	0		
S-30	9	3	6	1		1	0			8	3	5	0		
SEP	63	33	30	3	1	2	17	9	6	40	22	18	3	1	
10–01	9	0	9	0			0			a		9	0		
IO-02	13	6	5	2	2		0			8	5	3	3	1	
IO-03	11	5	6	0			0			11	5	6	0		
IO-04	4	2	2	0			0			4	2	2	0		
IO-05	16	5	11	1	1		0			15	4	11	0		
10–06	18	5	13	0			0			18	5	13			
10-07	11	5	6	0			0			11	5	6	8		
10-w	11	3	6	0			0			6	2	4	5	1	
10-10	7	0	7	0			0			7		7	0		
IO-II	5	0	5	0			0			5		5	0		
IO-12	9	4	5	1	1		0			6	2	4	2	1	
10-13	4	0	4	0			0			2		2	2		
IO-15	13	2	11	0			0			13	2	11	0		
IO-16	6	2	4	0			0			4	1	3	2	1	
10-17	6	4	2	1	1		0			5	3	2	0		
IO-10	15	4	11	0			0			15	4	11	0		
IO-IS	6	3	3	0			0			3	3		3		
10-20	2	1	1	0			0			1	1		1		
IO-23	14	8	6	0			0			11	5	6	3	3	
IO-24	3	0	3	0			0			3		3	0		
IO-25	5	3	2	0			0				3		0		
10–26	1	1	0	0			0			5	1	2	0		
10–27	4	1	3	0			0				1	3	0		
10–28	2	1	1	0			0			2	1	1	0		
10–30	3	0	3	0			0			4		3	0		
IO-31	1	1	0	0			0			1	1		0		
OCT	199	68	131	5	5		0	0		173	56	117	21	7	
11–02										1		1	0		
II-07	1	0	1	0			0			1		1	0		
11–09	2	1	1	1	1		0			1		1	0		
II-IO	3	0	3	0			0			3		3	0		
11-12	2	0	2	0			0			2		2	0		
11-13	3	0	3	0			0			3		3	0		
11-14	10	2	6	0			0			6	1	5	4	1	
11-15	45	14	31	1	1		0			40	13	27	4		
11–16	79	33	46	2	2		0			73	28	45	4	3	
11-17	62	22	40	4	4		0			45	13	32	13	5	
11–18	60	17	43	0			0			60	17	43	0		
II-IS	18	5	13	0			0			18	5	13	0		
II-20	11	2	9	1	1		0			6	1	5	4		
11–21	1	0	1	0			0			1		1	0		
11-24	4	2	2	0			0			4	2	2	0		
11-27	6	0	6	0			0			4		4	2		
11–28	12	0	121	0			0			12		12	0		
NOV	320	98	222	9	9		0	0		280	80	200	31	9	
12–05	80	13	67	0			0			80	13	67	0		
12–06	52	13	39	2	2		0			36	5	31	14	6	
12-07	11	5	6	0			0			11	5	6	0		
12–08	14	3	11	0			0			-10	3	7	4		
12-12	18	5	13	0			0			15	4	11	3	1	
12–16	59	16	43	0			0			59	16	43	0		
12-17	41	8	33	0			0			41	8	33	0		
12–18	56	25	31	1	1		0			36	17	IS	1s	7	
12–19	30	11	IS	4	4		0			26	7	19	0		
12-P	15	4	11	2	2		0			13	2	11	0		
12-21	39	17	22	6	6		0			33	11	22	0		
12-22	40	18	22	6	6		0			26	10	16	6		6
12-24	48	12	36	0			0			48	12	36	0		
12–26	6	4	2	3	3		0			3	1	2	0		
12–28	1	0	1	0			0			1		1	0		
12-31	30	9	21	0			0			30	9	21	0		
DEC	540	153	377	26	26		0	0		468	123	345	46	14	32
1–03	61	24	37	0			0			61	24	37	0		
1-04	67	24	42	9	a		0			52	16	36	6		6
I-05	4	0	4	0			0			4		4	0		
1–08	7	3	4	0			0			7	3	4	0		
1–09	11	4	7	0			0			11	4	7	0		
1–10	3	1	2	0			0			3	1	2	0		
1–11	1	0	1	0			0			1		1	0		
1-12	6	5	1	0			0			6	5	1	0		
I-14	17	8	8	0			0			17	8	9	0		
1–16	96	40	56	9	9		0			81	31	50	6		6
1-17	16	7	8	0			0			15	7	9	0		
I-IS	3	2	1	0			0			3	2	1	0		
I-P	6	3	3	0			0			6	3	3	0		
1-24	1	0	1	0			0			1		1	0		
1-25	2	0	2	0			0			2		2	0		
JAN	301	121	180	18	17		0	0		271	104	167	12	0	1:

Table 3. (continued)

2-16	1	0	1	0			0			1		1	0		
2-19	27	11	16	1		1	0			26	11	15	0		
2-21	4	1	3	0			0			4	1	3	0		
2-22	1	0	1	0			0			1		1	0		
2-23	1	1	0	0			0			1	1		0		
2-25	12	2	10	0			0			12	2	10	0		
2-26	2	0	2	0			0			2		2	0		
2-27	5	3	2	1	1		0			4	2	2	0		
2-29	1	1	0	0			0			1	1		0		
FEB	54	19	35	2	1	1	0	0	0	52	16	34	0	0	
3-01	1	0	1	0			0		1	1		1	0		
3-04	Bo	34	46	0			0		1	80	34	46	0		
3-05	6	2	4	0			0			6	2	4	0		
3-06	7	4	3	2	2		0			5	2	3	0		
3-07	32	15	I?	4	3	1	0			26	12	16	0		
3-08	24	11	13	1	1		0			19	10	9	4		
3-10	46	14	32	0			46	14	32	0			0		
3-11	2	0	2	2		2	0			0			0		
3-12	12	3	9	0			12	3	9	0			0		
3-15	7	2	5	0			6	2	4	1		1	0		
3-16	35	16	19	0			35	16	19	0			0		
3-17	14	6	8	0			14	6	6	0			0		
3-18	26	9	17	1	1		19	6	11	0			6		
3-19	47	30	17	1		1	46	30	16	0			0		
3-20	36	19	17	3	3		33	16	17	0			0		
3-21	31	17	14	0			26	17	9	1		1	4		
3-22	11	6	5	0			11	6	5	0			0		
3-24	25	13	12	0			25	13	12	0			0		
3-25	7	5	2	1	1		6	4	2	0			0		
3-27	3	1	2	0			2		2	1	1		0		
3-26	6	1	5	0			5		5	1	1		0		
3-29	7	3	4	0			7	3	4	0			0		
MAR	465	211	254	15	11	4	263	136	155	143	62	61	14	0	
4-01	11	6	5	2	2		6	3	5	1	1		0		
4-02	6	5	1	0			5	4	1	1	1		0		
4-03	7	5	2	0			7	5	2	0			0		
4-04	6	2	4	0			5	1	4	1	1		0		
4-05	3	1	2	0			3	1	2	0			0		
4-08	25	11	14	1	1		18	10	6	0			6		
4-09	4	1	3	0			3		3	1	1		0		
p-10	2	1	1	0			2	1	1	0			0		
4-11	5	2	3	0			4	1	3	1	1		0		
4-12	7	2	5	0			7	2	5	0			0		
4-15	15	9	6	0			15	9	6	0			0		
4-16	1	1	0	0			0			1	1		0		
4-17	3	0		0			3		3	0			0		
4-19	7	5	2	0			7	'5	2	0			0		
4-22	7	2		0			7	2	5	0			0		
4-23	2	1	1	0			2	1	1	0			0		
4-24	1	1	0	0			1	1		0			0		
4-30	11	7	4	0			11	7	4	0			0		
APR	123	62	61	3	3	0	108	53	55	6	6	0	6	0	
5-01	2	1	1	0			2	1	1	0			0		
5-02	1	1	0	0			1	1		0			0		
5-03	3	1	2	0			3	1	2	0			0		
5-04	1	1	0	0			1	1		0			0		
S-07	1	1	0	0			1	1		0			0		
5-09	1	1	0	0			1	1		0			0		
5-13	1	0	1	0			1		1	0			0		
5-15	1	0	1	0			1		1	0			0		
5-17	1	1	0	0			1	1		0			0		
5-18	1	0	1	0			1		1	0			0		
5-22	1	1	0	0			1	1		0			0		
MAY	14	6	6	0	0	0	14	8	6	0	0	0	0	0	0
6-06	1	1	0	0			1	1		0			0		
6-24	1	1	0	0			1	1		0			0		
JUN	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0
TOTAL	2081	765	1296	61	73	5	434	210	224	1433	471	962	133	31	102

