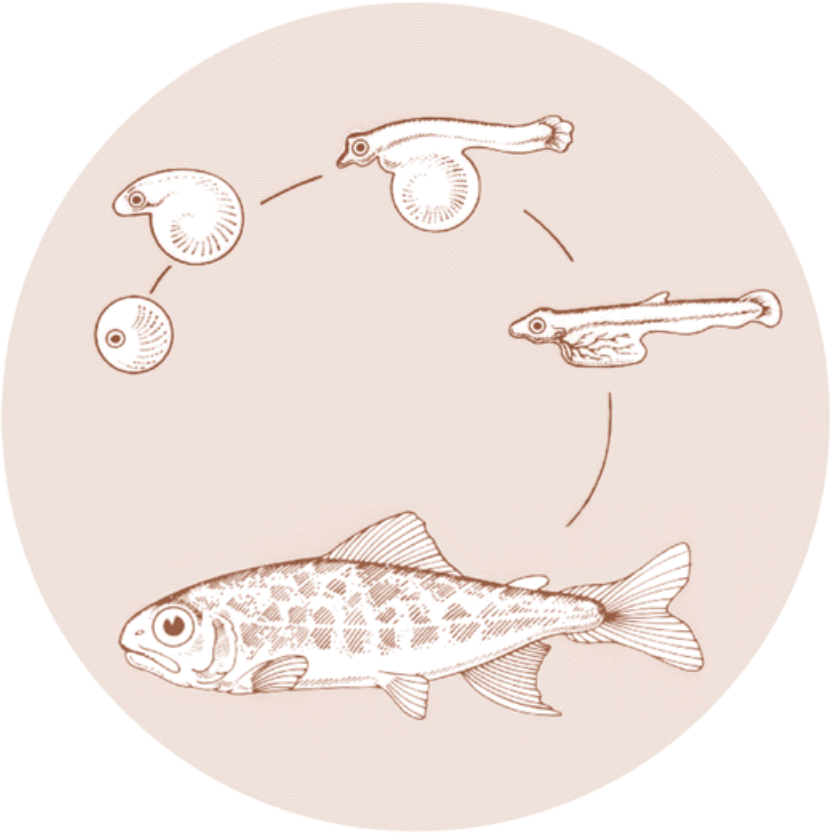
July 1991

HOOD RIVER PRODUCTION MASTER PLAN

Appendices 1991



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HOOD RIVER PRODUCTION MASTER PLAN

Appendices
1991

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TABLE OF CONTENTS

APPENDIX A: Juvenile Hatchery Spring Chinook Releases in the Hood River Subbasin 1

APPENDIX B: Juvenile Hatchery Summer Steelhead Releases in the Hood River Subbasin 3

APPENDIX C: Juvenile Hatchery Winter Steelhead Releases 9

APPENDIX D: Releases of Adult Anadromous Salmonids in the Hood River Subbasin 12

APPENDIX E: Releases of Anadromous Salmonids by the Salmon and Trout Enhancement Program in the Hood River Subbasin 14

APPENDIX F: Releases of Juvenile Hatchery Sea Run Cutthroat Trout in the Hood River Subbasin 16

APPENDIX G: Releases of Hatchery Rainbow Trout in the Hood River Subbasin 18

APPENDIX H: Water Quality Information 38

APPENDIX A

Juvenile Hatchery Spring Chinook Releases in the Hood River Subbasin

Table 1. Juvenile spring chinook Releases in the West Fork of Hood River, 1985-1990.

Br00d Year	Hatchery	Brood stock	Mark	Date	Size (fish/Lb)	Number	Release site
1985	Irrigon	Carson/Lookingglass		06/18/86	2 3	92,680	Hood River, W. Fk.
1986	Bonneville	Carson/Lookingglass		03/14/88	9.72	8,648	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	10.77	9,150	Hood River, W. Fk.
	Bomeville	Carson/Lookingglass		03/14/88	10.13	11,644	Hood River, U. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	11.23	34,548	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	9 . R	22.249	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	10.61	5,689	Hood River, U. Fk.
	Bomeville	Carson/Lookingglass		03/14/88	10.51	4,988	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	9.3s	11,Rb	Hood River, W. Ft.
	Bonneville	Carson/Lookingglass		03/14/88	10.24	12,288	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	11.38	14,443	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/14/88	11.13	14,570	Hood River, W. Fk.
1987	Bomeville	Carson/Lookingglass		03/09/89	10.01	8,989	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/09/89	10.98	32,117	Hood River, U. Fk.
	Bonneville	Carson/Lookingglass		03/09/89	10.01	24,024	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/09/89	10.75	31,828	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/09/89	11.05	37,089	Hood River, W. Fk.
1988	Bonneville	Carson/Lookingglass		03/12/90	10.10	11,209	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	9.90	10,890	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.30	11,330	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.80	11,664	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.20	10,913	Hood River, U. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.50	7,770	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.20	3,060	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.00	10,000	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.30	11,330	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.00	10,779	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.00	10,650	Hood River, U. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	9.90	31,675	Hood River, W. Fk.
	Bomeville	Carson/Lookingglass		03/12/90	10.30	12,463	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	9.40	23,970	Hood River, W. Fk.
	Bonneville	Carson/Lookingglass		03/12/90	10.20	10,761	Hood River, U. Fk.
	Bomeville	Carson/Lookingglass		03/12/90	10.40	14,144	Hood River, U. Fk.
1989	Bonneville	Carson/Lookingglass		03/14/90	10.20	198,002	Hood River, W. Fk.
1990	Bonneville	Carson/Lookingglass		03/25/91	10.30	125,627	Hood River, W. Fk.

APPENDIX B

Juvenile Hatchery Summer Steelhead Releases in the Hood River Subbasin

fable 2. Brood releases of juvenile hatchery summer steelhead into the Hood River drainage, 1956-86 broods.

Brood Year	Hatchery	Brood stock	Hark	Date	Size (fish/lb)	Number	Release site
1956	Hood River	Hood River	ADRM	4116158	9.0	1,800	Hood River
1957	Hood River	Hood River	RPRH	4/ 1/59	8.1	2,454	Hood River, E. Fk.
1958	Hood River	Hood River	RP	4/13/60	11.0	7,920	Hood River
	Hood River	Hood River	RP	4/14/60	11.0	9,460	Hood River
1959	Oak Springs	Hood River	RP	4113160	12.0	7,680	Hod River
	Oak Springs	Hood River	RP	4/14/60	12.4	7,746	Hod River
1960	Gnat Creek	Hood River	LP	5/25/61	6.7	18,242	Hood River, W. Fk.
	Gnat Creek	Hood River	LP	6/2161	10.0	12,000	Hood River, W. Fk.
	Gnat Creek	Hood River	LP	6/ 5/61	10.0	9,730	Hood River, W. Fk.
	Hood River	Hood River	LPRM	11/12/61	9.0	2,727	Hood River, W. Fk.
	Hood River	Hood River	LPRM	11113161	9.0	20,349	Hood River, W. Fk.
1961	Gnat Creek	Hood River	RPRH	5/ 8/62	12.0	11,460	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	6/ 8/62	22.0	13,200	Lake Branch Creek
	Hood River	Hood River	LVRPRH	5/7163	9.5	5,225	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	5/ 4/62	12.0	15,972	Hood River, W. Fk.
	Gnat Creek	Hood River	RPRM	6111162	22.0	16,038	Hood River, W. Fk.
1962	Gnat Creek	Hood River	LPLM	6/ 4/63	10.5	10,500	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	6/5163	10.5	9,355	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 5/63	11.0	3,355	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 7/63	11.0	2,640	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 9/63	11.0	3,432	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	6/3163	9.5	10,500	Hood River, W. Fk.
	Hood River	Hood River	RVLPLM	8/28/63	11.0	4,103	Hood River, W. Fk.
	Hood River	Hood River	RVLPLM	8130163	11.0	7,051	Hood River, W. Fk.
	Hood River	Hood River	RVLPLM	9/ 5/63	11.0	3,740	Hood River, W. Fk.
	Hood River	Hood River	RVLPLW	9/6163	11.0	3,861	Hood River, U. Fk.
	Hood River	Hood River	RVLPLM	9110163	11.0	6,578	Hood River, U. Fk.
	Hood River	Hood River	LVRP	6/ 8/64	9.0	28,377	Hood River, W. Fk.
1963	Gnat Creek	Hood River	RPRM	5/25/64	10.0	10,000	Lake Branch Creek
	Gnat Creek	Hood River	RPRH	5/25/64	10.2	10,934	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	6/ 1/64	11.b	12,574	Lake Branch Creek
	Hood River	Hood River	RPLM	4/12/65	7.0	2,100	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	5/22/64	10.0	10,000	Hood River, W. Fk.
	Gnat Creek	Hood River	RPRM	5126164	10.2	10,240	Hood River, W. Fk.
	Gnat Creek	Hood River	RPRM	5/28/64	11.2	11,366	Hood River, W. Fk.
	Gnat Creek	Hood River	RPRM	5/29/64	11.b	10,754	Hood River, U. Fk.
	Gnat Creek	Hood River	RPRU	6/ 2/64	11.8	12,400	Hood River, U. Fk.
	Hood River	Hood River	RPLM	4/12/65	7.0	1,100	Hood River, W. Fk.
	Hood River	Hood River	RPLM	4/13/65	7.0	2,100	Hood River, U. Fk.
1964	Gnat Creek	Hood River	LPLM	7116165	10.3	10,815	Lake Branch Creek
	Gnat Creek	Hood River	ADRPRM	5/ 4/66	6.8	9,044	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	7/14/65	10.8	10,260	Hood River, U. Fk.
	Gnat Creek	Hood River	LPLM	7/15/65	10.6	10,600	Hood River, W. Fk.
	Gnat Creek	Hood River	LPLM	7/20/65	10.5	11,025	Hood River, W. Fk.
	Gnat Creek	Hood River	LPLM	7/21/65	10.5	11,235	Hood River, W. Fk.
	Gnat Creek	Hood River	ADRPRH	5/2166	7.0	17,941	Hood River, W. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 3/66	6.8	8,704	Hood River, U. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 3/66	7.0	8,981	Hood River, W. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 5/66	6.8	8,228	Hood River, W. Fk.
1965	Gnat Creek	Hood River	RPRH	6/ 1/66	7.4	8,140	Lake Branch Creek
	Gnat Creek	Hood River	RPRH	6/ 1/66	7.4	9,620	Hood River, W. Fk.
1966	Gnat Creek	Uashouga l	LVLM	6/ 6/67	12.3	11,070	Lake Branch Creek
	Gnat Creek	Uashouga l	LVLM	6/ 6/67	12.3	11,070	Rood River, W. Fk.
	Gnat Creek	Uashouga l	LVLM	6/ 7/67	10.3	11,433	Rood River, W. Fk.

Table 2. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release Site
1967	Gnat Creek	Washougal	RV	5/13/68	9.6	20,553	Hood River, W. Fk.
	Gnat Creek	Uashougal	RV	5/14/68	7.8	9,625	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/14/68	9.6	11,520	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/15/68	7.7	20.867	Hood River, U. Fk.
	Gnat Creek	Uashouga l	RV	5/16/68	8.1	11,137	Hood RiVQr, W. Fk.
	Gnat Creek	Uashouga 1	RV	5/16/68	13.6	11,266	Hood RiVQr, W. Fk.
	Gnat Creek	Washouga1	RV	5/17/68	8.6	11,610	Hood River, W. Fk.
1968	Gnat Creek	Uashougal	LVRV	6/ 2/69	8.5	14,321	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 3/69	9.0	25,908	Hood River, U. Fk.
	Gnat Creek	Washougal	LVRV	6/ 4/69	9:o	26,990	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 5/69	8.0	9,440	Hood River, W. Fk.
	Gnat Creek	Uashougal	LVRV	6/ 5/69	8.5	14,448	Hood River, W. Fk.
	Gnat Creek	Uashougal	CVRV	6/ 6/69	8.5	12,871	Hood River, W. Fk.
1969	Gnat Creek	Uashougal	LPLM	6/ 1/70	6.9	11,730	Hod River, W. Ft.
	Gnat Creek	Uashougal	LPLM	6/ 1/70	7.4	12,570	Hod RiVQr, U. Ft.
	Gnat Creek	Uashougal	LPLM	6/ 2/70	7.1	12,448	Hood River, W. Fk.
	Gnat Creek	Uashougal	LPLM	6/ 2/70	7.3	8,764	Hood River, W. Fk.
	Gnat Creek	Uashougal	LPLM	6/ 2/70	7.4	8,954	Hood River, W. Fk.
	Gnat Creek	Washougal	LPLM	6/ 3/70	7.2	8,640	Hood River, U. Fk.
	Gnat Creek	Uashougal	LPLM	6/ 3/70	7.4	34,744	Hod River, W. Fk.
1970	Gnat Creek	Uashougal	RPLM	4/26/71	a.0	10,560	Hood River
	Gnat Creek	Uashougal	RPLH	4/27/71	8.0	10,560	Hood River
	Gnat Creek	Uashougal	RPLM	4/27/71	9.0	10,600	Hood River
	Gnat Creek	Uashougal	RPLM	4/30/71	8.8	10,560	Hood River
	Gnat Creek	Washougal	RPLM	5/ 3/71	15.0	14,400	Hood River
	Gnat Creek	Uashougal	RPLM	4/28/71	8.0	9,680	Hood River, W. Fk.
	Gnat Creek	Uashougal	RPLM	4/28/71	8.8	10,648	Hood River, U. Fk.
	Gnat Creek	Uashougal	RPLM	4/29/71	8.7	10,440	Hood River, U. Ft.
	Gnat Creek	Uashougal	RPLM	4/29/71	8.8	10,736	Hood River, W. Fk.
	Gnat Creek	Uashougal	RPLM	4/30/71	8.8	12,056	Hood River, U. Fk.
1971	Gnat Creek	Washougal	ANRV	4/20/R	7.1	9,230	Hood River
	Gnat Creek	Uashougal	ANRV	4/26/R	7.4	13,762	Hood River
	Gnat Creek	Washougal	ANRV	4/18/72	7.1	9,301	Lake Branch Creek
	Gnat Creek	Uashougal	ANRV	4/26/72	7.4	10,064	Lake Branch Creek
	Gnat Creek	Uashougal	ANRV	4/19/72	7.1	9,301	Hood River, W. Fk.
	Gnat Creek	Washougal	ANRV	4/21/72	7.1	9,301	Hood River, W.Fk.
	Gnat Creek	Uashougal	ANRV	4/24/R	7.1	13,062	Hood River, W. Fk.
	Gnat Creek	Uashougal	ANRV	4/25/R	7.4	13,902	Hood River, W. Fk.
	Gnat Creek	Uashougal	ANRV	4/27/72	7.3	14,079	Hood River, W. Fk.
1972	Gnat Creek	Uashougal	RPRM	4/17/73	11.2	21,350	Hood River
	Gnat Creek	Washougal	RPRM	4/20/73	6.8	21,246	Hood River
	Gnat Creek	Uashougal	RPRM	4/18/73	6.5	13,228	Lake Branch Creek
	Gnat Creek	Washouga1	RPRM	4/17/73	6.5	21,125	Hood River, W. Ft.
	Gnat Creek	Uashougal	RPRM	4/19/73	6.5	34,548	Hood River, W. Fk.
1973	Gnat Creek	Uashougal	RPLM	5/ 8/74	7.3	8,758	Hod River
	Gnat Creek	Uashougal	RPLM	5/ 9/74	7.3	27,740	Hood River
	Gnat Creek	Washougal	RPLM	5/13/74	6.5	11,700	Hood River
	Gnat Creek	Washouga1	RPLM	5/13/74	6.0	12,235	Hood River
	Gnat Creek	Washougal	RPLM	5/13/74	7.1	9,372	Hood River
	Gnat Creek	Uashougal	RPLM	5/14/74	5.0	5,000	Hood River
	Gnat Creek	Uashougal	RPLM	5/ 9/74	7.3	9,490	Lake Branch Creek
	Gnat Creek	Uashougal	RPLM	5/13/74	6.5	8,580	Lake Branch Creek
	Gnat Creek	Uashougal	RPLM	5/10/74	7.3	9.125	Hood River, W. Fk.
	Gnat Creek	Uashougal	RPLM	5/13/74	7.1	9,372	Hood River, U. Fk.
	Gnat Creek	Uashougal	RPLM	5/15/74	3.5	5,600	Hood RiVQr, W. Fk.
1974	Gnat Creek	Skamania	ADLV	4/16/75	6.7	9,111	Hood River
	Gnat Creek	Skamani a	ADLV	4/17/75	6.7	18,023	Hood River