Table 4. 1996 Spring Chinook Return Disposition

DATE	TRAPPED			SACRIFICED/MORTALITIES			RELEASED UPSTREAM			RELEASED @ DAM		
	TOTAL	ADULTS	JACKS	TOTAL	ADULTS	JACKS	TOTAL	ADULTS	JACKS	TOTAL	ADULTS	JACKS
4-15	1	1	0	0			0			1	1	
4-16	1	1	0	0			0			1	1	
4-17	1	1	0	0			0			1	1	
4-19	2	2	0	0			1	1		1	1	
4-22	6	6	0	0			4	4		2	2	
4-23	2	2	0	0			2	2		0		
4-24	2	2	0	0			2	2		0		
4-30	27	27	0	0			24	24		3	3	
APR	42	42	0	0	0	0	33	33	0	9	9	0
5-01	11	11	0	0			11	11		0		
5-02	22	22	0	0			18	18		4	4	
5-03	12	12	0	0			11	11		1	1	
5-04	26	26	0	0			26	26		0		
5-05	21	21	0	0			21	21		0		
5-06	18	18	0	0			16	16		2	2	
5-07	17	16	1	0			15	14	1	2	2	
5-08	15	14	1	0			15	14	1	0		
5-09	37	37	0	0			37	37		0		
5-10	30	29	1	1		1	29	29		0		
5-11	36	36	0	0			36	36		0		
5-12	62	61	1	1	1		61	60		0		
5-13	79	78	1	1		1	78	78		0		
5-14	83	81	2	1		1	81	80		1	1	
5-15	106	103	3	0			106	103	3	0		
5-16	156	156	0	1	1		154	154		1	1	
5-17	155	152	3	3	1	2	152	151		0		
5-18	67	66	1	0			67	66		0		
5-19	59	57	2	0			59	57	2	0		
5-20	240	232	8	4	1		236	231	4	0		
5-21	161	148	13	6		6	155	148		0		
5-22	161	150	11	4	2	2	157	148	9	0		
5-23	33	32	1	0			33	32		0		
5-24	170	157	13	5	1	4	165	156	9	0		
5-25	90	82	8	0			90	82	8	0		
5-26	48	46	2	0			48	46	2	0		
5-28	52	38	14	9	2		43	36		0		
5-29	18	16	2	1			17	16		0		
5-30	40	34	6	1			39	34		0		
5-31	17	13	4	1			16	13		0		
MAY	2042	1944	98	39	9	30	1992	1924	68	11	11	0
6-02	39	35	4	1	1		38	34		0		
6-03	13	10		3	2		10	8		0		
6-04	17	15	2	1			16	15		0		
6-06	22	21		1	1		21	20		0		
6-09	16	16	0	0			16	16		0		
6-10	14	11		5	2		9	9		0		
6-11	2	1		1			1	1		0		
6-12	3	2		0			3	2		0		
6-13	1	1	0	0			1	1		0		
6-14	1	1	0	0			1	1		0		
6-17	8	6	2	0			8	6		0		
6-19	7	6		0			7	6		0		
6-20	3	3	0	0			3	3		0		
6-24	16	16	0	0			16	16		0		
6-27	8	8		0			8	8		0		
6-28	8	5		3			5	5		0		
6-30	7	7	0	3	3		4	4		0		
JUN	185	164	21	18	9		167	155	11	0	0	
7-01	4	2		0			4	2	2	0		
JUL	4	2		0	0		4	2	2	0	0	
TOTAL	2273	2152	12	57	18	3	2196	2114	82	20	20	

** The following number of fish recorded as jacks in the summary table based on mark (RV or ADRV) were adults by size (>=24", 610mm):
5-14 (1), 5-15 (1), 5-19 (1), 5-21 (2), 5-22 (2), 5-25 (2), 5-28 (4), 5-30 (2), 5-31 (2), 6-04 (1), 6-10 (1), and 7-01 (1)

Westland Canal opened for groundwater recharge deliveries on Decenber 5, 1995 and switched from winter recharge to standard irrigation delivery on March 25, 1996. Natural and enhanced river flow levels were adequate to continue operation of the ladder and juvenile bypass for downstream migration until June 9 when they were closed in conjunction with the discontinuation of flow augmentation measures. Trapping began at the facility on June 10. Trap and haul operations continued for the remainder of the outmigration season until the facility was closed on August 9.

High flows throughout the spring and release of McKay water for juvenile fish passage during the fall chinook subyearling outmigration resulted in relatively low numbers of juvenile salmonids being captured at the Westland facility this year. A few hatchery rainbow trout "legals" were captured again this year. Small numbers of non-game and warmwater fish were also collected at Westland, including northern sguawfish, chiselmouth, large scale sucker, bridgelip sucker, redside shiner (Richardsonius balteatus), speckled dace (Rhinichthvs osculus), black crappie (Pomoxis nisromaculatus), brown bullhead (Ictalurus nebulosus), and carp (Cvprinus caroio).

Task 3.2 - Threemile Dam Juvenile Facility Operation

The Threemile Dam west bank juvenile bypass was open from September 8 through October 13, 1995. It was closed in conjunction with the discontinuation of WEID deliveries and Phase I exchanges. It was operated during this period by ODFW FPR in the 5 cfs mode for trapping purposes. The bypass was re-opened in the 25 cfs mode on March 18, 1996 in conjunction with WEID beginning spring operations. It operated in the 25 cfs mode until April 2. At that time, ODFW FPR again began operating the facility to monitor juvenile outmigration and the bypass flow was reduced to 5 cfs for trapping. With the exception of two days in late June during Phase I repairs at McNary Dam, natural and enhanced flows allowed the bypass to continue operating until June 30 when Phase I exchanges were terminated for the summer.

Natural and enhanced flows allowed all fish to be bypassed at the facility through the end of June. Beginning July 1, the Phase I exchange was discontinued and WEID resumed river deliveries for the summer. ODFW FPR operated the trap until July 11 to monitor juvenile presence.

Objective 4 - Adult and Juvenile Transportation

Task 4.1 - Threemile Dam Adult Hauling

Of the fish trapped at Threemile Dam, 434 summer steelhead; 16 adult and four jack fall chinook: one adult coho; and 2,114 adult and 82 jack spring chinook were hauled upstream. There were also 133 summer steelhead and 841 adult and 19 jack coho hauled for

brood. No fall or spring chinook were collected for broodstock this year. A total of 147 loads of fish were transported from Threemile Dam on 139 days. The 3,000 gallon liberation unit was used for 53 trips and one of the 370 gallon units was used for 94 trips. No double release site trips were made with the tanker this year.

Summer steelhead adults were hauled upstream from Threemile Dam 55 days between September 5, 1995 and June 24, 1996. There were also 26 trips made to Minthorn holding pond with broodstock between September 28 and April 8. Fall chinook were hauled upstream from Threemile Dam five days from September 8 to 27, 1995. One coho adult was hauled upstream on September 21. Spring chinook were hauled upstream from Threemile Dam 53 days between April 19 and July 1, 1996.

Fish condition at release generally appeared good this year with the exception of three spring chinook loads. A total of eight spring chinook adult mortalities were observed upon release. Adult hauling information, including dates, temperatures, liberation units used and release sites is included in Appendix B.

Five upriver release sites were used during 1995-96; Nolin, Yoakum, Barnhart, Thornhollow, and Bear Creek (RM 87). Barnhart was the major release site used again this year. Approximately 80% of the fall chinook, 98% of the summer steelhead, and 62% of the spring chinook hauled upstream were released at Barnhart. Adult spring chinook release criteria called for fish to be released at Barnhart until either May 15 or flows at Pendleton dropped below 150 cfs. Flows remained above 150 cfs throughout the spring and adults were transported to Barnhart through May 21 and then hauled to either Thornhollow or Bear Creek.

With the exception of two loads (May 16 and first load on May 20), all spring chinook released below Pendleton were marked with a caudal punch so that effects of release location on prespawning survival, fallback rate, and distribution could be evaluated. Data will not be available until after the spawning season and will be included in the CTUIR Umatilla Basin Natural Production Monitoring and Evaluation (UBNPME) annual report.

In addition to the fish hauled upstream, there were also 1,433 summer steelhead; 499 adult, 251 jack and 264 subjack fall chinook; 104 adult and 34 jack coho; and 20 adult spring chinook released into the forebay at Threemile Dam. All were caudal punched to identify fallbacks. Included in these numbers were adults released at Threemile Dam as part of the CTUIR Adult Passage Evaluation radio tagging study. These fish were also caudal punched for fallback identification. In addition, spring chinook and steelhead adults were radio tagged and hauled upstream to assess their movements following transport. Data and analysis from the Adult Passage study will also be included in the UBNPME annual report.

Summer steelhead adults were released at Threemile Dam on 102 days between September 28, 1995 and April 16, 1996. Fall chinook were released at Threemile Dam on 56 days between September 19 and November 27, 1995. Coho were released at Threemile Dam on 32 days between September 19 and December 5, 1995. Spring chinook were released at Threemile Dam on 12 days between April 15 and May 16, 1996. Table 5 includes release location and number by species.

Task 4.2 - Westland Kelt Hauling

No summer steelhead kelts were hauled from Westland this year. There were 21 spring chinook fallbacks recovered at Westland. Three were mortalities and 18 were hauled upriver and released at Thornhollow.

Task 4.3 - Westland Juvenile Hauling

A total of 51 loads of juveniles were hauled from Westland on 37 days between June 10 and August 9, 1996. The 3,000 gallon tanker was used for seven loads and one of the 370 gallon liberation units was used for 44 loads.

High spring flows and McKay water releases during the peak fall chinook subyearling outmigration period limited the number of juveniles captured at Westland this year. An estimated 8,715 pounds of fish were hauled from the facility. Based on species composition sampling conducted by Umatilla Hatchery Satellite Facility personnel, over 94% of the fish transported from Westland were juvenile salmonids. Species composition information is included in Table 6 and juvenile hauling information is located in Appendix C. All juveniles hauled from Westland were released at the Umatilla River boat ramp.

Task 4.4 - Threemile Dam Juvenile Hauling

No juvenile salmonids were transported by Trap and Haul personnel from the facility this year. ODFW FPR hauled all juvenile salmonids captured at Threemile Dam west bank as part of their daily operation of the facility. They would have any pertinent data on numbers, species composition, and release locations.

Task 4.5 - Other Hauling Operations

Trap and Haul personnel did not participate in any non-project transportation operations this year. The tanker was used in July by ODFW to move spring chinook broodstock from Lookingglass Hatchery to Wallowa Hatchery.

Table 5. Number of trips and adult fish hauled to each release site on the Umatilla River in 1995-96.

Release Site	Total Trips Made	Total Fish Released	Summer Steelhead Released	Spring Chinook Released	Fall Chinook Released	Coho Released
Nolin	2	2	2	0	0	0
Yoakum	4	9	4	0	4	1
Barnhart	62	1809	425	1368	16	0
Thornhollow	26	771	3	768	0	0
Bear Creek	2	60	0	60	0	0
Minthorn Brood Pond	51	993	133	0	0	860
Threemile Dam Forebay	NA	2605	1433	20	1014	138
Total	147	6249	2000	2216	1034	999

Table 6. Species composition of fish sampled at Westland juvenile facility in 1996.

Date	Total No.Fish Sampled	Number Per Pound	Hatchery Production			Natural and Unknown Production			Rainbow Trout	Non-game and Warmwater Species
			Coho	Chinook	Summer Steelhead	Coho	Chinook	Summer Steelhead		
6-10	429	51.6	0	422	1	3	1	0	2	0
6-12	408	57.3	0	406	0	0	0	1	0	1
6-14	383	53.3	0	380	1	0	0	0	1	1
6-17	432	45.5	0	426	0	1	0	0	1	4
6-19	329	42.8	0	325	0	1	0	0	0	3
6-21	329	43.9	0	325	0	0	0	1	0	3
6-24	361	43.1	0	360	0	0	0	0	1	0
6-26	318	39.1	0	317	0	0	0	0	0	1
6-28	355	38.1	0	354	0	0	0	0	0	1
7-01	313	32.3	0	310	0	1	0	0	1	1
7-09	237	23.1	0	228	0	0	0	0	0	9
7-11	271	27.4	0	266	0	0	0	0	0	5
7-16	160	21.7	0	153	0	0	0	0	0	7
7-18	183	16.1	0	170	0	0	0	0	0	13
7-23	158	20.4	0	152	0	0	0	0	0	6
7-25	117	9.3	0	83	0	0	0	0	0	34
7-31	148	12.8	0	95	0	0	0	0	0	53
8-07	178	14.6	0	24	0	0	0	0	0	154
Total	5109	---	0	4796	2	6	1	2	6	296

DISCUSSION

Objective 1 - Passage Facility Monitoring

Task 1.1 - Monitoring of River Conditions and Operation of Passage Facilities

The accuracy and timeliness of flow data from the Hydromet gauging stations continues to be adequate for project operational decisions with the possible exception of Dillon. The Dillon gauge site is located in a stream reach that experiences radical changes in channel morphology and OWRD has difficulty maintaining accurate rating curves at the station. This gauge site is the most important point for making fish passage decisions as it is located downstream of the major diversions and at what is normally the low flow point of the river. Decisions of when to implement UBP exchanges, when to augment stream flows for passage, whether to trap or bypass smolts, where to release adults, how to operate fish passage facilities, and at what flows adults and juveniles can effectively migrate are all made based on information from this gauging station.

The Phase I exchange with WEID continued this year. Flooding this spring in the mainstem Columbia River damaged the Oregon ladder auxiliary water supply traveling screens at McNary Dam. This is the diversion point for Phase I. Temporary fixes were made to the system prior to Phase I starting up which allowed Phase I to divert water for exchange until late June when more permanent repairs were made. With this one exception, the Phase I exchange program operated smoothly again this year.

There were concerns this spring with how BOR interpreted the exchange process for the HID portion of the Phase II exchange. There was reluctance by BOR to have HID discontinue diverting from the Umatilla River when flows dropped below UBP target flow levels in May. The exchange of live flow with pumped water from the Columbia River is clearly outlined in the process and there should have been no question as to when the exchange was implemented.

There were also concerns with how BOR conducted the SID portion of the Phase II exchange. First, there was a decision made by BOR in Yakima as to the duration of the live flow portion of the exchange without any communication or consultation with fisheries managers in the basin. In addition, it appears that the exchange of stored water in McKay Reservoir for fish passage was not maximized.

Coordination and cooperation in operating these exchange programs is critical for ensuring adequate fish passage conditions exist in the lower river. The UBP exchanges, along with McKay Reservoir storage releases and basin fish passage facilities, are three equally important components needed in order to provide suitable fish passage conditions. None of the three can optimize passage conditions without being used in conjunction with the other

two. In addition, these efforts need to be coordinated with irrigation district activities which may also affect passage conditions. Lack of communication by BOR with basin fisheries managers in coordinating operations this spring resulted in less suitable passage conditions than could have been provided and in two cases had direct negative impacts on juvenile passage survival.

The passage facilities operational criteria developed by NMFS needs to be updated. Changes have been made to the criteria at a number of facilities without being formalized. With new UPFO&M personnel involved in daily operation and maintenance of these facilities, up to date criteria is needed.

Task 1.2 - Inspection of Passage Facilities

The main problem observed at the lower river passage facilities was the insufficient amount of daily operation and maintenance performed by the UPFO&M project. There seems to be some confusion as to what people and/or agencies within UPFO&M have responsibility at which sites and for what activities. In addition, there appears to be a lower priority placed on operation and maintenance of the physical fish passage facilities compared to the UBP pump stations and delivery systems. This was a major problem throughout the entire project year and needs to be corrected.

There were mechanical problems with the hydraulic ladder gate system at Westland again this year. This has been ongoing for the last four years and needs to be corrected.

Adult passage concerns were noted again this year at Feed Canal diversion dam. A number of high flow events resulted in massive gravel deposition both above and below the diversion dam. Gravel deposition above the dam resulted in large flow reductions to the ladder and deposits below the dam isolated the ladder from the main river channel. There were at least four attempts made to correct the situation by moving the gravel deposits. These were only temporary corrections as high water continued to re-deposit gravel into the same locations. Large numbers of steelhead were observed trying to jump the dam in early March. This resulted in the decision to haul all steelhead above the diversions even though passage flows were adequate for release at Threemile Dam.

Major flooding this year caused all the ladders to be out of operation for extended periods and to experience some superficial damage. No major damage was incurred that prevented operation of the ladders after cleanup.

Brownell diversion dam and fishway (RM 2) are still a concern. High flows this year reduced passage problems at the site but they may still occur in other years. We again recommend the dam and fishway be modified or removed.

Monitoring of juvenile screen sites and bypasses identified concerns with two bypass outfalls this year. Changes in channel morphology left the Dillon bypass outfall approximately 100 feet from the main river channel. When flows receded, ODFW screen personnel dug a channel to the river but fish still had to traverse this shallow channel to access the river.

The river eroded away another 50 feet or more of bank behind the Westland outfall. It is now repositioned outside the main river channel. Flooding graveled in the bypass outfall and plugged the pipe on two occasions. After the first event, the bypass was inoperable for over a month because high water prevented access for equipment to open the outfall. In conjunction with the first smolt releases, Westland Irrigation District shut off their canal for five days in mid-March so juveniles would not enter the canal while the bypass was inoperable. The bypass was opened on March 19 and the canal reopened for groundwater recharge deliveries on March 20. The bypass was inoperable for only five days after the second event. In both cases, UPFO&M personnel opened the bypass.

The landowner at the Wilson and West Wilson diversions has tied into Stanfield Canal to access water for these two ditches. This will limit, if not stop, the need to divert directly from the Umatilla River. This should solve the screen problem and stop the loss of juveniles at this site.

In both instances noted above, an irrigation district or private landowner took corrective action that benefitted fish. In the Wilson case, the landowner corrected a problem that has been on-going for a number of years but which the responsible fisheries agencies never addressed. Trap and Haul has developed a solid working relationship with the irrigation districts and many private landowners in the lower river over the past few years. This is another important ingredient necessary in order to maximize fish survival benefits in the lower river.

Fall McKay Reservoir water releases to enhance adult passage provided access for adults into lower McKay Creek. A few adults and redds were observed in the creek after flow augmentation releases were discontinued. The McKay Creek barrier weir was completed during the winter but confusion over operation and maintenance responsibilities resulted in it being ineffective throughout the late winter and spring. McKay Reservoir filled very early again this year forcing BOR to release large volumes of water outside the normal release periods to maintain the reservoir within the allotted fill curve. These releases, in combination with the ineffective weir, most likely allowed both steelhead and spring chinook adults to enter the creek again this year:

Objective 2 - Operation of Adult Trapping Facilities

Task 2.1 - Threemile Dam Adult Trapping

Both the Threemile Dam east bank ladder and adult facility performed satisfactorily during the 1995-96 season. The large number of high flow events this year resulted in the facility being closed more than in previous years. High flows and the resultant heavy debris and silt require a high level of maintenance to keep the adult facility pump system running. Again, more frequent maintenance of the pump bay screens would have lessened the amount of down time during the year because of pumps shutting down.