Table 2. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1974	Gnat Creek	Sk-in	MLV	4/23/75	6.0	9,238	Hood River
	Gnat Creek	Sk-in	ADLV	4/25/75	6.0	10,500	Hood River
	Gnat Creek	Sk-in	ADLV	4/ 4175	6.5	10,724	Lake Branch Creek
	Gnat Creek	Sk-in	ADLV	4/16/75	6.7	9,489	Hood River, W. Fk.
	Gnat Creek	Sk-in	ADLV	4/21/75	6.5	10,725	Hood River, W. Fk.
	Gnat Creek	Sk-in	ADLV	4/22/75	6.5	10,205	Hood River, W. Fk.
	Gnat Creek	Skamania	ADLV	4/22/75	6.7	11,926	Hood River, W. ft.
	Gnat Creek	Sk-in	ADLV	4/24/75	7.4	5,809	Hood River, W. Ft.
1975	Oak Springs	Sk-i a	--	4/ 5176	4.8	10,846	Hood River
	Oak Springs	Sk-i a	—	4/ 6176	4.a	5,400	Hod River
	Oak Springs	Skamania	—	4/ 8/76	3.9	10,277	Hood River
	Oak Springs	Skamania	—	4/ 8176	4.0	10,940	Hood River
	Oak Springs	Skamani a	—	4/ 9176	3.9	10,803	Hood River
	Oak Springs	Skamani a	--	4/12/76	3.9	3,276	Hood River
	Oak Springs	Skamania	—	4112176	4.4	6,600	Hood River
	Oak Springs	Sk-in	--	4/ 7176	4.0	10,280	Coke Branch Creek
	Oak Springs	Skamania	—	4/ 9/76	3.9	6,123	Lake Branch Creek
	Oak Springs	Skamania	--	4/ 5176	4.8	5,992	Hood River, U. Fk.
	Oak Springs	Skamani a	--	4/ 5176	4.9	4,981	Hood River, W. Ft.
	Oak Springs	Sk-is	--	4/ 6176	4.0	10,314	Hood River, W. Fk.
	Oak Springs	Skamani a	--	4/ 7176	4.0	10,100	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/ 9176	3.9	4,871	Hood River, W. Fk..
1976	Oak Springs	Skamania	--	4111177	5.7	6,305	Hood River
	Oak Springs	Skamani a	--	4/11/77	6.0	6,240	Hood River
	Oak Springs	Skamani a	--	4/12/77	6.0	16,260	Hood River
	Oak Springs	Skamni a	--	4/12/77	6.0	6,660	Lake Branch Creek
	Oak Springs	Skamania	—	4/11/77	5.5	6,186	Hood River, U. Ft.
	Oak Springs	Skmania	--	4/13/77	6.0	30,510	Hood River, W. Fk.
	Oak Springs	Skamni a	--	4/14/77	5.2	7,436	Hood River, W. Fk.
	Oek Springs	Skmania	--	4/14/77	5.5	14,465	Hood River, W. Fk.
	Oak Springs	Skamania	--	4114177	5.6	6,384	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/15/77	5.4	14,769	Hood River, W. Fk.
1977	Oak Springs	Washougal	—	4/11/78	5.2	24,362	Hood River
	Oak Springs	Washougal	--	4/12/78	5.3	6,678	Hood River
	Oak Springs	Uashouga l	—	4112178	5.5	6,875	Hood River
	Oak Springs	Uashouga 1	--	4/13/78	5.3	6.678	Hood River
	Oak Springs	Washougal	--	4/13/78	5.5	12,763	Hood River
	Oak Springs	Washougal	--	4/14/78	5.5	20,942	Hood River
	Oak Springs	Uashwga l	—	4/12/78	5.2	7,059	Hood River, U. Fk.
	Oak Springs	Washougal	--	4/12/78	5.3	6,890	Hood River, W. Fk.
1978	Oak Springs	Skamania	--	4/ 9179	6.5	7,178	Hood River
	Oak Springs	Skamania	—	4/16/79	5.0	13,375	Hod River
	Oak Springs	Sk-ie	--	4/17/79	4.3	4,795	Hood River
	Oak Springs	Skamania	--	4/17/79	4.7	5.875	Hood River
	Oak Springs	Skamania	--	4/20/79	5.0	13:ooo	Hod River
	Oak Springs	Skamani a	—	4/10/79	5.4	5,993	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/11/79	5.4	6,210	Hood River, W. Fk.
	Oak Springs	Skamania	--	4112179	5.0	12,000	Hood River, W. Fk.
	Oak Springs	Skmania	—	4/13/79	5.2	13,572	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/20/79	5.0	6,850	Hood River, W. Fk.
	Oak Springs	Skamania	—	4124179	4.4	11,660	Hood River, W. Fk.
	Oak Springs	Skmania	—	4126179	4.4	4,004	Hood River, W. Fk.
1979	Oak Springs	Skamania	--	4/10/80	4.2	5,628	Hood River
	Oak Springs	Skamania	--	4/11/80	4.3	6,235	Hood River
	Oak Springs	Skamania	--	4/14/80	4.0	5,300	Hood River
	Oak Springs	Skamani a	—	4/15/80	3.8	5,510	Hood River
	Oak Springs	Skamni a	--	4/16/80	4.0	5,800	Hood River
	Oak Springs	Skamni a	--	4/17/80	4.0	6,200	Hood River
	Oak Springs	Skmania	--	4/17/80	4.3	6,020	Hood River

Table 2. (continued).

Brood Year	Hatchery	Brood stock	Mark	Oate	size (fish/lb)	Number	Release site
1979	Oak Springs	Skamania	--	5/14/80	4.0	2,899	Hood River
	Oak Springs	Sk-ie	--	4/15/80	4.2	6,300	Lake Branch Creek
	Oak Springs	Skamania	—	4/16/80	3.8	5,320	Lake Branch Creek
	Oek Springs	Sk-is	--	4/ 9/80	4.2	5,040	Hood River, W. Fk.
	Oak Springs	Skmania	—	4/10/80	4.2	5,460	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/11/80	4.2	5,565	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/14/80	4.2	6,090	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/18/80	3.8	4,648	Hood River, U. Fk.
1980	Oak Springs	Skamania	--	4/ 7/81	5.0	6,250	Hood River
	Oak Springs	Skamnia	--	4/ 7/81	5.1	5,508	Hood River
	Oak Springs	Skamnia	--	4/ 7/81	5.7	13,462	Hood River
	Oak Springs	Skamania	--	5/ 1/81	4.3	10,369	Hood River
	Oak Springs	Skamania	--	4/ 9/81	5.6	6,440	Lake Branch Creek
	Oak Springs	Skamnia	--	4/ 9/81	6.0	6,000	Lake Branch Creek
	Oak Springs	Skamnia	--	4/ 8/81	5.0	13,248	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/ 8/81	5.6	14,540	Hood River, W. Fk.
	Oak Springs	Skmani a	--	4/ 9/81	5.0	12,800	Hood River, W. Fk.
	Oak Springs	Skamnia	—	'/10/81	4.7	10,927	Hood River, U. Fk.
1981	Oak Springs	Skamania	--	4/ 5/82	4.3	13,650	Hood River
	Oak Springs	Skamni a	—	4/ 7/82	4.3	10,019	Hood River
	Oak Springs	Skamania	—	4/ 9/82	5.6	13,RO	Hood River
	Oak Springs	Skamania	--	4/ 8/82	5.6	13,300	Lake Branch Creek
	Oak Springs	Skamania	--	4/ 6/82	4.3	14,566	Hood River, U. Fk.
	Oak Springs	Skamania	--	4/7182	4.3	10,105	Hood River, W. Ft.
	Oak Springs	Skamni a	—	4/12/82	5.6	14,270	Hood River, W. Fk.
1982	Oak Springs	Skamania	--	4/ 6/83	5.1	11,730	Hood River
	Oak Springs	Skmania	--	4/ 7/83	5.1	35,589	Hood River
	Oak Springs	Skamania	--	4/12/83	5.0	19,075	Hood River
	Oak Springs	Skamnia	--	4/13/83	4.9	6,566	Hood River
	Oak Springs	Skamania	--	4/ am	5.0	11,975	Lake Branch Creek
	Oak Springs	Skamnia	—	4/ 9/83	5.0	12,440	Lake Branch Creek
	Oak Springs	Skamania	--	4/ 7/83	5.0	12,125	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/10/83	5.0	51,515	Hood River, W. Fk.
	Oak Springs	Skamni a	--	4/11/83	4.5	11,475	Hood River, U. Fk.
	Oak Springs	Skamania	--	4/11/83	5.0	6,900	Hood River, U. Fk.
	Oak Springs	Skamani a	—	4/11/83	5.1	6,120	Hood River, W.Fk.
1903	Oak Springs	Skamania	AD	4/ 5/84	4.0	9,960	Hood River
	Oak Springs	Skamania	AD	4/ 6/84	4.0	4,600	Hood River
	Oak Springs	Skamania	AD	4/ 9/84	3.9	9,516	Hood River
	Oak Springs	Skamania	AD	4/ 9/84	5.5	6,325	Hood River
	Oak Springs	Skamnia	A0	4/10/84	3.9	4,485	Hood River
	Oak Springs	Skamnia	A0	4/13/84	4.9	12,985	Hood River
	Oak Springs	Skamania	AD	4/11/84	3.9	9,653	Leke Branch Creek
	Oak Springs	Skmania	A0	4/ 4/84	4.0	4,400	Hood River, U. Fk.
	Oak Springs	Skamania	A0	4/ 4/84	4.5	5,400	Hod River, W. Fk.
	Oak Springs	Skamnia	AD	4/13/84	3.8	5,320	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/13/84	5.0	6,125	Hood River, U. Fk.
	Oak Springs	Skamania	AD	4/16/84	4.5	4,725	Hood River, W. Fk.
1984	Oak Springs	Skmania	AD	4/ 9/85	4.2	10,920	Hood River
	Oak Springs	Skamania	A0	4/ 9/85	5.5	7,095	Hod River
	Oak Springs	Skmania	AD	4/10/85	4.3	16,542	Hood River
	Oak Springs	Skamania	AD	4/11/85	4.3	4,300	Hood River
	Oak Springs	Skamnia	An	4/16/85	4.0	10,100	Hood River
	Oak Springs	Skamnia	AD	4/16/85	4.1	5,433	Hood River
	Oak Springs	Skamania	An	4/ 4/85	4.5	10,710	Lake Branch Creek
	Oak Springs	Skamnia	--	9/10/84	55.0	57,750	Hood River, U. Fk.
	Oak Springs	Skamnia	--	9/11/84	50.0	56,250	Hood River, W. Ft.
	Oak Springs	Skmani a	A0	4/ 3/85	4.7	11,506	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/ 5/85	4.4	4,743	Hood River, W. Fk.

Table 2. (continued).

Brood Year	Hatchery	Brood stock	Mark	Data	Size (fish/lb)	Number	Release site
1984	Oak Springs	Skamania	All	c/11/85	5.5	5,963	Hood River, W. Fk.
	Oak Springs	Skamania	An	4/12/85	4.5	5,850	Hod River, W. Ft.
1985	Oak Springs	Skaamnia	AD	4/ 7/86	4.1	4,920	Hood River
	Oak Springs	Skamania	AD	4/ 8/86	4.1	4,100	Hood River
	Oak Springs	Skamania	AD	4/ 9/86	4.1	9,656	Hood River
	Oak Springs	Sk-i a	AD	4/10/86	4.5	21,173	Hod River
	Oak Springs	Skamania	AD	4/11/86	4.5	9,900	Hood River
	Oak Springs	Skamania	AD	4/ 7/86	4.1	9,143	Hood River, W. Ft.
	Dak Springs	Skamania	AD	4/ 8/86	4.1	14,494	Hood River, W. Fk.
	Oak Springs	Skamni a	AD	4/ 9/86	4.1	9,430	Hood River, W. Fk.
1986	Oak Springs	S k - i s	An	4/ 7/87	4.0	4,700	Hood River
	Oak Springs	Skamania	An	4/ 8/87	4.5	5,738	Hood River
	Oak Springs	Skamania	AD	4/ 9/87	4.8	11,424	Hood River
	Oak Springs	Skamnia	AD	4/10/87	4.7	5,358	Hod River
	Oak Springs	Skamnia	AD	4/10/87	4.8	5,760	Hod River
	Oak Springs	Skamani a	AD	4/ 6/87	4.0	4,900	Hood River, W. Fk.
	Oak Springs	Skamani a	AD	4/ 7/87	4.0	9,900	Hood River, U. Fk.
	Oak Springs	Skamania	AD	4/ 8/87	4.6	5,635	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/ 9/87	4.2	10,206	Hood Riwr, W. Fk.
	Oak Springs	Skanamia	A0	4/10/87	4.4	5,170	Hood River, W. Fk.
	Oak Springs	Skamnia	AD	4/10/87	5.2	6,422	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/13/87	4.4	4,840	Hood River, W. Fk.
1987	Oak Springs	Skamania	AD	4/ 7-10		32,984	Hood River, M.S.
	Oak Springs	Skamania	AD	4/ 9-13		26,638	Hood River, W. Ft.
	Oak Springs	Skamni a	AD	4/ 7-8		10,535	Hood River, W. Fk.
	Oak Springs	Skamani a	A0	4/ 6-7		9,900	Hood River, W. Fk.
1988	Oak Springs	Skamni a	AD	4/ a m		50,778	Hood River, W. Fk.
	Oak Springs	Skamani a	AD	4/11/89		29,105	Hood River, M.S.
1989	Oak Springs	Skamnia	AD	4/ 6/90		62,580	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/ 7/90		26,466	Hood River, M.S.
1990	Oak Springs	Skamani a	AD	4/11/91		15,536	Hood River, M.S.
	Oak Springs	Skamania	AD	4/11/91		66,322	Hood River, W. Fk.

APPENDIX C

Juvenile Hatchery Winter Steelhead Releases

Table 3. Brood releases of juvenile hatchery winter steelhead into the Hood River drainage, 1962-63, 1966, 1969-m. 1972-74, 1976-77. and 1984-86 broods.

Brood Year	Hatchery	Brood stock	Hark	Date	Sire (fish/Lb)	Number	Release site
1962	Carson	Unknown	--	2/14/62	45.0	56,340	Tony Creek
	Carson	Unknown	--	2/13/62	45.0	50,040	Lake Branch Creek
	Carson	Unknown	--	2/26/62	45.0	120,150	Hood River, E. Fk.
	Carson	Unknown	--	2119162	45.0	117,450	Hood River, M. Fk.
	Carson	Unknown	--	2/14/62	45.0	56,385	Hood River, W. Fk.
1963	Eagle Creek (USFWS)	Unknown	--	6/ 7163	42.6	34,165	Clear Branch Creek
	Eagle Creek (USFWS)	Unknown	--	6/ 6/63	35.4	36,850	Hood River, E. Ft.
	Eagle Creek (USFWS)	Unknown	--	6/ 4/63	32.0	29,024	Hood River, M. Ft.
1966	Little White Salmon	Unknown	--	2/14/66	1050.0	26,250	Bear Creek
1969	Gnat Creek	Unknown	--	9/14/69	53.0	37,100	Laurance Lake
1970	Oak Springs	Alsea River	--	10/ 6/70	35.0	34,965	Laurance Lake
	Gnat Creek	Unknown	--	10/ 6/70	68.0	47,580	Laurance Lake
	Oak Springs	Alsea River	--	10/ 8/70	36.0	21,564	Laurance Lake
1972	Oak Springs	Foster Res.	--	9/12/72	47.8	49,983	Laurance Lake
1974	Oak Springs	Foster Res.	--	8/21/74	114.0	52,435	Laurance Lake
	Oak Springs	Foster Res.	--	8/22/74	107.0	48,150	Laurance Lake
1976	Gnat Creek	Big Creek	--	11/18/76	27.0	101,658	Laurance Lake
1977	Gnat Creek	Big Creek	--	9118178	4.0	33,896	Hood River, E. Fk.
	Gnat Creek	Big Creek	--	9/19/78	4.0	33,450	Hood River, E. Fk.
	Gnat Creek	Big Creek	--	9/20/78	4.0	31,889	Hood River, E. Fk.
1984	Trojan Ponds	Big Creek	--	4/30/85	4.3	13,379	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	5/ 1/85	4.8	13,397	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	5/ 2185	4.6	13,125	Hood River, M. Fk.
1985	Trojan Ponds	Big Creek	--	3/17/86	5.3	4,710	Hood River
	Trojan Ponds	Big Creek	--	3/18/86	4.7	4,269	Hood River
	Trojan Ponds	Big Creek	--	3119186	5.8	4,628	Hood River
	Trojan Ponds	Big Creek	--	3/20/86	5.3	4,448	Hood River
	Trojan Ponds	Big Creek	--	3/21/86	5.6	4,138	Hood River
	Trojan Ponds	Big Creek	--	3/19/86	5.8	4,398	Neal Creek
	Trojan Ponds	Big Creek	--	3/17/86	5.2	4,577	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	3/18/86	4.7	4,368	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	3/20/86	5.2	4,370	Hood River, M. Fk.
1986	Trojan Ponds	Big Creek	--	5/14/87	4.5	7,419	Hood River, E. Ft.
	Trojan Ponds	Big Creek	--	5/29/87	4.0	3,318	Hood River, E. Fk.
	Trojan Ponds	Big Creek	--	5/14/87	c.5	13,135	Hood River, M. Fk.
1987		Big Creek	--	4/22/88		15,512	Hood River, M, Fk.
		Big Creek	--	c/22/08		12,488	Hood River, E. Fk.
1988		Big Creek	--	4/17/89		5,040	Hood River, E. Fk.
1939		Big Creek	--	4/12/90		1.253	Hood River, M. Fk.
		Big Creek	--	4/12/90		7,755	Hood River, E. Fk.
1990		Big Creek	--	5/09/90		[illegible]	Hood River, M. Ft.
		Big Creek	--	5/09/90		[illegible]	Hood River, E. Ft.
1991		Big Creek	--	4/23/91		[illegible]	Howl River, M. fk.
		Big Creek	--	4/23/91		[illegible]	Hood River, E. Fk.