Phase I exchanges with WEID to assist fall chinook migration and attraction into the lower Umatilla River were initiated August 14, 1995. The Phase I program is being implemented in mid-August, rather than mid-September as originally outlined in the UBP, based on fall chinook migration timing in the mainstem Columbia River. Although exchanges began August 14, no salmon or steelhead were captured until September 5. This is still earlier than would be expected without flow augmentation.

There were only a couple of minor mechanical breakdowns at the Threemile Dam east bank adult facility this year. The biggest problem at the facility was associated with the large debris and silt loads. Large amounts of debris accumulated in the dam forebay and below the dam in the ladder approaches. Adult access to the east bank ladder can be limited by debris jams in the approach steps as flows recede. The debris and silt in the forebay can limit flow to the ladder and adult facility at lower flow levels. Debris was removed three times during the year. Mud and silt bars formed in the forebay that limited the ability to release fish directly into the river from the adult facility. In December, fish had to be trailered to the upper end of the adult facility for release because the release chute area was isolated from the river by a silt bar. Silt buildups were cleared from the area around the release chute twice during the year.

Mud buildups in the holding pond caused mechanical problems with the crowder. It also prevented the crowder from resting on the floor of the pond which allowed steelhead adults to bury in the mud and get rolled under the crowder. Seven steelhead mortalities were attributed to this problem in March.

The heavy silt and debris this year also damaged the pump bay screen. The screen was bowed in, creating gaps along the bottom and sides. This allowed smolts to enter the pump bay and get sucked through the pumps. There were an estimated 100 to 200 mortalities observed. The screen was repaired prior to operations restarting. No additional smolt mortalities were observed during the year.

Less physical damage was noticed on adult spring chinook than in past years. Little damage was seen until late May when a fairly large number of fish began exhibiting mechanical damage to the lower jaw. Most of the wounds were older, suggesting that they had occurred prior to entering the Umatilla River. No unusual amount of damage was observed on the other species trapped at Threemile Dam.

The west bank adult ladder and trap were not operated again this year. Previous evaluations recommended that all Trap and Haul operations take place exclusively at the east bank unless the east bank facility becomes inoperable.

Objective 3 - Operation of Juvenile Trapping Facilities

Task 3.1 - Westland Juvenile Facility Operations

There were few problems at the Westland juvenile collection facility this year. Canal forebay elevations were more stable than in previous years. Frequent maintenance of the sensor system for the automated headgates limits the canal level fluctuations. Cleaning of the sensor tube and stilling basin should be part of the monthly preventative maintenance routine at the facility.

This year's high flow events cut further behind the Westland bypass outfall structure and the outlet is again located outside the main channel. Passage conditions are less than desireable as fish now exit the bypass onto a gravel bar rather than into the main river channel. The bypass either needs to be cut off again or some type of bank/channel stabilization control structure needs to be built so that equipment does not have to continually be put into the river to open it. BPA was to have addressed this problem the last two years but no corrective measures have yet been taken.

A combination of high natural flows and flow augmentation allowed the facility to be operated in the bypass mode until June 9. This permitted the majority of the juvenile outmigration to be bypassed at Westland. Water from McKay Reservoir was again released for juvenile passage in conjunction with decreasing natural flows and the fall chinook subyearling releases. Now that Phase II is being implemented, more McKay Reservoir storage water is available for fish passage. We expect that the standard operating procedures at Westland will be to use storage water to augment natural passage flows over a longer period and allow the majority of the juveniles to migrate volitionally. Trap and haul operations will only be implemented to assist remnant portions of the outmigration and for times outside of the UBP target flow periods.

Poor water quality conditions still restrict the number of smolts that can be effectively trapped at Westland. There were significant losses of juveniles in June again this year related to gill disease. Poor water quality conditions at the facility exacerbate any fish health problems present in outmigrating smolts

and emphasize the need to enhance natural flows to allow volitional fish migration.

Task 3.2 - Threemile Dam Juvenile Facility Operations

The Phase I exchange with WEID provides water for passage from Threemile Dam to the mouth of the Umatilla River. It is anticipated that Phase I will continue to provide sufficient water during the spring for juvenile outmigration below Threemile Dam and that the west bank juvenile facility will be operated in the bypass mode.

Objective 4 - Adult and Juvenile Transportation

Task 4.1 - Threemile Dam Adult Hauling

Project hauling equipment was generally adequate for adult transport needs in 1995-96. The small exit ports on the trailers still require the use of the 3,000 gallon tanker to haul adult chinook salmon.

With the exception of spring chinook, high natural flows in combination with enhanced fall passage flows substantially reduced the number of fish transported upstream from Threemile Dam this year. Fish were released at Threemile Dam from September through early March. Although flows remained above criteria levels into June, adults were transported from Threemile Dam beginning March 10 due to passage concerns at Feed Canal diversion dam.

All adults released at Threemile Dam were marked (caudal punch) to identify fallbacks. Most of the fallbacks recovered at Threemile Dam were captured shortly after high flow events or were radio-tagged. Our recommendation is to discontinue marking fish to identify fallbacks. The small number of fallbacks observed does not seem to justify the additional handling and stress on the fish.

Marginal temperature differentials (-10 F) were experienced again this year during the spring chinook hauling season. Because of these temperature differences and the abnormally high flow levels, spring chinook were released at Barnhart through May 21.

Although only eight spring chinook mortalities were actually observed, three spring chinook loads looked very poor at release. All three were large loads and two occurred on days when double hauls had to be made. Although the poundage hauled was within project transport guidelines, the numbers transported were higher than typically hauled in past years. Loading time may play an important part in the success of transporting adults, especially during high temperature periods. Project transportation guidelines may need to be reevaluated for situations when large- loads are being hauled under high temperatures conditions. Consideration for loading time may need to be included in this criteria. The active transport volume of the tanker also needs to be rechecked.

The adult release sites located downriver of Pendleton are inadequate. Barnhart was the only useable site for most of the year and is the only site accessible with the tanker. Access and release conditions at Barnhart were improved this year by relocating the release point to the upper end of the site. Flooding severely damaged the Nolin release site and it had to be abandoned. One or two developed release sites located downriver from Pendleton are still needed.

Three release sites above Pendleton (Thornhollow, Bear Creek and Imeques) were used this year. Bear Creek has access problems for the tanker and is a safety hazard since releases are made directly from the road. In addition, there is limited resting area for the fish and the large number of people who follow the truck immediately harass them upon release. Imeques was unusable this year as flooding reconfigured the stream channel and release conditions are now inadequate. Thornhollow was the primary upriver release site used. Access was a problem initially because the high water had damaged the road. The road needs to be upgraded prior to next year as access is questionable during wet periods. Release conditions were generally acceptable.

Task 4.2 - Westland Kelt Hauling

No kelts were hauled from Westland this year. High flows this spring allowed kelts to volitionally migrate out of the system.

Task 4.3 - Westland Juvenile Hauling

A Neilson fish pump was borrowed from Lookinglass Hatchery again this year to load fish hauled out of Westland. The fish pump was used for loading the tanker and the trailers were typically loaded by dipnet. We plan to continue using the Neilsen pump in the future. The Pescalator fish pump is still stationed at Westland and would be available for use by another project in the Columbia Basin if so desired.

Hauling operations were evaluated by ODFW FPR this year. Results of the evaluation will be included in their annual report. High temperatures continue to be noted at the Umatilla River boat ramp juvenile release site. Temperatures of over 70 F were recorded again this year.

Task 4.4 - Threemile Dam Juvenile Hauling

Trap and Haul personnel did not participate in any hauling of juveniles from Threemile Dam.

Task 4.5 - Other Hauling Operations

Trap and Haul personnel did not directly participate in any hauling operations outside of project requirements.

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Appendix A. 1995-96 Umatilla River Water Parameter Data

Date	3 MD TEMPS C	F	FLOW _@ UMATILLA	FLOW _ @ PNDLTN	FLOW@ YOAKUM	SFC FLOWS	csc FLOWS	WLC FLOWS	FLOW@ DILLON
01-Sep-95	19.4	66.9	67	45	253	86	0	139	3
02-Sep-95	19.5	67.1	67	43	254	82	0	153	3
03-Sep-95	19.7	67.5	69	42	253	82	0	154	3
04-Sep-95	19.4	66.9	70	42	252	82	0	154	3
05-Sep-95	NA	NA	70	42	254	83	0	141	3
06-Sep-95	21.6	70.9	89	44	260	82	0	157	3
07-Sep-95	21.5	70.7	114	60	281	82	0	177	3
08-Sep-95	22.0	71.6	98	61	269	76	0	173	3
09-Sep-95	22.0	71.6	99	59	255	72	0	162	3
10-Sep-95	22.0	71.6	101	55	241	74	0	144	3
11-Sep-95	22.3	72.1	88	52	226	73	0	132	3
12-Sep-95	22.8	73.0	85	50	216	72	0	133	3
13-Sep-95	22.3	72.1	82	48	202	71	0	122	3
14-Sep-95	22.1	71.8	81	46	201	69	0	120	4
15-Sep-95	22.0	71.6	76	46	222	70	0	117	5
16-Sep-95	22.1	71.8	72	46	250	71	0	124	5
17-Sep-95	22.4	72.3	80	46	253	70	0	137	6
18-Sep-95	22.1	71.8	88	47	234	67	0	132	5
19-Sep-95	21.6	70.9	82	46	226	75	0	122	5
20-Sep-95	21.2	70.2	84	46	219	73	0	113	5
1-Sep-95	20.2	68.4	84	46	201	63	0	100	4
2-Sep-95	19.0	66.2	84	45	193	65	0	89	4
3-Sep-95	18.2	64.8	90	45	187	61	0	82	4
4-Sep-95	18.2	64.8	83	46	230	71	0	87	3
5-Sep-95	19.0	66.2	85	46	293	73	0	82	70
6-Sep-95	19.3	66.7	183	49	254	69	0	53	104
7-Sep-95	19.8	67.6	212	53	257	71	0	47	105
8-Sep-95	19.7	67.5	208	59	247	73	0	54	105
9-Sep-95	18.5	65.3	207	66	256	73	0	46	99
O-Sep-95	18.7	65.7	205	62	256	72	0	52	93
01-Oct-95	18.0	64.4	195	58	249	85	0	52	101
02-Oct-95	17.5	63.5	201	57	247	77	0	42	160
03-Oct-95	17.8	64.0	245	85	272	77	0	27	173
04-Oct-95	17.0	62.6	275	110	272	73	0	25	145
05-Oct-95	16.4	61.5	268	90	229	60	0	25	142
06-Oct-95	16.6	61.9	238	76	198	20	0	25	165
07-Oct-95	16.9	62.4	262	72	188	1	0	25	161
08-Oct-95	16.4	61.5	254	71	187	1	0	25	161
09-Oct-95	16.0	60.8	254	72	187	0	0	33	158
10-Oct-95	16.2	61.2	257	70	187	0	0	46	146
11 -Ott-95	16.7	62.1	262	72	190	0	0	34	155
12-Oct-95	15.7	60.3	265	79	200	0	0	25	164
13-Oct-95	15.0	59.0	271	77	200	0	0	25	17c
14-Oct-95	14.9	58.8	269	72	192	0	0	24	164
15-Oct-95	15.2	59.4	278	68	186	0	0	24	173
16-Oct-95	16.2	61.2	273	68	184	0	0	23	166
17-Oct-95	16.1	61.0	272	68	184	0	0	21	173
18-Oct-95	15.5	59.9	278	71	188	0	0	19	187
19-Oct-95	14.3	57.7	278	72	189	0	0	13	196
20-Oct-95	13.5	56.3	291	69	186	0	0	0	20i
21-Oct-95	13.1	55.6	290	72	189	0	0	0	207
22-Oct-95	13.2	55.8	291	77	195	0	0	0	209
23-Oct-95	12.8	55.0	289	78	199	0	0	0	214
24-Oct-95	13.1	55.6	288	76	195	0	0	0	21'
25-Oct-95	13.5	56.3	285	75	195	0	0	0	210
26-Oct-95	14.2	57.6	285	79	199	0	0	0	214
27-Oct-95	13.9	57.0	285	78	198	0	0	0	214
28-Oct-95	13.1	55.6	287	76	197	0	0	0	21'
29-Oct-95	12.2	54.0	281	76	198	0	0	0	21;
30-Oct-95	11.3	52.3	274	76	181	0	0	0	199
31 -Ott-95	10.6	51.1	261	76	168	0	0	0	180

ppendix A. (continued

Date	3 MD TEMPS C	F	FLOW @ UMATILLA	FLOW @ PNDLTN	FLOW @ YOAKUM	SFC FLOWS	csc FLOWS	WLC FLOWS	FLOW@ DILLON
1 -Nov-95	9.8	49.6	243	76	149	0	0	0	154
2-Nov-95	9.0	48.2	229	76	145	0	0	0	148
3-Nov-95	8.3	46.9	215	76	121	0	0	0	121
I-Nov-95	8.1	46.6	195	76	105	0	0	0	104
5-Nov-95	9.4	48.9	178	76	103	0	0	0	97
6-Nov-95	10.4	50.7	176	78	102	0	0	0	94
7-Nov-95		47.0	177	86	109	0	0	0	100
8-Nov-95		51.0	182	88	112	0	0	0	103
9-Nov-95		51.0	180	119	125	0	0	0	107
O-Nov-95		47.0	208	145	181	0	0	0	171
1 -Nov-95		49.0	250	145	174	0	0	0	176
2-Nov-95		50.0	252	377	341	0	0	0	271
3-Nov-95		51.0	535	432	440	0	0	0	417
4-Nov-95		52.0	689	745	730	0	0	0	615
5-Nov-95		52.0	834	536	605	0	0	0	569
6-Nov-95		50.0	674	415	481	0	0	0	455
7-Nov-95		50.0	566	337	399	0	0	0	385
8-Nov-95		52.0	492	293	347	0	0	0	339
9-Nov-95		50.0	428	262	308	0	0	0	306
0-Nov-95		45.0	386	231	277	0	0	0	281
1 -Nov-95		44.0	349	209	256	0	0	0	255
2-Nov-95		NA	324	195	239	0	0	0	240
3-Nov-95		NA	309	187	231	0	0	0	231
4-Nov-95		49.0	297	182	224	0	0	0	225
5-Nov-95		NA	281	205	235	0	0	0	227
6-Nov-95		NA	333	553	482	0	0	0	385
7-Nov-95		48.0	857	896	842	0	0	0	705
!8-Nov-95		51.0	2286	6160	4710	0	0	0	3740
!9-Nov-95		NA	7128	4780	5380	0	0	0	7000
30-Nov-95		NA	4319	4260	4150	0	28	0	4100
31 -Dee-95		NA	3674	3700	3530	0	125	0	3210
02-Dec-95		NA	3108	2760	2850	0	159	0	2540
03-Dec-95		NA	2207	1590	1980	0	161	0	165O
04-Dec-95		NA	1640	1460	1530	0	160	0	1180
05-Dec-95		43.0	1270	1170	1220	0	177	52	81:3
06-Dec-95		39.0	1019	938	1020	0	166	64	603
07-Dec-95		40.0	866	788	855	0	137	56	481
08-Dec-95		36.0	725	647	729	0	150	52	36;2
09-Dec-95		NA	568	546	631	0	151	46	271
IO-Dee-95		NA	537	505	579	0	104	43	264
11 -Dee-95		NA	556	556	606	0	53	46	31:2
12-Dec-95		39.0	1010	2290	1880	0	116	47	1130
13-Dec-95		NA	2685	2270	2590	0	165	46	1940
14-Dec-95		NA	2078	1660	1940	0	176	46	1430
15-Dec-95		NA	1796	1670	1920	0	184	47	1410
16-Dec-95		42.0	1633	1570	1610	0	180	47	1250
17-Dec-95		43.0	1343	1340	1330	0	179	47	1040
18-Dec-95		41.0	1126	1070	1120	0	176	49	857
19-Dec-95		41.0	942	902	953	0	177	50	7013
20-Dec-95		40.0	782	747	828	0	177	50	596
21 -Dee-95		41.0	648	637	730	0	177	50	514
22-Dec-95		42.0	557	548	653	0	179	51	440
23-Dec-95		NA	480	484	582	0	171	51	384
24-Dec-95		40.0	414	444	524	0	158	51	339
25-Dec-95		NA	371	402	470	0	146	50	303
26-Dec-95		38.0	338	364	429	0	166	34	263
27-Dec-95		NA	284	331	391	0	174	14	224
28-Dec-95		40.0	340	314	367	0	113	6	266
29-Dec-95		NA	347	393	369	0	117	3	268
30-Dec-95		NA	547	911	890	0	139	3	501
31 -Dee-95		41 .0	1089	1230	1240	0	146	6	931

Appendix A. (continued)