Table 3. Continued

Brood Year	Hatchery	Brood stock	Hark	Date	Sire (fish/lb)	Number	Release site
1989		Big Creek	--	5/09/90		12,015	Hood River, M. Fk.
		Big Creek	—	5/09/90		12,015	Hood River, E. Fk.

APPENDIX D

Releases of Adult Anadromous Salmonids in the Hood River Subbasin

Table I. Adult anadromous salmonids released into the Hood River drainage.

Year	Hatchery	Brood stock	Release Date	Number Released	Release site
Summer Steelhead					
1968	Big Creek	Big Creek	2/20/68	300	Hood River, E. Fk.
	Big Creek	Big Creek	2/21/68	250	Hood River, E. Fk.
1969	Hood River	Hood River	3/10/69	114	Hood River, W. Fk.
	Cascade	cascade	9/30/69	26	Hood River, W. Fk.
	Hood River	Hood River	10/ 1/69	96	Hood River, W. Fk.
	Oxbow	Unknown	10/13/69	26	Hood River, W. Fk.
Winter Steelhead					
1966	Big Creek	Big Creek	1/14/66	43	Bear Creek
1967	Big Creek	Big Creek	1/14/67	172	Hood River, E. Fk.
	Big Creek	Big Creek	1/16/67	212	Hood River, E. Fk.
Coho					
1966	Bonneville	Unknown	9/ 5/66	225	Clear Branch Creek
1968	Bonneville	Unknown	9/17/68	140	Neal Creek
	Bonneville	Unknown	9/68	990	Hood River, E. Fk.
	Bonneville	Unknown	9/68	150	Hood River, M. Fk.
	Bonneville	Unknown	9/17/68	200	Hood River, M. Fk.
1970	Sandy	Sandy	11/10/70	320	Hood River, E. Fk.

APPENDIX E

Releases of Anadromous Salmonids by the Salmon and Trout Enhancement program in the Hood River Subbasin

Table 5. Fry releases of spring chinook, winter steelhead, and rainbow trout by the salmon and trout enhancement program (STEP).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
Spring Chinook							
1984	--	Clackamas	--	1/85	Fry	15,112	Hood River, W. Fk.
	--	Clackamas	--	2/85	Fry	39,474	Hood River, W. Fk.
	--	Clackamas	--	12/84	Fry	19,708	Lake Branch Creek
	--	Clackamas	--	1/as	Fry	19,000	Lake Branch Creek
	--	Clackamas	--	1/85	Fry	100	Weal Creek
1985	--	Carson	--	12/85	Fry	27,626	Hood River, W. Ft.
	--	Carson	--	1/86	Fry	63,037	Hood River, U. Fk.
	--	Carson	--	12/85	Fry	27,625	Lake Branch Creek
1986	--	Carson	--	12/86	Fry	71,690	Hood River, W. Fk.
	--	Carson	--	1/87	Fry	52,209	Hood River, W. Fk.
	--	Carson	--	2/87	Fry	59,277	Hod River, W. Fk.
	--	Carson	--	12/86	Fry	47,331	Lake Branch Creek
Winter Steelhead							
1985	--	Klaskanine R.	--	6/85	Fry	23,129	Clear Branch Creek
	--	Klaskanine R.	--	7/85	Fry	3,926	Dog River
	--	Klaskanine R.	--	5/85	Fry	10,990	Hood River, M. Fk.
	--	Klaskanine R.	--	4/85	Fry	22,407	Meal Creek
	--	Klaskanine R.	--	4/85	Fry	22,667	Tony Creek
1986	--	Big Creek	--	5/86	Fry	19,430	Bear Creek
	--	Big Creek	--	4/86	Fry	29,279	Clear Branch Creek
	--	Big Creek	--	3/86	Fry	28,916	Ooq River
	--	Big Creek	--	5/86	Fry	14,751	Evans Creek
	--	Big Creek	--	3/86	Fry	15,179	Neal Creek W. Fk.
	--	Klaskanine R.	--	3/86	Fry	4,418	Neal Creek W. Fk.
	--	Big Creek	--	3/86	Fry	19,638	Neal Creek
	--	Big Creek	--	4/86	Fry	9,760	Neal Creek
	--	Big Creek	--	3/86	Fry	28,915	Odell Creek
	--	Big Creek	--	5/86	Fry	1,894	Rogers Spring Creek
	--	Big Creek	--	3/86	Fry	19,215	Tony Creek
1987	--	Big Creek	--	4/87	Fry	24,899	Clear Branch Creek
	--	Klaskanine R.	--	4/87	Fry	9,870	Evans Creek
	--	Big Creek	--	4/87	Fry	18,856	Tony Creek
Rainbow trout							
1985	--	Oak Springs	--	1/86	Fry	7,295	Cedar Creek
	--	Oak Springs	--	1/86	Fry	7,085	Indian Creek
	--	Oak Springs	--	1/86	Fry	lb,276	Neal Creek

APPENDIX F

Releases of Juvenile Hatchery Sea Run Cutthroat Trout in the Hood River Subbasin

Table 6. Brood releases of juvenile hatchery sea run cutthroat trout into the Hood River drainage, 1955, 1973-77, and 1984-86 broods.

Brood Year	Hatchery	Brood stock	Mark	Data	Sire (fish/lb)	Number	Release site
195s	Hood River	Unknown	--	6/ 4/56	1.3	475	Kingsley Resevoir
	Hood River	Unknown	--	6/12/56	1.3	63	Kingsley Resevoir
1973	Cedar Creek	Nestuca River	AD	c/24/74	3.5	2,002	Neal Creek
	Cedar Creek	Ncstuca River	AD	5/15/74	3.3	1,003	Neal Creek
	Cedar Creek	Nestuca River	AD	5/23/74	3.0	1,002	Neal Creek
	Cedar Creek	Nestuca River	AD	6/25/74	2.5	1,000	Neal Creek
	Cedar Creek	Ncstuca River	AD	4/24/74	3.5	2,503	Hood River, E. Fk.
	Cedar Creek	Nestucca River	AD	4/25/74	3.5	4,494	Hood River, E. Fk.
	Cedar Creek	Nestucca River	AD	5/15/74	3.3	2,003	Hood River, E. Fk.
	Cedar Creek	Nestucca River	AD	5/16/74	3.3	3,003	Hood River, E. Fk.
	Cedar Creek	Nestuca River	AD	5/22/74	3.0	4,002	Hood River, E. Fk.
	Cedar Creek	Nestuca River	AD	5/23/74	3.0	2,998	Hood River, E. Fk.
	Cedar Creek	Nestuca River	AD	6/25/74	2.5	1,500	Hood Riwr, E. Fk.
	Cedar Creek	Nestuca River	AD	6/26/74	2.5	3,500	Hood River, E. Fk.
1974	Cedar Creek	Alsea River	--	4/22/75	4.2	2,016	Neal Creek
	Cedar Creek	Alsea River	—	5/22/75	3.9	1,002	Neal Creek
	Cedar Creek	Alsea River	--	6/18/75	3.5	1,001	Neal Creek
	Cedar Creek	Alsea River	--	4/22/75	b.2	7,003	Hood River, E. Ft.
	Cedar Creek	Alsea River	--	5/22/75	3.9	5,002	Hood River, E. Ft.
	Cedar Creek	Alsea River	--	6/18/75	3.5	6,000	Hood River, E. Fk.
	Cedar Creek	Alsea River	--	7/ 2/75	3.2	6,144	Hood River, E. Fk.
197s	Cedar Creek	Alsea River	--	4/21/76	4.1	2,996	Neal Creek
	Cedar Creek	Alsea River	--	5/20/76	3.7	1,998	Neal Creek
	Cedar Creek	Alsea River	--	6/29/76	3.0	2,004	Neal Creek
	Cedar Creek	Alsea River	--	4/19/76	4.2	5,972	Hood River, E. Fk.
	Cedar Creek	Alsea River	--	4/21/76	4.1	2,994	Hood River, E. Fk.
	Cedar Creek	Alsea River	--	5/20/76	3.7	3,496	Hood River, E. Fk.
	Cedar Creek	Alsea River	--	5/26/76	3.5	5,489	Hood River, E. Ft.
	Cedar Creek	Alsea River	—	6/29/76	3.0	3,000	Hood River, E. Fk.
	Cedar Creek	Alsea River	--	7/ 2/76	3.0	5,000	Hood River, E. Fk.
1976	Alsea	Alsea River	--	4/77	4.8	3,000	Neal Creek
	Alsea	Alsea River	—	5/77	3.0	2,001	Neal Creek
	Alsea	Alsea River	--	4/77		8,990	Hood River, E. Fk.
	Alsea	Alsea River	--	5/77	4::	9,119	Hood River, E. Fk.
1977	Cedar Creek	Alsea River	--	4-5/78	3.1	3,121	Neal Creek
	Cedar Creek	Alsea River	—	4-5/78	3.1	21,536	Hood River, E. Fk.
1984	Trojan Ponds	Big Creek	--	5/13/85	2.8	3,981	Neal Creek
	Trojan Ponds	Big Creek	—	5/ 3/85	2.6	7,479	Hood River, E. Fk.
	Trojan Ponds	gig Creek	—	5/13/85	2.8	3,470	Hood River, E. Fk.
1985	Trojan Ponds	gig Creek	--	5/12/86	2.8	1,008	Neal Creek
	Trojan Ponds	Big Creek	--	5/12/86	2.8	6,818	Hood River, E. Fk.
	Trojan Ponds	Big Creek	--	6/ 3/86	2.6	3,807	Hood Riwr, E. Fk.
1986	Trojan Ponds	Big Creek	—	51 1/87	3.3	2,012	Neal Creek
	Trojan Ponds	Big Creek	--	5/ 1/87	3.3	8,377	Hood River, E. Fk.
	Trojan Ponds	gig Creek	--	5 1 1/87	3.3	2,639	Hood River
	Trojan Ponds	Big Creek	--	5/21/87	2.7	4,290	Hood River, E. FK.

APPENDIX G

Releases of Hatchery Rainbow Trout in the Hood River Subbasin

Table 7. Brood releases of hatchery rainbow trout into the Hood River drainage, 1953-86 broods.

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Releau site
1953	Hood River	Unknown	--	6/23/54	5.0	2,000	Lost Lake
	Hood River	Unknown	--	6/29/54	5.0	1,000	Lost Lake
	Hood River	Unknown	--	6/30/54	12.0	1,104	Lost Lake
	Hood River	Unknown	--	7/ 7/54	9.0	1,998	Lost Lake
	Hood River	Unknown	--	8/10/54	5.0	1,000	Lost Lake
	Hood River	Unknown	--	8/12/54	5.0	1,000	Lost Lake
	Hood River	Unknown	--	5/18/54	4.4	999	Neal Creek
	Hood River	Unknown	--	6/17/54	5.0	1,000	Neat Creak
	Hood River	Unknown	--	7/22/54	7.0	504	Neal Creek
	Hood River	Unknown	--	4/27/54	4.5	499	Evans Creek
	Hood River	Unknown	--	5/20/54	4.0	500	Evans Creek
	Hood River	Unknown	--	6/15/54	5.0	500	Evans Creek
	Hood River	Unknown	--	4/30/54	4.8	499	Odell Creek
	Hood River	Unknown	--	5/13/54	4.0	248	Odell Creek
	Hood River	Unknown	--	5/18/54	4.4	250	Odell Creek
	Hood River	Unknown	--	6/23/54	5.0	500	Odell Creek
	Hood River	Unknown	—	7/15/54	7.0	504	Odell Creek
	Hood River	Unknown	--	8/11/54	5.0	500	Odell Creek
	Hood River	Unknown	--	4/27/54	4.5	499	Trout Creek
	Hood River	Unknown	--	6/15/54	5.0	500	Trout Creek
	Hod River	Unknown	--	4/27/54	4.5	301	Indian Creak
	Hood River	Unknown	--	5/19/54	4.0	200	Indian Creek
	Hood River	Unknown	--	6/24/54	5.0	500	Indian Creek
	Hood River	Unknown	--	7/22/54	7.0	504	Polallie Creek
	Hood River	Unknown	—	6/28/54	5.0	1,000	Kingsley Resevoir
	Hood River	Unknown	--	b/29/54	5.0	1,000	Kingsley Resevoir
	Hood River	Unknown	—	7/20/54	8.0	1,600	Kingsley Resevoir
	Hood River	Unknown	--	7/26/54	7.0	420	Kingsley Resevoir
	Hood River	Unknoun	--	6/18/54	5.0	1,000	Lake Branch Creek
	Hood River	Unknown	--	b/21/54	5.0	2,000	Lake Branch Creak
	Hood River	Unknown	--	7/20/54	7.0	1,504	Lake Branch Creek
	Hood River	Unknown	--	7/26/54	7.0	1,505	Lake Branch Creek
	Hood River	Unknown	--	8/11/54	5.0	1,000	Lake Branch Creek
	Hood River	Unknown	--	8/18/54	5.5	1,001	Lake Branch Creek
	Hood River	Unknown	--	6/30/54	a.0	1,000	Clear Branch Creek
	Hood River	Unknown	--	7/21/54	7.0	1,015	Clear Branch Creek
	Hood River	Unknown	--	5/17/54	4.4	999	Hood River, E. Fk.
	Hood River	Unknown	--	5/19/54	4.0	1,000	Hood River, E. Fk.
	Hood River	Unknown	--	5/20/54	4.0	1,000	Hood River, E. Fk.
	Hood River	Unknown	—	6/22/54	5.0	2,000	Hood River, E. Fk.
	Hood River	Unknown	--	6/28/54	5.0	1,000	Hood River, E. Fk.
	Hood River	Unknown	--	7/15/54	7.0	1,505	Hood River, E. Fk.
	Hood River	Unknown	--	7/22/54	7.0	1,505	Hood River, E. Ft.
	Hood River	Unknown	--	7/26/54	7.0	1,050	Hood River, E. Fk.
	Hood River	Unknown	—	8/10/54	5.0	1,000	Hood River, E. Fk.
	Hood River	Unknown	--	8/11/54	5.0	1,000	Hood River, E. Fk.
	Hood River	Unknown	--	8/17/54	5.5	2,002	Hood River, E. Fk.
	Hood River	Unknown	--	5/11/54	4.0	2,000	Hood River, II. Fk.
	Hood River	Unknown	--	6/15/54	5.0	1,000	Hood River, M. Fk.
	Hood River	Unknown	--	6/29/54	5.0	1,000	Hood River, M. Fk.
	Hood River	Unknown	—	7/21/54	7.0	1,505	Hood River, M. Fk.
	Hood River	Unknown	--	5/13/54	4.0	1,000	Hood River, W. Fk.
	Hood River	Unknown	--	5/18/54	4.0	1,000	Hood River, W. Fk.
	Hood River	Unknown	--	5/20/54	4.0	1,000	Hood River, W. Fk.
	Hood River	Unknown	--	6/14/54	5.0	1,000	Hood River, W. Fk.
	Hood River	Unknown	--	6/28/54	5.0	1,000	Hood Rfver, W. Ft.
	Hod River	Unknown	--	b/29/54	5.0	1,000	Hood River, W. Fk.
	Hood River	Unknown	--	7/ 7/54	9.0	1,485	Hood River, W. Fk.
	Hood River	Unknoun	—	7/20/54	8.0	1,504	Hood River, W. Fk.
	Hood River	Unknoun	--	8/12/54	5.0	1,000	Hood River, W. Fk.
1954	Hod River	Hood River	--	6/28/55	4.7	1,001	Lost Lake
	Hood River	Hood River	--	6/29/55	4.7	1,001	Lost Lake
	Hood River	Hood River	--	6/30/55	4.7	2,002	Lost Lake