Date	3 MD TEMPS C	F	FLOW @ UMATILLA	FLOW @ PNDLTN	FLOW @ YOAKUM	SFC FLOWS	c s c FLOWS	WLC FLOWS	FLOW @ DILLON
01 -Jan-96		NA	1469	1470	1570	0	143	6	1170
02-Jan-96		NA	1469	1380	1470	0	176	31	1120
03-Jan-96		46.0	1286	1320	1440	'0	196	53	1040
04-Jan-96		42.0	1433	1330	1620	0	192	53	1200
05-Jan-96		40.0	1438	1180	1510	0	180	53	1170
06-Jan-96		NA	1271	983	1320	0	177	53	1040
07-Jan-96		NA	1139	872	1200	0	184	53	937
08-Jan-96		40.0	1115	965	1260	0	189	53	960
09-Jan-96		43.0	1308	1260	1540	0	200	53	1150
lo-Jan-96		43.0	1848	1640	2300	0	194	53	1740
11 -Jan-96		43.0	2191	1560	2240	0	191	52	1840
12-Jan-96		41.0	1838	1400	1840	0	203	52	1540
13-Jan-96		NA	1518	1200	1540	0	201	52	1280
14-Jan-96		44.0	1295	984	1330	0	200	52	1100
15-Jan-96		NA	1152	904	1230	0	200	52	992
16-Jan-96		46.0	1121	962	1210	0	194	52	964
17-Jan-96		42.0	1153	1070	1270	0	195	52	1030
18-Jan-96		NA	1085	948	1160	0	195	52	936
19-Jan-96		36.0	1023	933	1100	0	194	51	879
20-Jan-96		NA	986	958	1050	0	190	51	816
21 -Jan-96		NA	1030	1050	1140	0	192	51	909
22-Jan-96		37.0	982	886	1020	0	192	51	811
23-Jan-96		NA	836	775	909	0	191	51	678
24-Jan-96		40.0	783	756	875	0	191	53	637
25-Jan-96		40.0	718	703	815	0	190	53	576
26-Jan-96		NA	632	630	747	0	192	54	506
27-Jan-96		NA	595	591	711	0	195	54	466
28-Jan-96		NA	610	555	691	0	188	54	447
29-Jan-96		NA	583	503	652	0	119	40	470
30-Jan-96		NA	591	411	525	0	5	14	482
31 -Jan-96		NA	591	344	413	0	5	4	408
01 -Feb-96		NA	591	288	419	0	5	5	420
02-Feb-96		NA	591	245	417	0	5	4	49c
03-Feb-96		NA	591	244	446	0	5	4	5oc
04-Feb-96		NA	591	274	503	0	5	33	54c
05-Feb-96		NA	591	315	582	0	5	4	62C
06-Feb-96		NA	1298	1610	1790	0	5	7	180C
07-Feb-96		NA	4865	5870	6190	0	5	6	572a
08-Feb-96		NA	11126	11400	13200	0	5	7	14300
09-Feb-96		NA	13588	11900	14100	0	0	7	16100
10-Feb-96		NA	13466	6660	9960	0	0	6	11600
11 -Feb-96		NA	8801	3800	5510	0	0	4	5040
12-Feb-96		NA	5129	2370	4170	0	0	3	249C
13-Feb-96		NA	4103	2010	3530	0	0	12	1920
14-Feb-96		NA	3606	1830	3160	0	0	52	1800
15-Feb-96		NA	3274	1770	2960	0	0	59	1720
16-Feb-96		43.0	3042	1740	2780	0	0	59	181C
17-Feb-96		NA	2785	1790	2620	0	0	56	166C
18-Feb-96		NA	3363	3400	4000	0	0	53	2730
19-Feb-96		46.0	5363	4490	5440	0	0	52	5260
20-Feb-96		NA	5340	3420	4560	0	0	52	4070
21 -Feb-96		46.0	3892	2450	3570	0	0	52	2600
22-Feb-96		43.0	3302	1980	2800	0	0	52	2190
23-Feb-96		43.0	2550	1800	2190	0	0	52	1840
24-Feb-96		NA	2113	1610	1830	0	0	51	1660
25-Feb-96		41 .o	1863	1400	1590	0	0	51	1520
26-Feb-96		38.0	1660	1180	1380	0	0	53	1370
27-Feb-96	3.4	38.1	1430	1040	1160	0	0	54	1200
28-Feb-96	3.1	37.6	1307	983	1090	0	0	54	1120
29-Feb-96	3.6	38.5	1192	904	998	0	87	54	973

Appendix A. (continued)

Date	3MDTEMPS C	3MDTEMPS F	FLOW@ UMATILLA	FLOW@ PNDLTN	FLOW@ YOAKUM	SFC FLOWS	csc FLOWS	WLC FLOWS	FLOW@ DILLON
1-Mar-96	4.2	39.6	984	877	904	0	147	54	780
2-Mar-96	5.3	41.5	935	892	865	0	149	54	736
3-Mar-96	7.5	45.5	1023	1030	1230	0	163	54	914
4-Mar-96	7.5	45.5	1682	1220	1700	0	190	56	1340
5-Mar-96	6.0	42.8	1816	1350	1790	0	203	56	1440
6-Mar-96	5.9	42.6	1663	1340	1480	0	199	56	1240
7-Mar-96	7.3	45.1	1470	1350	1390	0	192	56	1140
8-Mar-96	7.5	45.5	1364	1530	1340	0	187	56	1060
9-Mar-96	7.4	45.3	1860	2020	2140	0	204	56	1590
O-Mar-96	7.7	45.9	2508	2190	2650	0	199	56	2060
1-Mar-96	9.2	48.6	2599	2260	2750	0	189	55	2150
2-Mar-96	9.0	48.2	3251	2410	3590	0	192	55	2940
3-Mar-96	7.8	46.0	3731	2380	3720	0	194	55	3240
4-Mar-96	7.8	46.0	3424	2240	3050	0	189	42	2670
S-Mar-96	8.6	47.5	2619	2130	2520	0	190	9	2210
6-Mar-96	7.5	45.5	2307	1860	2120	0	186	9	1910
7-Mar-96	7.8	46.0	1844	1480	1730	0	194	9	1570
8-Mar-96	8.7	47.7	1615	1180	1530	0	195	10	1380
g-Mar-96	9.1	48.4	1462	986	1330	0	190	9	1220
!O-Mar-96	9.4	48.9	1182	909	1090	0	191	56	952
! l-Mar-96	9.6	49.3	1037	813	998	0	191	74	832
22-Mar-96	10.0	50.0	961	801	958	0	188	59	796
23-Mar-96	9.9	49.8	925	766	935	0	186	60	765
24-Mar-96	9.0	48.2	861	716	880	0	185	60	713
25-Mar-96	7.1	44.8	799	609	793	0	185	60	635
26-Mar-96	7.4	45.3	667	574	747	0	188	84	54E
27-Mar-96	8.8	47.8	595	551	722	0	188	92	505
28-Mar-96	9.2	48.6	522	533	698	0	187	79	497
29-Mar-96	9.0	48.2	487	507	668	0	184	73	478
3O-Mar-96	9.0	48.2	450	482	642	0	181	77	45i
31-Mar-96	9.3	48.7	496	476	945	0	181	82	628
01-Apt-96	9.1	48.4	950	559	1080	0	129	72	90:3
02-Apr-96	10.0	50.0	953	833	1180	0	70	60	95:3
03-Apr-96	10.2	50.4	109	954	1310	0	70	56	1090
04-Apr-96	10.3	50.5	116	920	1350	0	74	56	110)
05-Apr-96	10.9	51.6	1201	854	1380	0	78	59	1170)
06-Apr-96	12.4	54.3	125	831	1300	0	78	68	1100
07-Apr-96	13.9	57.0	076	917	1310	0	78	68	1100
08-Apr-96	14.7	58.5	1099	1030	1410	73	79	71	1120
09-Apr-96	14.8	58.6	163	1120	1490	67	80	93	1170
lo-Apr-96	3.3	55.9	1167	1110	1440	48	30	115	11%)
ll-Apr-96	2.2	54.0	1120	977	1380	40	0	119	1150
12-Apr-96	10.9	51.6	1176	916	1310	36	0	115	1180
13-Apr-96	0.8	51.4	891	815	1100	36	0	117	93;7
14-Apr-96	2.0	53.6	847	742	1070	38	0	122	91:3
15-Apr-96	3.3	55.9	717	693	974	44	0	132	80:7
16-Apr-96	12.8	55.0	944	709	1240	47	0	138	1020
17-Apr-96	11.8	53.2	714	760	987	53	68	143	7313
18-Apr-96	12.2	54.0	601	748	1070	62	134	143	71 1
19-Apr-96	11.4	52.5	564	709	956	61	126	147	6113
20-Apr-96	10.7	51.3	750	793	1220	61	130	149	840
21-Apr-96	11.0	51.8	591	867	1010	61	116	136	660
22-Apr-96	11.0	51.8	747	910	1340	61	106	129	894
23-Apr-96	11.1	52.0	1316	1720	2340	61	111	115	1500
24-Apr-96	10.8	51.4	4997	6160	7510	61	98	103	68710
25-Apr-96	10.2	50.4	7957	4630	6480	59	51	106	7660
26-Apr-96	9.0	48.2	4202	2780	4200	61	113	107	3610
27-Apr-96	10.5	50.9	2905	2040	3220	59	142	106	2450
28-Apr-96	10.8	51.4	2264	1830	2600	61	136	107	1890
29-Apr-96	11.7	53.1	1792	1570	2170	73	159	113	1430
30-Apr-96	12.0	53.6	1352	1330	1810	83	188	146	1020

Appendix A. (continued)