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Hark	Date	Size (fish/lb)	Number	Release site
1954	Hood River	Hood River	--	7/ 1/55	c.7	1,001	Lost Lake
	Hood River	Hood River	--	7/ 5/55	3.6	998	Lost Lake
	Hood River	Hood River	--	7/20/55	5.4	1,004	Lost Lake
	Hood River	Hood River	--	7/21/55	5.0	1,998	Lost Lake
	Hood River	Hood River	--	a/ 4/55	4.0	999	Lost Lake
	Hood River	Hod River	--	8/10/55	4.0	1,000	Lost Lake
	Hood River	Hood River	--	8/12/55	4.0	1,000	Lost Lake
	Hood River	Hood River	--	8/17/55	4.0	1,000	Lost Lake
	Hood River	Hood River	--	5/13/55	5.0	1,000	Neal Creek
	Hood River	Hood River	--	6/ 1/55	5.0	1,000	Neal Creek
	Hood River	Hood River	--	7/12/55	6.0	504	Neal Creek
	Hood River	Hood River	--	C/27/55	5.4	502	Evans Creek
	Hood River	Hood River	--	5/17/55	5.0	1,000	Evans Creek
	Hood River	Hood River	--	6/ 7/55	5.0	500	Evans Creek
	Hood River	Hood River	--	4/26/55	5.0	300	Odell Creek
	Hood River	Hood River	--	5/17/55	5.0	500	Odell Creek
	Hood River	Hood River	--	6/ 7/55	5.0	800	Odell Creek
	Hood River	Hood River	--	7/13/55	6.0	204	Odell Creek
	Hood River	Hood River	--	C/27/55	5.4	297	Trout Creek
	Hood River	Hood River	--	5/18/55	5.0	500	Trout Creek
	Hood River	Hood River	--	6/ 7/55	5.0	200	Trout Creek
	Hood River	Hood River	--	4/27/55	5.4	297	Indian Creek
	Hood River	Hood River	--	5/13/55	5.0	300	Indian Creek
	Hood River	Hood River	--	7/ 7/55	7.0	1,001	Polallie Creek
	Hod River	Hood River	--	6/ 7/55	5.0	1,000	Greenpoint Creek
	Hood River	Hood River	--	6/28/55	5.0	1,000	Greenpoint Creek
	Hood River	Hood River	--	7/12/55	6.0	1,002	Greenpoint Creek
	Hood River	Hood River	--	6/ 2/55	5.0	1,000	Kingsley Resevoir
	Hood River	Hood River	--	6/ 8/55	5.0	2,000	Kingsley Resevoir
	Hood River	Hood River	--	6/20/55	5.0	1,000	Kingsley Resevoir
	Hood River	Hood River	--	5/ 4/55	5.0	1,000	Lake Branch Creek
	Hood River	Hood River	--	5/23/55	5.0	1,000	Lake Branch Creek
	Hood River	Hood River	--	6/ 7/55	5.0	1,000	Lake Branch Creek
	Hood River	Hood River	--	b/22/55	4.7	1,001	Lake Branch Creek
	Hod River	Hood River	--	7/ 6/55	7.0	1,000	Lake Branch Creek
	Hod River	Hood River	--	7/11/55	6.0	1,002	Lake Branch Creek
	Hood River	Hood River	--	a/ 3/55	4.0	1,000	Lake Branch Creek
	Hod River	Hood River	--	8/ 4/55	4.0	1,000	Lake Branch Creek
	Hood River	Hood River	--	5/ 2155	5.0	1,000	Hood River, E. Fk.
	Hood River	Hood River	--	5/17/55	5.0	1,000	Hood River, E. Fk.
	Hood River	Hood River	--	5/18/55	5.0	1,000	Hood River, E. Fk.
	Hood River	Hood River	--	6/ b/55	5.0	1,000	Hood River, E. Fk.
	Hood River	Hood River	--	6/21/55	4.7	2,001	Hood River, E. Ft.
	Hod River	Hood River	--	6/28/55	4.7	1,001	Hod River, E. Fk.
	Hood River	Hood River	--	7/ 1/55	4.7	1,001	Hod River, E. Fk.
	Hod River	Hood River	--	7/ 5/55	3.6	1,001	Hood River, E. Fk.
	Hood River	Hood River	--	7/11/55	6.0	1,002	Hood River, E. Fk.
	Hod River	Hood River	--	7/26/55	9.7	C17	Hood River, E. Fk.
	Hood River	Hood River	--	8/ 1/55	4.0	1,000	Hood River, E. Fk.
	Hood River	Hood River	--	8/ 2155	4.0	999	Hood River, E. Fk.
	Hood River	Hood River	--	5/ 3/55	5.0	1,000	Hood River, M. Fk.
	Hood River	Hood River	--	5/18/55	5.0	500	Hood River, M. Fk.
	Hod River	Hod River	--	6/ 1/55	5.0	1,000	Hood River, M. Fk.
	Hood River	Hood River	--	6/22/55	4.7	503	Hood River, M. Fk.
	Hood River	Hood River	--	7/ 6/55	7.0	1,505	Hood River, M. Fk.
	Hood River	Hood River	--	8/ 2/55	4.0	1,000	Hood River, M. Ft.
	Hood River	Hood River	--	8/ 3/55	4.0	500	Hood River, M. Fk.
	Hood River	Hood River	--	5/ 2/55	5.0	1,000	Hood River, W. Fk.
	Hood River	Hood River	--	5/18/55	5.0	1,000	Hood River, W. Fk.
	Hood River	Hood River	--	5/19/55	5.0	1,000	Hood River, W. Ft.
	Hood River	Hood River	--	6/ b/55	5.0	1,000	Hood River, U. Fk.
	Hood River	Hood River	--	6/ 9/55	5.0	1,000	Hod River, W. Fk.
	Hood River	Hood River	--	6/22/55	4.7	1,001	Hood River, W. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1954	Hood River	Hood River	--	7/ 6/55	7.0	1,505	Hood River, W. Fk.
	Hood River	Hood River	--	7/ 7/55	7.0	1,505	Hood River, U. Fk.
	Hood River	Hood River	--	8/ 1/55	4.0	1,000	Hood River, W. Fk.
	Hood River	Hood River	--	8/ 3/55	4.0	1,000	Hood River, W. Fk.
1955	Hood River	Oak Springs	--	7/ 3/56	4.0	720	Lost Lake
	Hood River	Oak Springs	--	7/ 5/56	4.0	800	Lost Lake
	Hood River	Oak Springs	--	7/ b/M	4.0	800	Lost Lake
	Hod River	Oak Springs	--	7/ 9/56	4.0	799	Lost Lake
	Hood River	Oak Springs	--	7/10/56	6.0	1,200	Lost Lake
	Hood River	Oak Springs	--	7/13/56	6.0	1,200	Lost Lake
	Hood River	Oak Springs	--	7/16/56	6.0	1,199	Lost Lake
	Hood River	Oak Springs	--	7/17/56	8.0	1,600	Last Lake
	Hood River	Oak Springs	--	7/23/56	8.0	1,680	Last Lake
	Hood River	Oak Springs	--	8/29/56	5.0	2,000	Lost Lake
	Hood River	Oak Springs	--	5/21/56	5.0	1,000	Neal Creek
	Hood River	Oak Springs	--	b/11/56	4.0	800	Neal Creek
	Hood River	Oak Springs	--	6/14/56	4.0	200	Neal Creek
	Hood River	Oak Springs	--	7/12/56	6.0	510	Neal Creek
	Hood River	Oak Springs	--	4/24/56	5.0	500	Evans Creek
	Hood River	Oak Springs	--	5/21/56	5.0	500	Evans Creek
	Hood River	Oak Springs	--	6/14/56	4.0	500	Evans Creek
	Hood River	Oak Springs	--	4/24/56	5.0	500	Ode11 Creek
	Hood River	Oak Springs	--	5/14/56	5.0	300	Odell Creek
	Hood River	Oak Springs	--	6/14/56	4.0	500	Ode11 Creek
	Hood River	Oak Springs	--	7/12/56	6.0	210	Cdell Creek
	Hood River	Oak Springs	--	4/26/56	5.0	300	Trout Creek
	Hood River	Oak Springs	--	5/21/56	5.0	500	Trout Creek
	Hood River	Oak Springs	--	6/14/56	4.0	200	Trout Creek
	Hood River	Oak Springs	--	4/24/56	5.0	300	Indian Creek
	Hood River	Oak Springs	--	5/21/56	5.0	200	Indian Creek
	Hood River	Oak Springs	--	6/19/56	4.0	500	Indian Creek
	Hood River	Oak Springs	--	6/20/56	4.0	1,000	Greenpoint Creek
	Hood River	Oak Springs	--	7/10/56	6.0	1,020	Greenpoint Creek
	Hood River	Oak Springs	--	5/22/56	5.0	2,000	Kingsley Resevoir
	Hood River	Oak Springs	--	5/23/56	5.0	2,000	Kingsley Resevoir
	Hood River	Oak Springs	--	6/11/56	4.0	1,400	Kingsley Resevoir
	Hood River	Oak Springs	--	6/12/56	4.0	600	Kingsley Resevoir
	Hood River	Oak Springs	--	5/ 8/56	5.0	1,000	Lake Branch Creek
	Hood River	Oak Springs	--	5/24/56	5.0	1,000	Lake Branch Creek
	Hood River	Oak Springs	--	6/ 5/56	4.0	800	Lake Brmch Creek
	Hood River	Oak Springs	--	6/14/56	4.0	600	Lake Branch Creek
	Hood River	Oak Springs	--	6/15/56	4.0	600	Lake Branch Creek
	Hood River	Oak Springs	--	7/ 6/56	4.0	800	Lake Brmch Creek
	Hood River	Oak Springs	--	7/12/56	6.0	1,200	Lake Brmch Creek
	Hood River	Oak Springs	--	8/ 6 1 %	7.0	1,001	Lake Branch Creek
	Hood River	Oak Springs	--	8/ 7/56	7.0	1,001	Lake Branch Creek
	Hood River	Oak Springs	--	5/ 9/56	5.0	1,000	Hood Rinr, E. Fk.
	Hood River	Oak Springs	--	5/14/56	5.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/20/56	4.0	1,600	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 9/56	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/10/56	6.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/16/56	6.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/17/56	6.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/24/56	8.0	1,600	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 7/56	7.0	2,401	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/15/56	5.0	1,000	Hood River, M. Ft.
	Hod River	Oak Springs	--	5/24/56	5.0	1,000	Hood River, M. Fk.
	Hood River	Oak Springs	--	6/15/56	4.0	700	Hood River, M. Fk.
	Hood River	Oak Springs	--	6/19/56	4.0	1,300	Hood River, M. Fk.
	Hood River	Oak Springs	--	7/10/56	6.0	1,020	Hod River, M. Fk.
	Hood River	Oak Springs	--	7/12/56	6.0	1,020	Hood River, M. Fk.
	Hood River	Oak Springs	--	8/20/56	5.0	2,000	Hood River, M. Fk.
	Hood River	Oak Springs	--	5/ 8/56	5.0	2,000	Hood River, U. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1955	Hood River	Oak Springs	--	5/24/56	5.0	1,500	Hood River, W. Fk.
	Hood River	Oak Springs	--	6/ 5/56	4.0	800	Hood River, W. Ft.
	Hood River	Oak Springs	--	6/13/56	4.0	2,400	Hood River, W. Fk.
	Hood River	Oak Springs	--	6/14/56	4.0	800	Hood River, W. Fk.
	Hood River	Oak Springs	--	7/11/56	6.0	2,400	Hood River, W. Ft.
	Hood River	Oak Springs	--	7/26/56	8.0	1,600	Hood River, W. Fk.
	Hood River	Oak Springs	--	8/21/56	5.0	1,000	Hood River, W. Ft.
	Hod River	Oak Springs	--	8/27/56	5.0	1,000	Hood River, U. Fk.
1956	Hood River	Unknown	--	5/27/57	7.5	1,500	Lost Lake
	Hood River	Unknown	--	5/29/57	7.0	1,505	Lost Lake
	Hood River	Unknown	--	b/19/57	7.5	1,500	Lost Lake
	Hood River	Unknown	--	b/25/57	8.0	1,504	Lost Lake
	Hood River	Unknown	--	7/ 1/57	8.0	1,504	Lost Lake
	Hood River	Unknown	--	7/16/57	8.0	1,248	Lost Lake
	Hood River	Unknown	--	7/17/57	8.0	1,256	Lost Lake
	Hood River	Unknown	--	10/ 1/57	30.0	10,017	Lost Lake
	Hood River	Unknown	--	4/23/57	5.5	500	Meal Creek
	Hood River	Unknown	--	5/ 8/57	6.0	1,002	Neal Creek
	Hood River	Unknown	--	5/16/57	9.0	999	Ned Creek
	Hood River	Unknown	--	8/ 7/57	8.0	2,000	Neal Creek
	Hood River	unknown	--	4/23/57	5.5	500	Odell Creek
	Hood River	Unknown	--	5/ 7/57	5.0	300	Odell Creek
	Hood River	Unknown	--	4/24/57	5.5	500	Indian Creek
	Hood River	Unknown	--	5/ 8/57	6.0	504	Indian Creek
	Hood River	Unknown	--	5/14/57	7.5	1,013	Kingsley Resevoir
	Hood River	Unknown	--	5/15/57	9.0	1,800	Kingsley Resevoir
	Hood River	Unknown	--	5/22/57	7.0	1,190	Kingsley Resevoir
	Hood River	Unknown	--	7/29/57	0.0	1,600	Kingsley Resevoir
	Hood River	Unknown	--	8/ 6/57	8.0	1,719	Clear Branch Creek
	Hood River	Unknown	--	4/24/57	5.5	2,002	Hood River, E. Fk.
	Hood River	Unknown	--	4/25/57	5.5	1,001	Hood River, E. Fk.
	Hood River	Unknown	--	4/25/57	6.0	2,004	Hood River, E. Fk.
	Hood River	Unknown	--	5/13/57	7.5	1,013	Wood River, E. Fk.
	Hood River	Unknown	--	5/14/57	7.5	1,012	Hood River, E. Fk.
	Hood River	Unknown	--	5/15/57	7.0	3,003	Hood River, E. Fk.
	Hood River	Unknown	--	5/22/57	7.0	2,002	Hood River, E. Fk.
	Hood River	Unknown	--	5/28/57	7.5	1,500	Hood River, E. Fk.
	Hood River	Unknown	--	5/29/57	7.0	1,505	Hood River, E. Fk.
	Hood River	Unknown	--	6/24/57	7.0	1,001	Hood River, E. Fk.
	Hood River	Unknown	--	6/26/57	8.0	1,504	Hood River, E. Fk.
	Hood River	Unkmwn	--	b/28/57	0.0	1,504	Hood River, E. Fk.
	Hood River	Unknown	--	7/ 1/57	7.0	1,505	Hood River, E. Fk.
	Hood River	Unknown	--	7/ 1/57	8.0	1,504	Hood River, E. Fk.
	Hood River	Unknown	--	7/ 2/57	8.0	1,504	Hood River, E. Fk.
	Hood River	Unknown	--	7/16/57	8.0	1,504	Hood River, E. Fk.
	Hood River	Unknown	--	7/17/57	8.0	1,504	Hood River, E. Fk.
	Hood River	Unknown	--	7/22/57	8:0	4.511	Hood River, E. Fk.
	Hood River	Unknown	--	7/23/57	8.0	3,008	Hood River, E. Fk.
	Hood River	Unknown	--	8/ 7/57	8.0	4,000	Hood River, E. Fk.
	Hood River	Unknown	--	8/14/57	8.0	2,000	Hood River, E. Fk.
	Hood River	Unknown	--	5/16/57	9.0	1,998	Hood River, M. Fk.
1957	Hood River	Oak Springs	--	5/22/58	5.3	2,650	Lost Lake
	Hood River	Oak Springs	--	5/23/58	5.3	1,325	Lost Lake
	Hood River	Oak Springs	--	5/26/58	5.3	1,325	Lost Lake
	Hood River	Oak Springs	--	7/ 1/58	5.0	2,350	Lost Lake
	Hood River	Oak Springs	--	7/ 1/58	6.7	1,608	Lost Lake
	Hood River	Oak Springs	--	7/22/58	5.5	825	Lost Lake
	Hood River	Oak Springs	--	4/17/58	5.0	2,000	Neal Creek
	Hood River	Oak Springs	--	51 2/58	5.0	1,000	Neal Creek
	Hood River	Oak Springs	--	6/10/58	5.0	1,000	Neal Creek
	Hood River	Oak Springs	--	4/16/58	5.0	500	Odell Creek
	Hood River	Oak Springs	--	5/12/58	4.7	300	Odell Creek