Date	3MDTEMPS C	3MDTEMPS F	FLOW@ UMATILLA	FLOW@ PNDLTN	FLOW@ YOAKUM	SFC FLOWS	csc FLOWS	WLC FLOWS	FLOW@ DILLON
01-May-96	12.1	53.8	1074	1190	1540	85	193	159	987
02-May-96	11.8	53.2	913	1060	1420	89	189	173	875
03-May-96	11.5	52.7	720	932	1150	94	178	179	619
04-May-96	11.9	53.4	474	799	1030	102	169	181	453
05-May-96	12.8	55.0	445	683	985	107	167	174	452
06-May-96	13.5	56.3	347	604	848	108	156	165	358
07-May-96	13.8	56.8	260	551	764	47	160	169	296
08-May-96	13.6	56.5	277	506	695	0	161	175	289
09-May-96	13.8	56.8	250	471	549	0	105	187	298
10-May-96	14.4	57.9	348	445	570	52	25	189	259
11-May-96	15.1	59.2	291	423	525	87	0	196	178
12-May-96	15.8	60.4	282	430	546	97	0	195	168
13-May-96	16.9	62.4	335	443	701	114	0	194	303
14-May-96	17.2	63.0	571	519	923	115	107	194	494
15-May-96	16.8	62.2	445	690	924	114	161	191	343
16-May-96	16.0	60.8	798	999	1410	101	185	184	927
17-May-96	5.5	59.9	718	1180	1550	102	185	181	889
18-May-96	12.9	55.2	1629	1540	1990	70	184	159	1750
19-May-96	3.3	55.9	1535	1610	1800	39	184	111	1510
to-May-96	4.0	57.2	1576	1490	1890	42	189	126	1580
21-May-96	13.3	55.9	1640	1320	1980	45	194	125	1690
22-May-96	2.4	54.3	1698	1320	1950	56	194	115	1700
23-May-96	12.2	54.0	1504	1260	1680	52	190	100	1480
24-May-96	13.8	56.8	1132	1170	1290	58	185	93	1030
25-May-96	15.9	60.6	898	1060	1180	62	184	120	831
26-May-96	17.6	63.7	786	913	1100	64	182	120	744
27-May-96	17.1	62.8	618	750	917	73	178	121	5x
28-May-96	15.6	60.1	451	628	857	79	146	142	48
29-May-96	15.2	59.4	430	554	787	85	40	162	443
30-May-96	15.7	60.3	414	499	742	92	0	166	427
31-May-96	16.1	61.0	351	450	677	87	0	186	359
01-Jun-96	17.5	63.5	289	405	576	66	0	197	25c
02-Jun-96	19.3	66.7	306	369	587	64	0	200	233
03-Jun-96	20.6	69.1	336	338	616	66	0	200	28
04-Jun-96	19.9	67.8	345	303	615	66	0	200	298
05-Jun-96	19.0	66.2	328	281	588	67	0	205	268
06-Jun-96	19.6	67.3	300	275	531	57	0	211	24
07-Jun-96	20.6	69.1	239	254	473	57	0	217	171
08-Jun-96	20.5	68.9	211	235	482	64	0	220	169
09-Jun-96	19.4	66.9	203	216	436	69	0	228	140
10-Jun-96	19.2	66.6	156	202	379	89	0	223	6:
11-Jun-96	19.6	67.3	103	189	382	127	0	213	2i
12-Jun-96	19.9	67.8	79	180	405	136	0	223	25
13-Jun-96	20.3	68.5	72	170	392	142	0	231	15
14-Jun-96	20.8	69.4	69	159	387	140	0	235	1:
15-Jun-96	20.9	69.6	70	150	373	135	0	232	8
16-Jun-96	20.8	69.4	69	141	386	135	0	234	14
17-Jun-96	19.8	67.6	67	134	383	24	0	229	15
18-Jun-96	17.2	63.0	68	137	355	113	0	214	1'
19-Jun-96	17.2	63.0	80	129	356	107	0	228	10
20-Jun-96	17.5	63.5	76	123	337	103	0	222	8
21-Jun-96	19.0	66.2	70	120	339	106	0	223	8
22-Jun-96	19.1	66.4	70	116	315	107	0	177	29
23-Jun-96	18.4	65.1	90	113	348	101	0	209	1:
24-Jun-96		NA	91	119	367	96	0	185	69
25-Jun-96		NA	34	120	298	89	0	180	30
26-Jun-96		NA	56	116	275	83	0	176	1!
27-Jun-96	19.1	66.4	94	129	268	77	0	161	2:
28-Jun-96	18.5	65.3	104	152	258	78	0	138	3
29-Jun-96	19.0	66.2	118	128	234	77	0	136	2
30-Jun-96	20.2	68.4	93	116	206	77	0	118	1

Appendix A. (continued)

Date	3MD TEMPS C	F	FLOW@ UMATILLA	FLOW@ PNDLTN	FLOW@ YOAKUM	SFC FLOWS	csc FLOWS	WLC FLOWS	FLOW@ DILLON
01-Jul-96	22.4	72.3	37	107	228	85	0	112	6
02-Jul-96	24.3	75.7	3	100	327	96	0	188	4
03-Jul-96	23.7	74.7	8	95	347	98	0	216	4
04-Jul-96	23.3	73.9	7	91	352	98	0	208	4
05-Jul-96	21.9	71.4	14	90	358	101	0	230	4
06-Jul-96	20.5	68.9	23	88	337	102	0	220	4
07-Jul-96	21.3	70.3	13	85	327	102	0	221	4
08-Jul-96	22.8	73.0	10	81	312	102	0	208	4
09-Jul-96	23.8	74.8	6	77	298	88	0	182	6
10-Jul-96	23.3	73.9	6	73	298	85	0	191	6
11-Jul-96	23.3	73.9	4	72	300	88	0	194	5
12-Jul-96	24.3	75.7	2	69	297	83	0	187	4
13-Jul-96	24.1	75.4	5	67	295	81	0	186	4
14-Jul-96	24.9	76.8	4	65	284	84	0	177	4
15-Jul-96	25.2	77.4	3	64	280	89	0	168	4
16-Jul-96	24.0	75.2	2	62	283	90	0	166	4
17-Jul-96	22.1	71.8	3	61	287	88	0	175	4
18-Jul-96	20.0	68.0	11	65	280	81	0	176	5
19-Jul-96	20.0	68.0	8	64	255	69	0	165	3
20-Jul-96	21.1	70.0	7	62	251	67	0	159	3
21-Jul-96	221	71.8	4	61	253	66	0	177	4
22-Jul-96	23.3	73.9	3	58	244	63	0	165	5
23-Jul-96	24.4	75.9	2	56	260	66	0	159	6
24-Jul-96	24.3	75.7	3	51	306	76	0	189	4
25-Jul-96	24.2	75.6	2	50	337	81	0	223	4
26-Jul-96	24.2	75.6	2	48	325	79	0	212	4
27-Jul-96	24.1	75.4	3	46	325	83	0	211	3
28-Jul-96	24.4	75.9	6	45	318	79	0	204	3
29-Jul-96	23.7	74.7	6	44	309	76	0	200	3
30-Jul-96	24.0	75.2	2	48	313	75	0	198	4
31-Jul-96	23.6	74.5	2	47	291	75	0	182	5
01-Aug-96	23.7	74.7	2	42	289	73	0	178	5
02-Aug-96	22.2	72.0	1	41	306	76	0	198	5
03-Aug-96	20.5	68.9	7	45	307	79	0	195	5
04-Aug-96	19.8	67.6	10	45	292	75	0	196	6
05-Aug-96	19.7	67.5	8	44	290	77	0	195	6
06-Aug-96	19.9	67.8	5	47	279	71	0	178	5
07-Aug-96	20.5	68.9	4	47	293	67	0	191	5
08-Aug-96	21.4	70.5	3	43	279	66	0	180	5
09-Aug-96	22.4	72.3	3	41	276	64	0	173	5
10-Aug-96	23.0	73.4	4	40	273	62	0	170	6
11-Aug-96	23.4	74.1	3	39	271	62	0	170	4
12-Aug-96	22.2	72.0	2	38	268	61	0	168	4
13-Aug-96	21.3	70.3	4	38	281	69	0	179	6
14-Aug-96	21.9	71.4	25	39	275	73	0	174	7
15-Aug-96	24.5	76.1	75	37	269	73	0	168	8
16-Aug-96	21.4	70.5	69	36	260	73	0	156	6
17-Aug-96	21.0	69.8	61	36	260	67	0	159	5
18-Aug-96	20.2	68.4	64	40	265	62	0	171	4
19-Aug-96	19.9	67.8	69	41	262	61	0	166	4
20-Aug-96	19.6	67.3	76	42	257	62	0	156	9
21-Aug-96	19.8	67.6	78	44	260	57	0	164	8
22-Aug-96	19.6	67.3	72	44	268	63	0	181	9
23-Aug-96	19.9	67.8	74	44	264	63	0	185	6
24-Aug-96	20.5	68.9	74	40	261	60	0	173	5
25-Aug-96	20.6	69.1	75	37	266	61	0	163	5
26-Aug-96	20.2	68.4	78	37	270	62	0	161	8
27-Aug-96	19.4	66.9	81	39	279	62	0	176	7
28-Aug-96	19.3	66.7	87	46	271	62	0	182	6
29-Aug-96	19.9	67.8	74	45	274	62	0	175	5
30-Aug-96	20.4	68.7	73	40	258	61	0	160	4
31-Aug-96	20.3	68.5	76	39	231	54	0	144	4

Appendix B. 1995-96 Threemile Dam Adult Transportation Summary

Date	Loading Site Temperature	Release Site Temperature	Number Hauled	Release Site	Liberation Unit
9-05	67	67	1	Barnhart	Trailer
9-07	68	64	1	Barnhart	Trailer
9-08	68	64	2	Barnhart	Trailer
9-11	65	64	2	Barnhart	Trailer
9-13	68	64	1	Barnhart	Trailer
9-18	68	64	1	Yoakum	Trailer
9-19	68	64	1	Yoakum	Trailer
9-20	66	64	3	Yoakum	Trailer
9-21	65	63	4	Yoakum	Trailer
9-22	60	57	1	Nolin	Trailer
9-25	60	64	1	Nolin	Trailer
9-26	62	61	4	Barnhart	Trailer
9-27	64	60	16	Barnhart	Tanker
9-28	64	57	44	Minthorn	Tanker
9 - 2 9	61	56	26	Minthorn	Tanker
9-30	64	56	11	Minthorn	Tanker
10-01	61	57	8	Minthorn	Tanker
10-02	61	64	7	Minthorn	Trailer
10-04	58	57	1	Minthorn	Trailer
10-05	56	55	24	Minthorn	Trailer
10–06	62	57	14	Minthorn	Tanker
10-07	59	55	6	Minthorn	Trailer
10-09	52	55	7	Minthorn	Trailer
10-10	52	55	3	Minthorn	Trailer
10-l 1	57	55	8	Minthorn	Trailer
10-12	56	56	8	Minthorn	Trailer
10–13	56	54	5	Minthorn	Trailer
10-15	54	53	3	Minthorn	Trailer
10–16	56	55	2	Minthorn	Trailer
10-17	56	56	7	Minthorn	Trailer
10–18	53	56	38	Minthorn	Trailer
10-19	51	53	11	Minthom	Trailer
10-20	51	54	2	Minthorn	Trailer
10–23	49	52	5	Minthorn	Trailer
10–25	51	53	2	Minthorn	Trailer
10–26	50	53	4	Minthorn	Trailer
10–27	51	53	26	Minthorn	Trailer
10–28	48	53	38	Minthorn	Trailer
10-29	48	53	17	Minthom	Trailer
1 O-30	46	50	7	Minthorn	Trailer
11-02	41	47	4	Minthorn	Trailer
11-09	NA	NA	22	Minthorn	Trailer
11–11	49	53	72	Minthorn	Tanker
11-12	50	53	32	Minthorn	Trailer
11-13	51	52	30	Minthorn	Trailer
11-14	52	56	298	Minthorn	Tanker
11-14	52	56	4	Minthorn	Trailer
11-15	52	55	86	Minthorn	Tanker
11-15	52	55	4	Minthorn	Trailer
11-16	54	53	8	Minthorn	Trailer
11-17	50	51	15	Minthorn	Trailer
11-20	49	51	4	Minthorn	Trailer
11-27	48	NA	2	Minthorn	Trailer

Appendix B. (continued)

Date	Loading Site Temperature	Release Site Temperature	Number Hauled	Release Site	Liberation Unit
12-06	39	42	14	Minthorn	Trailer
12-08	42	43	4	Minthorn	Trailer
12-12	39	42	3	Minthorn	Trailer
12-18	41	47	19	Minthorn	Trailer
12-22	42	43	6	Minthorn	Trailer
1-14	42	47	6	Minthorn	Trailer
1-16	46	47	6	Minthorn	Trailer
No transports were made in the month of February					
3-08	48	46	4	Minthom	Trailer
3-10	47	45	46	Barnhart	Trailer
3-12	50	45	12	Bamhart	Trailer
3-15	50	50	6	Barnhart	Trailer
3-16	45	42	35	Barnhart	Trailer
3-17	45	44	14	Barnhart	Trailer
3-18	48	44	19	Barnhart	Trailer
3-18	48	48	6	Minthorn	Trailer
3-19	48	48	46	Barnhart	Trailer
3-20	48	46	33	Barnhart	Trailer
3-21	49	48	26	Barnhart	Trailer
3-21	49	47	4	Minthorn	Trailer
3-22	50	46	11	Barnhart	Trailer
3-24	46	46	25	Barnhart	Trailer
3-25	45	46	6	Barnhart	Trailer
3-27	47	46	2	Barnhart	Trailer
3-28	46	46	5	Barnhart	Trailer
3-29	48	44	7	Barnhart	Trailer
4-01	49	46	8	Barnhart	Trailer
4-02	51	54	5	Barnhart	Trailer
4-03	50	52	7	Barnhart	Trailer
4-04	50	52	5	Barnhart	Trailer
4-05	NA	NA	3	Barnhart	Trailer
4-08	57	54	18	Barnhart	Trailer
4-08	57	52	6	Minthorn	Trailer
4-09	59	55	3	Barnhart	Trailer
4-10	56	56	2	Barnhart	Trailer
4-11	55	54	4	Barnhart	Trailer
4-12	53	52	7	Barnhart	Trailer
4-15	56	54	15	Barnhart	Trailer
4-17	56	56	3	Barnhart	Trailer
4-19	54	47	8	Barnhart	Trailer
4-22	54	48	11	Barnhart	Tanker
4-23	54	47	4	Barnhart	Trailer
4-24	53	48	3	Barnhart	Trailer
4-30	55	57	35	Barnhart	Tanker

ppendix B. (continued)

Date	Loading Site Temperature	Release Site Temperature	Number Hauled	Release Site	Liberation Unit
5-01	54	51	13	Barnhart	Tanker
5-02	53	50	19	Barnhart	Tanker
5-03	55	49	14	Barnhart	Tanker
5-04	52	47	27	Barnhart	Tanker
5-05	56	46	21	Barnhart	Tanker
5-06	57	50	16	Barnhart	Tanker
5-07	59	53	16	Barnhart	Tanker
5-08	58	50	15	Barnhart	Tanker
5-09	58	53	38	Barnhart	Tanker
5-10	59	53	29	Barnhart	Tanker
5-11	60	54	36	Barnhart	Tanker
5-12	62	55	61	Barnhart	Tanker
5-13	62	58	79	Barnhart	Tanker
5-14	65	55	81	Barnhart	Tanker
5-15	65	60	107	Barnhart	Tanker
5-16	64	56	154	Barnhart	Tanker
5-17	61	56	86	Barnhart	Tanker
5-17	61	55	67	Barnhart	Tanker
5-18	58	54	68	Barnhart	Tanker
5-19	57	51	59	Barnhart	Tanker
5-20	54	54	132	Barnhart	Tanker
5-20	59	56	104	Barnhart	Tanker
5-21	59	51	106	Barnhart	Tanker
5-21	57	51	49	Thornhollow	Tanker
5-22	55	50	158	Thornhollow	Tanker
5-23	53	49	33	Thornhollow	Tanker
5-24	56	51	165	Thornhollow	Tanker
5-25	58	51	90	Thornhollow	Tanker
5-26	61	56	48	Thornhollow	Tanker
5-28	60	51	43	Bear Creek	Tanker
5-29	59	49	17	Bear Creek	Tanker
5-30	60	52	39	Thornhollow	Tanker
5-31	60	54	16	Thornhollow	Tanker
6-02	65	63	38	Thornhollow	Tanker
6-03	65	64	10	Thornhollow	Tanker
6-04	67	60	16	Thornhollow	Tanker
6-06	66	62	22	Thornhollow	Tanker
6-09	65	59	16	Thornhollow	Tanker
6-10	66	65	9	Thornhollow	Tanker
6-11	NA	NA	1	Thornhollow	Trailer
6-12	NA	NA	3	Thornhollow	Trailer
6-13	NA	NA	1	Thornhollow	Trailer
6-14	69	67	1	Thornhollow	Tanker
6-17	69	62	8	Thornhollow	Tanker
6-19	66	NA	7	Thornhollow	Trailer
6-20	69	NA	3	Thornhollow	Trailer
6-24	60	63	17	Thornhollow	Tanker
6-27	68	64	8	Thornhollow	Trailer
6-28	68	64	5	Thornhollow	Trailer
6-30	68	65	4	Thornhollow	Trailer
7-01	72	72	4	Thornhollow	Trailer

Appendix C. 1996 Westland Juvenile Transportation Summary

Date	Loading Site Temperature	Release Site Temperature	Pounds Hauled	Release Site	Liberation Unit
6-10	61	65	90	URBR	Trailer
6-11	64	67	140	URBR	Trailer
6-11	61	65	140	URBR	Trailer
6-11	66	68	200	URBR	Trailer
6-12	62	66	160	URBR	Trailer
6-12	62	66	150	URBR	Trailer
6-12	65	65	80	URBR	Trailer
6-13	64	67	350	URBR	Tanker
6-13	62	64	70	URBR	Trailer
6-14	64	70	450	URBR	Tanker
6-15	63	67	375	URBR	Tanker
6-16	63	67	140	URBR	Trailer
6-16	61	67	180	URBR	Trailer
6-17	60	66	750	URBR	Tanker
6-18	56	65	275	URBR	Tanker
6-18	56	65	90	URBR	Trailer
6-19	60	60	150	URBR	Trailer
6-20	60	65	180	URBR	Trailer
6-21	61	64	200	URBR	Trailer
6-21	62	64	130	URBR	Trailer
6-23	61	67	180	URBR	Trailer
6-24	60	66	600	URBR	Tanker
6-25	62	64	140	URBR	Trailer
6-26	61	66	175	URBR	Trailer
6-27	59	65	250	URBR	Trailer
6-28	61	64	200	URBR	Trailer
6-28	62	65	200	URBR	Trailer
6-28	62	67	200	URBR	Trailer
6-29	58	62	180	URBR	Trailer
6-30	61	68	100	URBR	Trailer
7-01	68	68	150	URBR	Trailer
7-01	68	68	160	URBR	Trailer
7-01	72	71	150	URBR	Trailer
7-01	71	71	100	URBR	Trailer
7-02	71	76	600	URBR	Tanker
7-02	72	68	90	URBR	Trailer
7-03	69	74	150	URBR	Trailer
7-05	61	67	30	URBR	Trailer
7-09	68	69	60	URBR	Trailer
7-11	66	70	35	URBR	Trailer
7-16	68	68	50	URBR	Trailer
7-18	64	67	40	URBR	Trailer
7-23	70	71	45	URBR	Trailer
7-25	68	70	45	URBR	Trailer
7-26	67	72	40	URBR	Trailer
7-29	68	76	50	URBR	Trailer
7-31	68	70	25	URBR	Trailer
8-01	65	72	30	URBR	Trailer
8-05	62	69	150	URBR	Trailer
8-07	66	72	90	URBR	Trailer
8-09	69	76	100	URBR	Trailer