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Hark	Date	Size (fish/lb)	Number	Release site
1957	Hood River	Oak Springs	--	6/10/58	5.0	500	Odell Creek
	Hood River	Oak Springs	--	5/13/58	5.6	1,344	Kingsley Raevoir
	Hood River	Oak Springs	--	5/14/58	5.6	2,660	Kingsley Resevoir
	Hood River	Oak Springs	--	6/17/58	4.8	2,006	Kingsley Resevoir
	Hood River	Oak Springs	--	4/22/58	5.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/23/58	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 1/58	5.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	—	5/ 7/58	4.6	1,150	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/12/58	4.6	1,150	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/13/58	5.6	4,704	Hood River, E. Fk.
	Hood River	Oak Springs	—	5/23/58	5.3	1,325	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/10/58	5.2	1,300	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/18/58	4.8	2,400	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/24/58	4.7	2,350	Road River, E. Fk.
	Hood River	Oak Springs	--	6/25/58	4.7	1,316	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/26/58	4.7	1,311	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/ 2/58	6.7	1,608	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/22/58	5.5	1,375	Hood River, E. Fk.
	Hood River	Oak Springs	—	7/23/58	5.5	1,375	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/24/M	5.5	1,375	Hood River, E. Fk.
	Hood River	Oak Springs	—	a m	6.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	—	8/ 7/58	6.5	1,625	Hood River, E. Fk.
	Hood River	Oak Springs	—	8/15/58	6.1	3,660	Hood River, E. Pk.
	Hood River	Oak Springs	—	8/19/58	6.0	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/21/58	5.8	1,754	Hood River, E. Fk.
	Hood River	Oak Springs	—	8/22/M	5.8	3,502	Hood River, E. Fk.
	Hood River	Oak Springs	—	5/ 2/58	5.0	1,000	Hood River, M. Fk.
	Hood River	Oak Springs	--	7/ 2/58	6.7	1,005	Nood River, M. Fk.
1958	Hood River	Oak Springs	--	5/14/59	4.9	2,000	Lost Lake
	Hood River	Oak Springs	--	5/19/59	5.4	2,160	Lost Lake
	Hood River	Oak Springs	--	5/20/59	5.4	1,840	Lost Lake
	Hood River	Oak Springs	--	6/ 1/59	4.6	1,003	Lost Lake
	Hood River	Oak Springs	--	6/ 9/59	5.2	2,080	Lust Lake
	Hood River	Oak Springs	—	6/23/59	4.5	922	Lost Lake
	Hood River	Oak Springs	--	9/24/59	30.0	9,990	Lost Lake
	Hood River	Oak Springs	--	4/22/59	4.9	2,000	Neal Creek
	Hood River	Oak Springs	--	5/12/59	4.9	1,000	Neal Creek
	Hood River	Oak Springs	--	4/22/59	12.5	500	Odell Creek
	Hood River	Oak Springs	—	5/12/59	5.0	300	Odell Creek
	Hood River	Oak Springs	--	6/ 9/59	5.4	499	Odell Creek
	Hood River	Oak Springs	—	7/ 7/59	5.5	220	Odell Creek
	Hood River	Oak Springs	—	5/20/59	5.4	2,160	Kingsley Raevoir
	Hood River	Oak Springs	—	5/25/59	5.3	1,060	Kingsley Resevoir
	Hood River	Oak Springs	--	5/26/59	5.5	781	Kingsley Resevoir
	Hood River	Oak Springs	—	6/15/59	4.4	999	Kingsley Resevoir
	Hood River	Oak Springs	--	6/22/59	4.5	900	Kingsley Resevoir
	Hood River	Oak Springs	—	4/21/59	4.7	3,292	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/29/59	4.9	980	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 5/59	5.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/11/59	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/12/59	5.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/13/59	4.9	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/25/59	5.1	1,020	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/25/59	5.3	1,060	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/26/59	5.3	1,811	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 1/59	4.6	2,007	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/ 8/59	5.2	2,080	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/15/59	4.4	1,764	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/22/59	4.5	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 1/59	5.5	4,400	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 7/59	5.5	3,300	Hood River, E. Fk.
	Hood River	Oak Springs	—	7/15/59	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/20/59	6.2	1,240	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/20/59	6.5	1,300	Hood River, E. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Hark	Date	Size (fish/lb)	Number	Release site
1959	Hood River	Oak Springs	--	6/ l/M	2.5	SW	Lost Lake
	Hood River	Oak Springs	--	6/ 2/60	2.5	SW	Lost Lake
	Hod River	Oak Springs	--	6/ 6/60	2.5	1,000	Lost Lake
	Hod River	Oak Springs	--	6/ 6/60	4.7	1,880	Lost Lake
	Hod River	Oak Springs	--	6/ 7/60	2.5	1,500	Lost Lake
	Hood River	Oak Springs	--	6/ 7/60	4.7	1,001	Lost Lake
	Hood River	Oak Springs	--	6/14/60	4.0	800	Lost Lake
	Hood River	Oak Springs	--	6/15/60	4.0	800	Lost Lake
	Hood River	Oak Springs	--	6/20/60	3.5	700	Lost Lake
	Hood River	Oak Springs	--	6/30/60	3.7	1,406	Lost Lake
	Hood River	Oak Springs	--	4/15/60	3.1	1,240	Neal Creek
	Hood River	Oak Springs	--	4/26/60	5.0	765	Neal Creek
	Hood River	Oak Springs	--	5/12/60	5.0	1,000	Neal Creek
	Hood River	Oak Springs	--	4/15/60	3.0	240	Odell Creek
	Hood River	Oak Springs	--	4/26/60	5.0	260	Odell Creek
	Hod River	Oak Springs	--	6/ 3/60	2.5	200	Ockll Creek
	Hood River	Oak Springs	--	6/15/60	4.7	376	Odell Creek
	Hood River	Oak Springs	--	6/ 1/60	2.5	2,000	Kingsley Resevoir
	Hood River	Oak Springs	--	6/ 2/60	2.5	500	Kingsley Resevoir
	Hood River	Oak Springs	--	6/ 9/60	2.5	1,000	Kingsley Resevoir
	Hood River	Oak Springs	--	6/10/60	2.5	1,000	Kingsley Resevoir
	Hood River	Oak Springs	--	6/21/60	3.5	700	Kingsley Resevoir
	Hood River	Oak Springs	--	6/28/60	5.0	800	Kingsley Resevoir
	Hood River	Oak Springs	--	4/15/60	3.1	620	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/18/60	3.1	620	Hod River, E. Fk.
	Hood River	Oak Springs	--	4/18/60	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/25/60	4.9	1,960	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 3/60	3.0	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 9/60	2.7	540	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/12/60	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/16/60	3.0	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/17/60	3.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/24/60	3:o	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/25/60	3.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 1160	2.5	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 3160	2.5	1,000	Hod River, E. Fk.
	Hood River	Oak Springs	--	6/ am	2.5	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/15/60	4.0	800	Hood River, E. Fk.
	Hod River	Oak Springs	--	6/16/60	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/21/60	3.0	600	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/22/60	3.0	600	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/24/60	3.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/28/60	5.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/29/60	3.7	1,480	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 6/60	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 8/60	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/13/60	4.0	1,600	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/14/60	4.0	800	Hood River, E. Fk.
	Hod River	Oak Springs	--	7/15/60	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/20/60	4.0	2,400	Hood River, E. Fk.
	Hod River	Oak Springs	--	7/27/60	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/28/60	3.9	803	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/29/60	3.9	1,579	Hood River, E. Fk.
1960	Hood River	Oak Springs	--	5/22/61	3.9	780	Lost Lake
	Hood River	Oak Springs	--	5/23/61	3.9	1,560	Lost Lake
	Hood River	Oak Springs	--	5/24/61	3.8	1,520	Lost Lake
	Hood River	Oak Springs	--	6/20/61	3.0	600	Lost Lake
	Hood River	Oak Springs	--	6/29/61	3.3	660	Lost Lake
	Hood River	Oak Springs	--	7/ 5/61	3.3	660	Lost Lake
	Hood River	Oak Springs	--	7/ 6/61	4.3	3,362	Lost Lake
	Hood River	Oak Springs	--	8/25/61	2.5	1,000	Lost Lake
	Hod River	Oak Springs	--	8/28/61	2.5	500	Lost Lake
	Hood River	Oak Springs	--	8/30/61	2:s	2,000	Lost Lake

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1960	Hood River	Oak Springs	--	4/17/61	4.0	1,240	Neal Creek
	Hood River	Oak Springs	--	C/28/61	3.2	400	Neal Creek
	Hood River	Oak Springs	--	5/ 3/61	3.5	323	Neal Creek
	Hood River	Oak Springs	--	5/23/61	3.9	390	Neal Creek
	Hood Rivet	Oak Springs	--	4/17/61	4.0	200	Odell Creek
	Hood River	Oak Springs	--	4/27/61	4.3	201	Odell Creek
	Hood River	Oak Springs	--	5/12/61	3.9	2,340	Kingsley Resevoir
	Hood River	Oak Springs	--	5/22/61	3.9	1,560	Kingsley Resevoir
	Hood River	Oak Springs	--	5/24/61	3.8	1.320	Kingsley Resevoir
	Hood River	Oak Springs	--	7/ 3/61	3.3	561	Kingsley Resevoir
	Hood River	Oak Springs	--	b/17/61	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/18/61	4.0	1,280	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/21/61	4.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/28/61	3.2	640	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 3/61	3.3	700	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 5/61	3.3	700	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/11/61	3.3	1,400	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/17/61	3.7	740	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/19/61	3.7	740	Hood River, E. Ft.
	Hood River	Oak Springs	--	5/25/61	3.9	780	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/29/61	3.3	700	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/29/61	3.9	1,560	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/31/61	3.3	1,400	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/ 1/61	3.3	2,100	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/ 5/61	3.0	600	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 5/61	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 6/61	3.3	1,320	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 9/61	4.0	800	Hood River, E. Fk.
	Hod River	Oak Springs	--	6/ 9/61	4.2	840	Hood River, E. Ft.
	Hod River	Oak Springs	--	6/14/61	3.2	1,280	Hood River, E. Fk.
	Hood River	Oak Springs	--	b/15/61	3.1	620	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/19/61	3.2	1,280	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/20/61	3.1	1,240	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/30/61	3.4	1,360	Hod River, E. Fk.
	Hood River	Oak Springs	--	7/ 3/61	3.3	1,320	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 7/61	3.5	2,800	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	7/27/61	5.0	3,750	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 4/61	3.3	660	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 7/61	3.3	660	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ am	3.3	660	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/17/61	3.2	1,920	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/22/61	2.7	1,620	Hod River, E. Fk.
	Hood River	Oak Springs	--	8/23/61	2.7	1,080	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/29/61	2.5	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/30/61	2.5	750	Hood River, E. Fk.
1961	Hood River	Oak Springs	--	6/12/62	3.0	1,300	Lost Lake
	Hood River	Oak Springs	--	6/12/62	3.3	a23	Lost Lake
	Hood River	Oak Springs	--	6/13/62	3.0	2,676	Lost Lake
	Hood River	Oak Springs	--	7/11/62	4.0	1,080	Lost Lake
	Hood River	Oak Springs	--	8/15/62	3.5	945	Lost Lake
	Hood River	Oak Springs	--	8/27/62	3.5	945	Lost Lake
	Hood River	Oak Springs	--	8/29/62	3.5	945	Lost Lake
	Hood River	Oak Springs	--	4/17/62	4.5	675	Neal Creak
	Hood River	Oak Springs	--	4/23/62	4.3	1,325	Neal Creek
	Hood River	Oak Springs	--	5/ 4/62	4.3	1,075	Neal Creek
	Hood River	Oak Springs	--	4/23/62	4.5	504	Odell Creek
	Hood River	Oak Springs	--	5/11/62	3.3	330	Odell Creek
	Hood River	Oak Springs	--	7/19/62	4.0	400	Odell Creek
	Hood River	Oak Springs	--	5/22/62	3.8	950	Kingsley Resevoir
	Hood River	Oak Springs	--	5/23/62	3.5	873	Kingsley Resevoir
	Hood River	Oak Springs	--	5/24/62	3.5	an	Kingsley Resevoir
	Hood River	Oak Springs	--	5/28/62	3.5	1,302	Kingsley Resevoir
	Hood River	Oak Springs	--	6/19/62	3.0	750	Kingsley Resevoir

Table 7. (continued).

Brood Year	Hatchery	Brood stack	Mark	Date	Size (fish/lb)	Number	Release site
1961	Hood River	Oak Springs	--	7/ 3/62	3.0	750	Kingsley Resevoir
	Hood River	Oak Springs	--	4/16/62	4.5	1,134	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/18/62	4.3	1,075	Nood River, E. Fk.
	Hood River	Oak Springs	--	4/19/62	4.3	1,075	Hood River, E. Ft.
	Hood River	Oak Springs	--	4/23/62	b.3	1,073	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/23/62	4.3	657	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 7/62	3.6	900	Hod River, E. Fk.
	Hood River	Oak Springs	--	5/11/62	3.2	871	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/11/62	3.3	1,650	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/15/62	3.3	660	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/16/62	3.8	1,024	Hood River, E. Fk.
	Hood River	Oak Springs	—	5/22/62	3.8	950	Hood River, E. fk.
	Hood River	Oak Springs	--	5/23/62	3.3	875	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/25/62	3.5	a75	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/29/62	3.3	875	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/ 1/62	3.2	1,600	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/ 7/62	3.2	a m	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/ 8/62	3.2	1,600	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/15/62	3.0	2,250	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/19/62	3.0	750	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/20/62	3.0	1,500	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/23/62	3.0	730	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/27/62	3.0	750	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/28/62	3.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 2/62	3.0	810	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/ 3/62	3.0	750	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/ 5/62	3.3	891	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/12/62	3.5	1,942	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/13/62	3.5	943	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/20/62	4.0	1,080	Hood River, E. Fk.
	Hod River	Oak Springs	--	7/26/62	4.0	1,080	Hood River, E. Fk.
	Hood River	Oak Springs	—	8/ 8/62	3.5	875	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/16/62	3.5	945	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/24/62	3.5	945	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/28/62	3.5	1,890	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/29/62	3.3	1,890	Hood River, E. Fk.
1962	Hood River	Oak Springs	--	5/27/63	4.0	1,000	Lost Lake
	Hood River	Oak Springs	--	5/28/63	4.0	1,200	Lost Lake
	Hood River	Oak Springs	—	5/29/63	4.0	3,600	Lost Lake
	Hood River	Oak Springs	--	6/ 6/63	4.0	2,400	Lost Lake
	Hood River	Oak Springs	--	6/25/63	4.3	1,350	Lost Lake
	Hood River	Oak Springs	—	6/26/63	4.3	430	Lost Lake
	Oak Springs	Oak Springs	--	8/29/63	3.0	3,780	Lost Lake
	Nood River	Oak Springs	--	4/11/63	4.0	1,000	Neal Creek
	Hood River	Oak Springs	--	4/25/63	4.0	1,000	Neal Creek
	Hood River	Oak Springs	--	5/ 8/63	3.6	551	Neal Creek
	Hood River	Oak Springs	--	6/26/63	4.5	430	Neal Creek
	Hod River	Oak Springs	--	4/17/63	4.0	252	Odell Creek
	Hood River	Oak Springs	--	4/25/63	4.0	252	Odell Creek
	Hood River	Oak Springs	--	5/ a m	3.8	4 %	Odell Creek
	Hood River	Oak Springs	--	4/23/63	4.5	2,250	Kingsley Resevoi r
	Hood River	Oak Springs	—	5/13/63	4.5	1,125	Kingsley Resevoir
	Hood River	Oak Springs	--	5/14/63	4.5	2,230	Kingsley Resevoi r
	Hood River	Oak Springs	--	6/24/63	4.0	1,200	Kingsley Resevoir
	Hood River	Oak Springs	--	6/26/63	4.5	1,179	Kingsley Resevoir
	Hood River	Oak Springs	--	4/17/63	4.5	2,250	Hood River, E. Pk.
	Hood River	Oak Springs	--	4/19/63	4.5	1,125	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/22/63	4.5	1,125	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/25/63	4.0	1,000	Hood River, E. Ft.
	Hod River	Oak Springs	--	5/ 1/63	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 8/63	3.8	1,045	Hood River, E. Fk.
	Hod River	Oak Springs	--	5/14/63	4.5	1,125	Hod River, E. Fk.
	Hood River	Oak Springs	--	5/22/63	4.3	2,903	Hood River, E. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1962	Hood River	Oak Springs	--	5/28/63	4.0	1,200	Hood Rim, E. Fk.
	Hood River	Oak Springs	--	5/29/63	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/ 5/63	4.0	1,200	Hood Rim, E. Fk.
	Hood River	Oak Springs	—	6/ 6/63	4.0	1,200	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/13/63	4.0	2,400	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/25/63	4.0	2,400	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/26/63	4.5	1,350	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 2/63	4.5	2,700	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 5/63	4.5	2,700	Hood River, E. Fk.
	Hood River	Oak Springs	—	7/10/63	4.5	1,350	Hood River, E. Fk.
	Hod River	Oak Springs	--	7/12/63	4.5	1,350	Hood River, E. Fk.
	Hood River	Oak Springs	—	7/16/63	4.5	2,700	Hod River, E. Fk.
	Hood River	Oak Springs	—	8/ 2/63	4.0	2,400	Hood River, E. Fk.
	Hood River	Oak Springs	—	8/ 9/63	4.0	2,400	Hood River, E. Fk.
	Hood River	Oak Springs	--	a/29/63	3.5	2,100	Hood River, E. Fk.
1963	Hood River	Oak Springs	—	6/ 5/64	b.5	927	Last Lake
	Hood River	Oak Springs	—	6/ 9/64	4.0	3,400	Lat Lake
	Hood River	Oak Springs	--	6/10/64	4.0	3,624	Lost Lake
	Hood River	Oak Springs	--	6/30/64	4.5	1,125	Lost Lake
	Hood River	Oak Springs	--	7/20/64	4.0	1,000	Lost Lake
	Hood River	Oak Springs	--	7/21/64	4.0	1,060	Lost Lake
	Hood River	Oak Springs	--	8/26/64	3.3	2,100	Lost Lake
	Hood River	Oak Springs	--	3120164	4.0	4,000	Kingsley Resevoir
	Hood River	Oak Springs	--	5/26/64	4.5	2,016	Kingsley Resevoir
	Hoed River	Oak Springs	—	7/21/64	4.0	1,000	Kingsley Resevoir
	Hood River	Oak Springs	--	8/25/64	3.5	987	Kingsley Resevoir
	Hood River	Oak Springs	—	4/22/64	2.8	2,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/23/64	3.6	1,800	Hood River, E. Fk.
	Hood River	Oak Springs	—	4/30/64	3.6	1,440	Hood Rim, E. Ft.
	Hood River	Oak Springs	--	5/ 8/64	4.0	800	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/14/64	3.8	950	Hood River, E. Fk.
	Hod River	Oak Springs	--	5/19/64	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	—	5/21/64	4.0	2,000	Hod River, E. Fk.
	Hood River	Oak Springs	—	5/29/64	4.3	3,375	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/ 2/64	4.3	2,700	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/11/64	5.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/12/64	5.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	—	6/24/64	4.5	3,150	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/25/64	4.3	1,573	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/30/64	4.5	2,925	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 1/64	4.3	3,130	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/20/64	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	—	7/21/64	4.0	1,000	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	7/23/64	5.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/24/64	3.5	1,925	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/25/64	3.5	700	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/26/64	3.3	1,925	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/27/64	3.5	350	Hood River, E. Fk.
1964	Hood River	Oak Springs	—	6/23/65	4.5	1,373	Lost Lake
	Hood River	Oak Springs	--	6/23/65	4.8	1,340	Lost Lake
	Hood River	Oak Springs	--	6/28/65	4.5	1,350	Last Lake
	Hood River	Oak Springs	--	6/30/65	4.3	4,410	Lost Lake
	Hood River	Oak Springs	--	7/15/65	4.0	1,100	Lost Lake
	Hood River	Oak Springs	--	8/ 5/65	4.1	538	Lost Lake
	Hood River	Oak Springs	—	8/11/65	4.0	1,400	Lost Lake
	Hood River	Oak Springs	--	4/20/65	4.5	1,330	Heal Creek
	Hood River	Oak Springs	--	5/27/65	4.5	673	Neal Creek
	Hood River	Oak Springs	--	6/28/65	4.5	504	Neal Creek
	Hood River	Oak Springs	--	7/1 6165	4.0	500	Neal Creek
	Hood River	Oak Springs	—	5/14/65	4.3	1,350	Kingsley Resevoir
	Hood River	Oak Springs	—	5/18/65	4.3	2,302	Kingsley Resevoir
	Hood River	Oak Springs	--	5/19/65	4.5	1,330	Kingsley Resevoir

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release rite
1964	Hood River	Oak Springs	--	6/18/65	4.7	1,175	Kingsley Resevoir
	Hood River	Oak Springs	--	6/28/65	4.5	1,800	Kingsley Resevoir
	Oak Springs	Oak Springs	--	7/28/65	1.0	100	Kingsley Resevoir
	Hood River	Oak Springs	--	8/11/65	4.0	1,012	Kingsley Resevoir
	Hood River	Oak Springs	--	C/M/65	4.5	1,350	Hood River, E. Fk.
	Hood River	Oak Springs	--	L/22/65	4.5	4,050	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/23/65	4.5	1,125	Hod River, E. Fk.
	Hood River	Oak Springs	--	5/ 5/65	4.S	2,250	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/14/65	4.5	1.350	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/20/65	4.5	2,700	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/27/65	4.5	1,125	Hood River, E. Fk.
	Hod River	Oak Springs	--	5/28/65	4.5	1,350	Hod River, E. Fk.
	Hood River	Oak Springs	--	5/29/65	4.5	1,350	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/16/65	4.7	2,585	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/18/65	4.7	1,175	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/29/65	4.0	2,600	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 2/65	4.5	1,350	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/15/65	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/16/65	4.0	1,200	Hood River, E. Ft.
	Hood River	Oak Springs	--	7/19/65	4.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/21/65	4.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	a/ C/65	4.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 5/65	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 6/65	4.0	1,200	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/11/65	4.0	2,800	Hood River, E. Fk.
1965	Hood River	Oak Springs	--	5/25/66	b.4	3,001	Lost Lake
	Hood River	Oak Springs	--	5/26/66	4.4	3,000	Lost Cake
	Hood River	Oak Springs	--	5/29/M	5.0	2,000	Lost Lake
	Hood River	Oak Springs	--	7/ 5/66	3.7	2,002	Lost Lake
	Hood River	Oak Springs	--	8/ 9/66	3.5	2,002	Lost Lake
	Hood River	Oak Springs	--	8/10/66	3.5	1,001	Lost Lake
	Hood River	Oak Springs	--	8/15/66	3.1	1,860	Lost Lake
	Hood River	Oak Springs	--	8/16/66	3.1	3,720	Last Lake
	Hood River	Oak Springs	--	4/22/66	5.0	1,500	Weal Creek
	Hood River	Oak Springs	--	5/18/66	5.1	1,005	Neal Creek
	Hood River	Oak Springs	--	6/16/66	4.0	500	Neal Creek
	Hood River	Oak Springs	--	5/17/66	5.1	4,590	Kingsley Resevoir
	Hood River	Oak Springs	--	5/18/66	5.1	1,408	Kingsley Resevoir
	Hood River	Oak Springs	--	7/28/66	3.5	3,003	Kingsley Resevoir
	Hood River	Oak Springs	--	4/20/66	5.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/22/66	5.0	3,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/10/66	5.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/23/66	5.0	3,000	Hood River, E. Fk.
	Hod River	Oak Springs	--	5/27/66	4.4	1,003	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/16/66	4.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/17/66	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/27/66	5.0	1,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/28/66	5.0	4,500	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/21/66	4.0	3,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/28/66	3.5	2,002	Hood River, E. Fk.
	Hood River	Oak Springs	--	8/ 9/66	3.5	3,003	Hod River, E. Fk.
1966	Hod River	Oak Springs	--	5/17/67	4.3	3,870	Lost Lake
	Hood River	Oak Springs	--	6/ 5/67	.a	277	Lost Lake
	Hood River	Oak Springs	--	6/ 6/67	3.7	2,220	Lost Lake
	Hood River	Oak Springs	--	6/21/67	4.0	5,000	Lost Lake
	Hood River	Oak Springs	--	7/ 6/67	3.6	2,000	Lost Lake
	Hood River	Oak Springs	--	7/11/67	3.5	3,003	Lost Lake
	Oak Springs	Oak Springs	--	7/13/67	.4	'150	Lost Lake
	Oak Springs	Oak Springs	--	7/13/67	.5	150	Lost Lake
	Oak Springs	Oak Springs	--	7/14/67	.4	75	Lost Lake
	Oak Springs	Oak Springs	--	8/ 2/67	.4	239	Lost Lake
	Oak Springs	Oak Springs	--	8/15/67	3.0	3,000	Lost Lake

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Nuder	Release site
1966	Oak Springs	Oak Springs	--	8/29/67	3.0	2,250	Lost Lake
	Hood River	Oak Springs	--	4/19/67	4.0	1,500	Neal Creek
	Hood River	Oak Springs	--	5117167	3.2	1,500	Neal Creek
	Hood River	Oak Springs	--	5/ 9167	3.6	1,080	Kingsley Resevoir
	Hood River	Oak Springs	--	5110167	3.6	2,160	Kingsley Resevoir
	Hood River	Oak Springs	--	5/19/67	4.3	2,580	Kingsley Resevoir
	Hood River	Oak Springs	--	6/10/67	5.0	1,250	Kingsley Resevoir
	Hood River	Oak Springs	--	6/20/67	4.1	3,000	Kingsley Resevoir
	Oak Springs	Oak Springs	--	7111167	.4	75	Kingsley Resevoir
	Hood River	Oak Springs	--	4117167	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/18/67	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	4/19/67	4.0	2,000	Hod River, E. Fk.
	Hood River	Oak Springs	--	4/21/67	4.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 4/67	4.5	2,002	Hood River, E. Fk.
	Hood River	Oak Springs	--	5/ 4/67	5.0	1,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	5119167	4.3	2,580	Hood River, E. Fk.
	Hood River	Oak Springs	--	5129167	4.0	2,800	Hod River, E. Fk.
	Hood River	Oak Springs	--	6/ 6167	3.7	2,222	Had River, E. Ft.
	Hood River	Oak Springs	--	6/ 7167	3.6	1,080	Hood River, E. Fk.
	Hood River	Oak Springs	--	6112167	3.6	1,116	Hood River, E. Fk.
	Hood River	Oak Springs	--	6/28/67	5.0	1,000	Hood River, E. Ft.
	Hood River	Oak Springs	--	6/29/67	3.7	2,168	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 3/67	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/ 7167	5.0	2,000	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/10/67	3.5	1,001	Hood River, E. Fk.
	Hood River	Oak Springs	--	7/11/67	3.5	1,400	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	8/16/67	2.9	3,001	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	0122167	2.5	2,550	Hood River, E. Fk.
1967	Hood River	Uillamette R.	--	5/ 2168	c.3	2,002	Lost Lake
	Hood River	Uillamette R.	--	5/ 3/68	4.3	1,001	Lost Lake
	Hood River	Willamette R.	--	51 9168	4.0	2,000	Lost Lake
	Hood River	Willamette R.	--	5113160	4:o	1,000	Lost Lake
	Hood River	Uillamette R.	--	6/ 4/68	3.8	3,006	Lost Lake
	Hood River	Uillamette R.	--	6/ 6/68	3.8	1,003	Lost Lake
	Hood River	Uillamtte R.	--	6/10/68	.a	480	Lost Lake
	Hood River	Uillamtte R.	--	6/11/68	4.5	1,002	Lost Lake
	Hood River	Uillamtte A.	--	6/28/68	3.9	2,133	Lost Lake
	Oak Springs	Oak Springs	--	8/ 8/68	4.2	3,003	Lost Lake
	Oak Springs	Oak Springs	--	8/13/68	3.6	3,002	Lost Lake
	Hood River	Uillamette R.	--	4/17/68	4.0	1,000	Neal Creek
	Hod River	Willamette R.	--	4/25/68	4.2	1,004	Neal Creek
	Hood River	Uillamette R.	--	5/27/68	4.1	1,000	Neal Creek
	Hood River	Uillamette R.	--	5/15/68	4.0	1,000	Polallie Creek
	Hood River	Uillwtte R.	--	4/ 8/68	4.0	3,600	Kingsley Resevoir
	Hood River	Uillamtte R.	--	4/25/68	4.2	1,004	Kingsley Resevoir
	Hood River	Uillamette R.	--	5/23/68	4.1	2,402	Kingsley Resevoir
	Hood River	Willamette R.	--	4/17/68	4.0	3,000	Hood River, E. Fk.
	Hood River	Uillamette R.	--	4/18/68	4.0	2,000	Hood River, E. Fk.
	Hood River	Uillamtte R.	--	4/18/68	4.5	1,008	Hood River, E. Fk.
	Hood River	Uillamette R.	--	4/25/68	4.2	2,008	Hood River, E. Fk.
	Hood River	Uillamtte R.	--	5/ 3/68	4.3	2,002	Hood River, E. Fk.
	Hood River	Willamette R.	--	5/10/68	4.0	2,000	Hood River, E. Fk.
	Hood River	Willamette R.	--	5/23/68	4.1	1,000	Hood River, E. Fk.
	Hood River	Uillamette R.	--	5/24/68	4.1	2,000	Hood River, E. Fk.
	Hood River	Uillamette R.	--	5127168	4.1	1,000	Hood River, E. Fk.
	Hood River	Uillamette R.	--	6/ 5/68	3.8	2,006	Hood River, E. Fk.
	Hood River	Uillamtte R.	--	6 i 7/68	3.8	2,006	Hood River, E. Fk.
	Hood River	Uillamette R.	--	6/11/68	4.5	1,035	Hood River, E. Fk.
	Hood River	Willamette R.	--	6/14/68	4.0	3,000	Hood River, E. Fk.
	Hood River	Willamette R.	--	6/17/68	4.0	1,000	Hood River, E. Fk.
	Hood River	Uillamette R.	--	6/27/68	3.9	4,009	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	8/ 4/68	3.6	2,383	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	9/11/68	3.8	3,249	Hood River, E. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Dete	Size (fish/lb)	Number	Release rite
1968	Hood River	Roaring River	—	6/ 4/69	3.8	2,006	Lost Lake
	Hood River	Roaring River	--	6/ 6/69	3.8	1,001	Lost Lake
	Hood River	Roaring River	--	6/ 9/69	3.8	1,003	Lost Lake
	Hood River	Roaring River	—	6/16/69	3.a	1,002	Lost Lake
	Hood River	Roaring River	--	6/17/69	3.8	2.005	Lost Lake
	Hod River	Roaring River	--	6/18/69	3.8	2:00b	Lost Lake
	Hood River	Roaring River	--	6/20/69	3.0	1,989	Lost Lake
	Hood River	Roaring River	--	6/25/69	3.5	1,001	Lost Lake
	Hood River	Roaring River	--	7/ 1/69	2.0	2,001	Lost Lake
	Hood River	Roaring River	—	7 i 9/69	2.1	1,155	Lost Lake
	Hod River	Roaring River	--	7/10/69	2.1	252	Lost Lake
	Oak Springs	Oak Springs	--	9/ 4/69	3.2	2,016	Lost Lake
	Hood River	Roaring River	--	4/15/69	4.6	1,002	Neal Creek
	Hood River	Roaring River	--	4/24/69	4.4	501	Neal Creek
	Hood River	Roaring River	--	5/ 6/69	4.3	502	Neal Creek
	Hood River	Roaring River	--	5/12/69	3.5	525	Neal Creek
	Hood River	Roaring River	--	4/15/69	4.6	500	Odell Creek
	Hood River	Roaring River	--	4/24/69	4.4	502	Ode11 Creek
	Hood River	Roaring River	--	5/ bib9	4.3	499	Odell Creek
	Hood River	Roaring River	--	5/12/69	3.5	525	Odell Creek
	Hood River	Roaring River	--	6/25/69	3.0	510	Odell Creek
	Hood River	Roaring River	--	5/ bib9	4.3	1,001	Indian Creek
	Hood River	Roaring River	--	5/22/69	3.8	3,006	Kingsley Resevoir
	Hood River	Roaring River	--	5/27/69	3.8	2,006	Kingsley Raevoir
	Hood River	Roaring River	--	5/28/69	3.8	1,003	Kingsley Resevoir
	Hood River	Roaring River	--	6/20/69	3.0	1,002	Kingsley Resevoir
	Hood River	Roaring River	—	6/30/69	2.1	1,575	Kingsley Resevoir
	Hood River	Roaring River	--	7/ 8/69	2.1	1,050	Kingsley Resevoir
	Hood River	Roaring River	--	4/15/69	4.6	1,002	Hood River, E. Fk.
	Hood River	Roaring River	—	4/16/69	4.6	2,004	Hood River, E. Fk.
	Hood River	Roaring River	--	4/18/69	4.6	1,002	Hood River, E. Fk.
	Hod River	Roaring River	—	4/24/69	4.4	2,006	Hood River, E. Fk.
	Hood River	Roaring River	--	4/25/69	4.4	2,323	Hood River, E. Fk.
	Hood River	Roaring River	--	5i bib9	4.3	1,001	Hood River, E. Fk.
	Hood River	Roaring River	—	5/ 9/69	4.3	1,290	Hood River, E. Fk.
	Hood River	Roaring River	--	5/28/69	3.8	3,010	Hood River, E. Fk.
	Hood River	Roaring River	—	bi ‡ 59	3.0	2,006	Hood River, E. Ft.
	Hood River	Roaring River	--	6/12 59	3.8	1,003	Hood River, E. Fk.
	Hood River	Roaring River	--	6/16/69	3.8	1,003	Hood River, E. Fk.
	Hood River	Roaring River	--	6/17/69	3.8	1,003	Hood River, E. Fk.
	Hod River	Roaring River	—	6/19/69	3.0	792	Hood River, E. Fk.
	Hood River	Roaring River	--	6/23/69	3.0	1,002	Hood River, E. Fk.
	Hood River	Rowing River	--	6/24/69	3.5	1,001	Hood River, E. Fk.
	Hood River	Roaring River	--	6/25/69	3.0	600	Hood River, E. Fk.
	Hood River	Roaring River	—	7 i 3/69	2.1	2,645	Hood River, E. Fk.
	Oak Springs	Oak Springs	—	8/13/69	4.0	3,288	Hood River, E. Fk.
1969	Hood River	Roaring River	--	5/22/70	3.0	4,002	Lost Lake
	Hood River	Roaring River	--	6/ 3/70	2.3	3,220	Lost Lake
	Hod River	Roaring River	--	6/17/70	2.2	1,540	Lost Lake
	Hod River	Roaring River	--	6/19/70	2.2	1,540	Lost Lake
	Hood River	Roaring River	--	6/22/70	2.2	660	Lost Lake
	Hod River	Roaring River	--	6/26/70	2.3	1,060	Lost Lake
	Hood River	Roaring River	--	7/ 7/70	2.0	1,800	Lost Lake
	Oak Springs	Diamond L.	--	7/16/70	2.8	2,002	Lost Lake
	Hood River	Roaring River	—	4/16/70	3.1	1,500	Neal Creek
	Hood River	Roaring River	--	5/13/70	3.5	1,500	Neal Creek
	Hod River	Roaring River	--	6/ am	2.6	1,001	Neal Creek
	Hood River	Roaring River	--	7/ 6/70	2.0	400	Evans Creek
	Hood River	Roaring River	--	4/16/70	3.1	502	Odell Creek
	Hood River	Roaring River	—	4/24/70	3.0	501	Odell Creek
	Hood River	Roaring River	--	5/13/70	3.2	502	Odell Creek
	Hod River	Roaring River	--	5/18/70	3.0	501	Odell Creek
	Hod River	Roaring River	--	7/ 6/70	2.0	600	Odell Creek

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Dete	Size (fish/lb)	Number	Release site
1969	Hood River	Roaring River	--	7/ 6/70	2.0	400	Trout Creek
	Hood River	Roaring River	--	7/ 7/70	2.0	400	Indian Creek
	Hood River	Roaring River	--	7/ 6/70	2.0	600	Polallie Creek
	Hood River	Roaring River	--	5/18/70	3.0	4,002	Kingsley Resevoir
	Hood River	Roaring River	--	6/ 1/70	2.2	1,375	Kingsley Resevoir
	Hood River	Roaring River	--	6/16/70	2.2	1,540	Kingsley Raevoir
	Hood River	Roaring River	--	6/22/70	2.2	1,100	Kingsley Raevoir
	Hood River	Roaring River	--	4/14/70	3.1	2,002	Hood River, E. Fk.
	Hood River	Roaring River	--	4/15/70	3.1	6,006	Hood River, E. Fk.
	Hood River	Roaring River	--	5/ 6/70	3.2	2,002	Hood River, E. Fk.
	Hood River	Roaring River	--	5/13/70	3.2	2,002	Hood River, E. Fk.
	Hood River	Rowing River	--	5/27/70	2.2	1,542	Nod River, E. Fk.
	Hood River	Roaring River	--	5/29/70	2.2	660	Hood River, E. Pk.
	Hood River	Roaring River	--	6/ 5/70	2.2	1,430	Hood River, E. Fk.
	Hood River	Rowing River	--	b i 9/70	2.6	1,820	Hood River, E. Fk.
	Hood River	Roaring River	--	6/10/70	2.6	551	Hood River, E. Ft.
	Hood River	Roaring River	--	6/17/m	2.2	1,540	Hood River, E. Fk.
	Hood River	Roaring River	--	6/19/70	2.2	2,310	Hood River, E. Fk.
	Hood River	Roaring River	--	6/26/70	2.3	1,005	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	7/14/70	3.0	2,001	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	7/29/m	2.5	2,000	Hood River, E. Ft.
1970	Hood River	Roaring River	--	b i 4/71	2.9	2,001	Lost Lake
	Hood River	Roaring River	--	b i 8/71	2.9	2,001	Lost Lake
	Hood River	Roaring River	--	6/15/71	2.8	2,002	Lost Lake
	Hood River	Roaring River	--	6/17/71	2.2	770	Lost Lake
	Hood River	Roaring River	--	6/22/71	2.2	1,584	Lost Lake
	Hood River	Roaring River	--	6/24/71	2.2	1,991	Lost Lake
	Hood River	Roaring River	--	7/ 6/71	2.0	552	Lost Lake
	Hood River	Roaring River	--	7/ 7/71	2.0	552	Lost Lake
	Hood River	Roaring River	--	7/ 8/71	2.0	552	Lost Lake
	Oak Springs	Diamond L.	--	8/ 5/71	3.3	3,015	Lost Lake
	Hood River	Roaring River	--	4/20/71	2.8	1,002	Neal Creek
	Hood River	Roaring River	--	4/21/71	2.8	1,002	Neal Creek
	Hood River	Roaring River	--	5/11/71	3.0	1,002	Neal Creek
	Hood River	Roaring River	--	6/23/71	2.2	1,001	Neal Creek
	Hood River	Roaring River	--	4/21/71	2.8	1,002	Odell Creek
	Hod River	Roaring River	--	5/ 6/71	3.0	501	Odell Creek
	Hood River	Roaring River	--	5/27/71	2.9	501	Ode11 Creek
	Hood River	Roaring River	--	6/16/71	2.8	501	Odell Creek
	Hood River	Roaring River	--	4/20/71	2.8	501	Trout Creek
	Hood River	Roaring River	--	5/12/71	3.2	502	Trout Creek
	Hood River	Roaring River	--	5/27/71	2.9	3,001	Kingsley Resevoir
	Hood River	Roaring River	--	b i 9/71	2.9	2,001	Kingsley Resevoir
	Hood River	Roaring River	--	6/16/71	2.2	1,540	Kingsley Resevoir
	Hood River	Roaring River	--	6/23/71	2.2	1,500	Kingsley Resevoir
	Hood River	Roaring River	--	4/20/71	2.8	1,002	Hood River, E. Fk.
	Hood River	Roaring River	--	4/21/71	2.8	3,007	Hood River, E. Fk.
	Hood River	Roaring River	--	4/23/71	3.0	2,001	Hood River, E. Fk.
	Hood River	Roaring River	--	4/30/71	3.0	1,002	Hood River, E. Fk.
	Hood River	Roaring River	--	5/ 4/71	3.0	1,050	Hood River, E. Fk.
	Hood River	Roaring River	--	5/ 7/71	3:o	2,004	Hod River, E. Fk.
	Hood River	Roaring River	--	5/26/71	3.0	1,002	Hood River, E. Ft.
	Hood River	Roaring River	--	5/27/71	2.9	1,000	Hood River, E. Ft.
	Hood River	Roaring River	--	6/ 4/71	2.9	2,001	Hod River, E. Fk.
	Hood River	Roaring River	--	6/ 9/71	2.9	1,000	Hood River, E. Fk.
	Hood River	Roaring River	--	6/17/71	2.2	660	Hood River, E. Fk.
	Hood River	Roaring River	--	6/22/71	2.2	1,540	Hood River, E. Fk.
	Hood River	Roaring River	--	6/23/71	2.2	800	Hood River, E. Fk.
	Hood River	Roaring River	--	7/ 6/71	2.0	1,000	Hood River, E. Fk.
	Oak Springs	DiamondI..	--	7/20/71	3.0	1,002	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	8/ 3/71	3.3	3,030	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	9/ 3/71	3.7	3,000	Hood River, E. Fk.

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1971	Hood River	Roaring River	--	5/23/72	2.7	3,356	Lost Lake
	Hood River	Roaring River	--	5/24/72	2.7	2.441	Lost Lake
	Hood River	Roaring River	--	6/ 2/72	2.9	2,900	Lost Lake
	Oak Springs	Oak Springs	--	bi 6/72	.3	207	Lost Lake
	Hood River	Roaring River	--	bi 6/72	2.9	870	Lost Lake
	Hood River	Roaring River	--	6/14/72	2.9	972	Lost Lake
	Hood River	Roaring River	--	6/15/72	2.9	1,015	Lost Lake
	Hood River	Roaring River	--	6/21/72	2.9	957	Lost Lake
	Oak Springs	Oek Springs	--	6/22/72	.2	200	Lost Lake
	Hood River	Roaring River	--	6/28/72	2.9	1,015	Lost Lake
	Hood River	Roaring River	--	6/29/72	2.9	667	Lost Lake
	Hood River	Roaring River	--	7/10/72	2.8	2,820	Lost Lake
	Oak Springs	Oak Springs	--	7/11/72	.3	200	Lost Lake
	Hood River	Diamond L.	--	8/16/72	2.0	2,000	Lost Lake
	Hood River	Roaring River	--	4/24/R	2.5	1,350	Neal Creek
	Hood River	Roaring River	--	4/25/72	2.4	650	Neal Creek
	Hood River	Roaring River	--	6/28/72	2.9	1,000	Neal Creek
	Hood River	Roaring River	--	4/25/72	2.4	1,001	Odell Creek
	Hood River	Roaring River	--	5/10/R	2.4	480	Odell Creek
	Hood River	Roaring River	--	5/22/72	3.0	522	Odell Creek
	Hood River	Roaring River	--	4/27/R	2.4	1,440	Kingsley Resevoir
	Hood River	Roaring River	--	5/3/R	2.4	2,561	Kingsley Resevoir
	Hood River	Roaring River	--	6/ 7/72	2.9	2,523	Kingsley Resevoir
	Hood River	Roaring River	--	6/13/72	2.9	493	Kingsley Resevoir
	Hood River	Roaring River	--	6/29/72	2.9	2,001	Kingsley Resevoir
	Hood River	Roaring River	--	7/10/72	2.8	1,002	Kingsley Resevoir
	Hood River	Roaring River	--	4/19/72	3.1	1,001	Hood River, E. Fk.
	Hood River	Roaring River	--	4/20/72	3.1	1,001	Hood River, E. Fk.
	Hood River	Roaring River	--	4/25/R	2.4	2,160	Hood River, E. Fk.
	Hood River	Roaring River	--	4/26/72	2.4	2,842	Hood River, E. Fk.
	Hood River	Roaring River	--	5/10/72	2.4	816	Hood River, E. Fk.
	Hood River	Roaring River	--	5/10/72	3.0	1,002	Hood River, E. Fk.
	Hood River	Roaring River	--	5/19/72	3.0	900	Hood River, E. Fk.
	Hood River	Roaring River	--	5/22/72	3.0	726	Hood River, E. Fk.
	Hood River	Roaring River	--	5/24/72	2.7	1,458	Hood River, E. Fk.
	Hood River	Roaring River	--	6/ 2/72	2.9	319	Hood River, E. Fk.
	Hood River	Roaring River	--	6/13/R	2.9	2,001	Hood River, E. Fk.
	Hood River	Roaring River	--	6/14/72	2.9	1,856	Hood River, E. Fk.
	Hood River	Roaring River	--	6/21/72	2.9	1,667	Hood River, E. Fk.
	Hood River	Roaring River	--	6/27/R	3.0	3,169	Hood River, E. Fk.
	Hood River	Roaring River	--	7/11/R	2.8	3,780	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	8/21/72	1.8	1,503	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	8/27/72	3.5	1,505	Hood River, E. Fk.
1972	Oak Springs	Oak Springs	--	5/21/73	.2	98	Lost Lake
	Oak Springs	Diamond L.	--	5/21/73	2.9	4,002	Lost Lake
	Wizard Falls	Roaring River	--	5/29/73	2.7	3,996	Lost Lake
	Oak Springs	Diamond L.	--	6/12/73	2.4	6,000	Lost Lake
	Oak Springs	Oak Springs	--	6/29/73	.1	128	Lost Lake
	Oak Springs	Diamond L.	--	7/10/73	2.0	3,624	Lost Lake
	Oak Springs	Diamond L.	--	7/10/73	2.5	375	Lost Lake
	Oak Springs	Diamond L.	--	8/14/73	1.4	2,998	Lost Lake
	Oak Springs	Diamond L.	--	4/23/73	3.4	2,502	Neal Creek
	Oak Springs	Diamond L.	--	5/14/73	3.6	1,501	Neat Creek
	Oak Springs	Diamond L.	--	6/15/73	2.8	1,002	Neal Creek
	Oak Springs	Diamond L.	--	7/ 9/73	2.3	1,035	Neal Creek
	Oak Springs	Diamond L.	--	4/23/73	3.5	1,032	Odell Creek
	Oak Springs	Diamond L.	--	5/14/73	3.6	1,501	Odell Creek
	Oak Springs	Diamond L.	--	4/25/73	4.0	4,000	Kingsley Resevoir
	Oak Springs	Diamond L.	--	5/14/73	3.6	3,146	Kingsley Resevoir
	Oak Springs	Diamond L.	--	6/25/73	1.5	1,996	Kingsley Resevoir
	Oak Springs	Diamond L.	--	4/26/73	3.1	3,000	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	4/26/73	3.9	4,001	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	5/23/73	2.8	5,001	Hood River, E. Fk.

Table 7. (continued).

Brood rear	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1972	Oak Springs	D i d L.	--	6/14/73	2.8	3,500	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	b/27/73	2.6	3,502	Hood River, E. Fk.
	Oak Springs	Diamond 1.	--	7/11/73	2.4	2,001	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	7/25/A	2.2	2,002	Hood River, E. Fk.
	Oak Springs	Diamond L.	--	8/30/73	1.1	1,661	Hod River, E. Fk.
	Oak Springs	Oak Springs	--	8/30/73	2.8	1,400	Hood River, E. Fk.
1973	Oak Springs	Diamond 1.	--	6/12/74	3.5	3,858	lost Lake
	Oak Springs	Diamond 1.	--	6/14/74	3.5	3,850	lost Lake
	Oak Springs	Oiammd L.	--	7/ 8/74	3.7	4,068	lost Lake
	Oak Springs	Diamond 1.	--	7/30/74	3.6	4,498	lost lake
	Oak Springs	Diamond L.	--	5/24/74	2.8	3,072	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	6/ 4/74	2.6	2,015	Kingsley Resevoir
	Oak Springs	Diamond L.	--	6/ 4/74	3.0	975	Kingsley Resevoir
	Oak Springs	Diamond L.	--	6/10/74	3.3	2,310	Kingsley Resevoir
	Oak Springs	Diamond L.	--	7/ 2/74	3.2	1,501	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	8/14/74	3.2	2,560	Hood River, E. Fk.
1974	Oak Springs	Diamond L.	--	3/21/75	3.7	4,650	lost Lake
	Oak Springs	Diamond 1.	--	5/21/75	3.0	3,780	lost Lake
	Oak Springs	Oak Springs	--	5/22/75	.1	99	lost lake
	Oak Springs	Diamond 1.	--	6/13/75	3.0	7,290	Lost Lake
	Oak Springs	Diamond L.	--	7/24/75	2.5	3,650	lost lake
	Oak Springs	Diamond 1.	--	4/21/75	3.2	502	Odell Creek
	Oak Springs	Diamond L.	--	6/11/75	2.8	501	Odell Creek
	Oak Springs	Diamond 1.	--	7/30/75	2.7	500	Odell Creek
	Oak Springs	Diamond 1.	--	5/20/75	3.0	3,750	Kingsley Resevoir
	Oak Springs	Diamond L.	--	5/23/75	2.2	3,248	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	6/11/75	2.8	3,002	Kingsley Resevoir
	Oak Springs	Diamond L.	--	7/30/75	2.7	3,002	Kingsley Resevoir
197s	Oak Springs	Diamond 1.	--	5/26/76	3.0	3,641	lost lake
	Oak Springs	Diamond 1.	--	5/26/76	3.2	4,355	Lost Lake
	Oak Springs	Oak Springs	--	6/ 8/76	.3	500	Lost lake
	Oak Springs	Oak Springs	--	6/17/76	.2	259	Lost Lake
	Oak Springs	Diamond L.	--	6/22/76	2.3	2,381	lost Lake
	Oak Springs	Diamond 1.	--	b/22/76	2.5	3,750	Lost lake
	Oak Springs	Diamond L.	--	8/ 5/76	2.0	2,450	lost Lake
	Oak Springs	Diamond L.	--	8/ 6/76	2.0	2,550	Lost Lake
	Oak Springs	Diamond 1.	--	4/19/76	3.2	1,oso	Odell Creek
	Oak Springs	Diamond L.	--	5/25/76	2.6	499	Odell Creek
	Oak Springs	Diamond 1.	--	6/30/76	2.5	500	Odell Creek
	Oak Springs	Diamond L.	--	5/17/76	3.2	3,295	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	5/17/76	3.b	3,002	Kingsley Resevoir
	Oak Springs	Oak Springs	--	6/ 9/76	.3	273	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	6/30/76	2.5	3,500	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	7/26/76	1.9	5,054	Hood River, E. Fk.
1976	Oak Springs	Diamond L.	--	4/21/77	3.5	4,340	lost Lake
	Oak Springs	Oak Springs	--	5/ 5/77	.2	478	lost Lake
	Oak Springs	Diamond L.	--	5/20/77	2.7	3,062	Lost Lake
	Oak Springs	Oak Springs	--	6/ 7/77	.2	239	lost lake
	Oak Springs	Diamond 1.	--	b/23/77	3.1	8,212	Lost lake
	Oak Springs	Oak Springs	--	6/24/77	.2	343	lost Lake
	Oak Springs	Oak Springs	--	7/ 7/77		190	Lost lake
	Oak Springs	Oak Springs	--	7/27/77	3::	4,010	lost Cake
	Oak Springs	Oak Springs	--	8/31/77	2.8	4,338	Lost Lake
	Oak Springs	Diamond 1.	--	5/20/77	2.7	526	Odell Creek
	Oak Springs	Diamond 1.	--	6/29/77	3.0	7,995	Hood River, E. Fk.
1977	Oak Springs	Willamette R.	--	5/10/78	2.5	6,299	Lost Lake
	Oak Springs	Oak Springs	--	6/5/A	.2	366	Lost Lake
	Oak Springs	Oak Springs	--	6/19/78	.2	283	lost lake
	Oak Springs	Willamette R.	--	6/19/78	2.8	3,144	Lost Lake

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1977	Oak Springs	Willamette R.	--	6/20/78	3.3	3,379	lost Lake
	Oak Springs	Willamette R.	--	6/21/78	3.4	3,399	Lost Lake
	Oak Springs	Willamette R.	--	7/19/78	2.8	4,283	Lost Lake
	Oak Springs	Willamette R.	--	7/20/78	2.8	4,000	Hood River
	Oak Springs	Uillatte R.	--	4/19/78	2.7	500	Odell Creek
	Oak Springs	Uillanette R.	--	5/22/78	2.8	501	Odell Creek
	Oak Springs	Willamette R.	--	5/17/78	2.8	6,664	Kingsley Resevoir
	Oak Springs	Uillmette R.	--	6/21/78	3.3	3,300	Kingsley Resevoir
	Oak Springs	Willamette R.	--	6/29/78	3.2	3,040	Laurence Resevoir
	Oak Springs	Uillmette R.	--	6/30/78	3.2	3,520	Laurence Resevoir
	Oak Springs	Oak Springs	--	12/ 8/78	1.0	500	Laurence Resevoir
1978	Oak Springs	Diamond L.	--	5/23/79	2.5	6,025	Lost Lake
	Oak Springs	Qak Springs	--	5/24/79	.2	487	Lost lake
	Oak Springs	Oak Springs	--	6/20/79	.2	180	lost lake
	Oak Springs	Diamond 1.	--	6/20/79	2.5	3,038	Lost lake
	Oak Springs	Diamond 1.	--	6/21/79	2.6	3,301	Lost Lake
	Oak Springs	Diamond 1.	--	7/23/79	2.5	5,500	Lost lake
	Oak Springs	Diamond L.	--	4/18/79	3.0	1,002	Neal Creek
	Oak Springs	Diamond 1.	--	4/18/79	3.0	249	Odell Creek
	Oak Springs	Diamond 1.	--	5/18/79	2.8	6,393	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	b/25/79	2.3	2,875	Kingsley Resevoir
	Oak Springs	Diamond 1.	--	4/18/79	3.0	1,515	Laurence Resevoir
	Oak Springs	Diamond 1.	--	5/11/79	2.4	1,536	Laurence Resevoir
	Oak Springs	Diamond 1.	--	6/26/79	2.3	1,495	Laurence Resevoir
	Oak Springs	Roaring River	--	6/29/78	50.0	15,000	Laurence Resevoir
	Oak Springs	Diamond 1.	--	7/24/79	2.5	1,500	Laurence Resevoir
	Oak Springs	Diamond 1.	--	7/ 2/79	3.1	3,844	Hood River, E. Fk.
	Oak Springs	Diamond 1.	--	7/30/79	2.0	3,000	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	a/29/79	3.3	1,155	Hood River, E. Fk.
1979	Oak Springs	Willamette R.	--	5/12/80	2.5	5,812	Lost Lake
	Oak Springs	Uillamette R.	--	6/24/80	2.2	3,001	Lost lake
	Oak Springs	Uillamette R.	--	6/25/80	2.5	3,000	lost Lake
	Oak Springs	Oak Springs	--	7/ 9/80	.1	124	Lost lake
	Oak Springs	Oak Springs	--	7/14/80	.1	148	Lost Lake
	Oak Springs	Oak Springs	--	7/16/80	.1	37	lost lake
	Oak Springs	Uillmette R.	--	7/16/80	2.0	2,000	Lost Lake
	Oak Springs	Uillamtte R.	--	7/29/80	2.1	2,995	Lost Lake
	Oak Springs	Willamette R.	--	4/24/80	3.5	1,050	Neal Creek
	Oak Springs	Uillmette R.	--	5/22/80	2.5	500	Neal Creek
	Oak Springs	Uillamtte R.	--	4/22/80	3.2	512	Odell Creek
	Oak Springs	Uillanette R.	--	5/16/80	3.0	4,050	Kingsley Resevoir
	Oak Springs	Uillanette R.	--	6/19/80	2.5	2,999	Kingsley Resevoir
	Oak Springs	Uillamette R.	--	7/25/80	2.1	3,040	Kingsley Reswoir
	Oak Springs	Willamette R.	--	5/ 6/80	3.0	4,002	Laurence Resevoir
	Oak Springs	Willamette R.	--	6/25/80	2.0	2,396	Laurence Resevoir
	Oak Springs	Willamette R.	--	4/22/80	3.2	2.624	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	4/24/80	3.5	7,350	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	5/22/80	2.5	3,000	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	5/22/80	2.7	2,930	Hood River, E. Fk.
	Oak Springs	Uillmnette R.	--	6/ 3/80	2.5	2,563	Hood River, E. Fk.
	Oak Springs	Willamette R.	--	6/27/80	3.2	5,500	Hood River, E. Fk.
	Oak Springs	Uillamtte R.	--	7/23/80	2.3	6,092	Hood River, E. Fk.
1980	Oak Springs	Uillmette R.	--	4/29/81	3.0	3,444	Lost lake
	Oak Springs	Uillamtte R.	--	5/18/81	3.5	3,003	Lost Lake
	Oak Springs	Oak Springs	--	6/17/81	.1	161	Lost lake
	Oak Springs	Oak Springs	--	6/18/81	.1	154	Lost Lake
	Oak Springs	Uillamette R.	--	6/22/81	3.6	3,240	Lost Lake
	Oak Springs	Uillamtte R.	--	7/ 6/81	2.5	3,125	Lost Lake
	Oak Springs	Uillmette R.	--	7/15/81	2.0	2,498	Lost Lake
	Oak Springs	Uillamette R.	--	7/22/81	2.0	2,140	Lost Lake
	Oak Springs	Oak Springs	--	9/14/81	2.6	3,835	Lost lake

Table 7. (continued).

Brood rear	Hatchery	Brood stock	Mark	Date	Sire (fish/lb)	Number	Release site
1980	Oak Springs	Willamette R.	--	4/22/81	3.6	1,001	Neal Creek
	Oak Springs	Willamette R.	--	5/19/81	3.5	1,001	Neal Creek
	Oak Springs	Uillamtte R.	--	4/22/81	3.6	500	Ode11 Creek
	Oak Springs	Uillamettc R.	--	6/ 5/81	3.7	3,016	Kingsley Resevoir
	Oak Springs	Willamette R.	--	6/26/81	3.6	3,999	Kingsley Resevoir
	Oak Springs	Willamette R.	--	7/21/81	2.0	2,890	Kingsley Resevoir
	Oak Springs	Oak Springs	--	8/26/81	2.7	3,038	Kingsley Resevoir
	Oak Springs	Uillamette R.	--	4/29/81	3.0	2,099	Lwrence Resevoir
	Oak Springs	Willamette R.	--	5/18/81	3.5	2,002	Lwrence Resevoir
	Oak Springs	Willamette R.	--	5/19/81	3.5	1,998	Laurence Resevoir
	Oak Springs	Uillamette A.	--	6/23/81	2.5	2,000	Lwrence Resevoir
	Oak Springs	Willamette R.	--	4/21/81	3.6	7.9343	Hood River, E. Fk.
	Oak Springs	Willamette R.	--	C/22/81	3.6	2,063	Hood River, E. Fk.
	Oak Springs	Uillamettc R.	--	5/21/81	3.2	4,000	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	6/29/81	3.0	3,750	Hod River, E. Fk.
	Oak Springs	Willamette R.	--	6/30/81	3.0	3,744	Hood River, E. Fk.
	Oak Springs	Uillmette R.	--	7/27/81	1.5	2,010	Hood River, E. Fk.
	Oak Springs	Uillamtte R.	--	7/28/81	2.0	4,016	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	8/27/81	2.8	3,150	Hood River, E. Fk.
1981	Oak Springs	Uillamette R.	--	5/ 7/82	3.0	3,000	Kingsley Resevoir
	Oak Springs	Willamette R.	--	4/19/82	2.9	1,001	Neal Creek
	Oak Springs	Uillamette R.	--	5/26/82	2.9	1,001	Neal Creek
	Oak Springs	Uillamette R.	--	4/19/82	2.9	5,308	Hood River, E. Fk.
	Oak Springs	Uillamtte R.	--	4/22/82	2.8	2,000	Hod River, E. Fk.
	Oak Springs	Oak Springs	--	5/26/82	2.9	2,625	Hood River, S. Fk.
	Oak Springs	Uillamette R.	--	5/27/82	2.9	3,843	Hood River, E. Fk.
	Oak Springs	Uillamtte R.	--	6/30/82	2.3	5,998	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	7/23/82	1.a	2,070	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	7/28/82	1.7	2,057	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	7/30/82	1.7	2,040	Hood River, E. Fk.
	Oak Springs	Oak Springs	--	9/ 1/82	2.0	3,998	Hood River, E. Fk.
1982	Oak Springs	Uillamette R.	--	4/14/83	3.4	3,400	Lost Lake
	Oek Springs	Willamette R.	--	5/17/83	3.0	3,300	Lost Lake
	Oak Springs	Uillamtte R.	--	6/22/83	1.9	2,613	Lost Lake
	Oak Springs	Willamette R.	--	6/23/83	1.9	2,641	Lost Lake
	Oak Springs	Uillamette R.	--	7/29/83	1.5	1,815	Lost Lake
	Oak Springs	Uillamette R.	--	a/ 2/83	1.4	3,640	Lost Lake
	Oak Springs	Willamette R.	--	5/26/83	2.7	5,035	Hood River
	Oak Springs	Uillamette R.	--	8/31/83	1.1	1,958	Hood River
	Oak Springs	Oak Springs	--	8/31/83	3.0	1,500	Hood River
	Oak Springs	Willamette R.	--	4/21/83	3.0	1,sw	Neal Creek
	Oak Springs	Willamette R.	--	5/25/83	2.5	1,000	Neal Creek
	Oak Springs	Willamette R.	--	5/ 4/83	2.8	3,360	Kingsley Resevoir
	Oak Springs	Uillamtte R.	--	6/22/83	1.9	2,204	Kingsley Resevoir
	Oak Springs	Willamette R.	--	7/25/83	1.8	2,466	Kingsley Resevoir
	Oak Springs	Willamette R.	--	7/29/83	1.5	2,055	Kingsley Resevoir
	Oak Springs	Uillamette R.	--	5/17/83	3.0	3,930	Laurence Resevoir
	Oak Springs	Uillamtte R.	--	6/20/83	2.2	2,830	Laurence Resevoir
	Oak Springs	Willamette R.	--	7/25/83	1.0	2,160	Laurence Resevoir
	Oak Springs	Willamette R.	--	c/22/03	3.4	8,075	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	6/29/83	2.0	4,800	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	7/22/83	1.9	2,470	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	7/27/83	1.8	4,671	Hood River, E. FL.
1983	Oak Springs	Uillamette R.	--	5/21/84	3.4	4,250	Lost Lake
	Oak Springs	Uillamtte R.	--	5/22/84	3.4	4,080	Lost Lake
	Oak Springs	Uillamette R.	--	6/20/84	2.1	2,625	Lost Lake
	Oak Springs	Oak Springs	--	6/22/84	.1	170	Lost Lake
	Oak Springs	Uiltamette R.	--	7/ 9/84	2.1	2,730	Lost Lake
	Oak Springs	Uillamette R.	--	7/24/84	1.5	2,175	Lost Lake
	Oak Springs	Willamette R.	--	8/29/84	1.3	1,300	Lost Lake
	Oak Springs	Uillamette R.	--	4/25/84	3.2	499	Neal Creek

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1983	Oak Springs	Uillamette R.	--	5123104	2.6	1,001	Neal Creek
	Oak Springs	Uillamette R.	--	4125104	3.2	499	Odell Creek
	Oak Springs	Willamette R.	--	6/13/84	2.8	3,640	Kingsley Resevoir
	Oak Springs	Uillamette R.	--	6115104	2.6	3,094	Kingsley Resevoir
	Oak Springs	Uillamette R.	--	7/24/84	1.5	1,875	Kingsley Resevoir
	Oak Springs	Willamette R.	--	8/30/84	1.5	1,648	Kingsley Resevoir
	Oak Springs	Uillamtte R.	--	5/22/84	3.4	4,454	Laurence Resevoir
	Oak Springs	Uillamette R.	--	6/20/84	2.1	2,730	Laurence Resevoir
	Oak Springs	Uillamtte R.	--	7/10/84	1.8	2,430	Laurence Resevoir
	Oak Springs	Uillamtte R.	--	4/26/84	3.2	8,000	Hood River, E. Fk.
	Oak Springs	Uillamette R.	--	5/24/84	3.0	4,230	Hood River, E. Fk.
	Oak Springs	Uillamtte R.	--	6127104	2.3	6,095	Hood River, E. Fk.
	Oak Springs	Willamette R.	--	6120104	1.8	2,430	Hod River, E. Fk.
	Oak Springs	Uillamette R.	--	7/20/84	1.5	2,175	Hod River, E. Fk.
	Oak Springs	Uillamtte R.	--	7/26/84	1.0	2,565	Hood River, E. Fk.
	Oak Springs	Willamette R.	--	8/ 6/84	1.5	2,080	Hood River, E. Fk.
1984	Oak Springs	Deschutes R.	--	5/21/85	3.0	3,930	Lost Lake
	Oak Springs	Deschutes R.	--	6/ 6/85	2.9	3,770	Lost Lake
	Oak Springs	Deschutes R.	--	6/17/85	3.0	4,560	Lost Lake
	Oak Springs	Deschutes R.	--	8/ 5/85	2.7	3,294	Lost Lake
	Oak Springs	Deschutes R.	--	4/24/85	2.5	1,000	Neal Creek
	Oak Springs	Deschutes R.	--	4125105	3.1	502	Ode11 Creek
	Oak Springs	Deschutes R.	--	6/10/85	2.6	2,990	Kingsley Resevoir
	Oak Springs	Oeschutes R.	--	6/11/85	2.6	3,380	Kingsley Resevoir
	Oak Springs	Deschutes R.	--	8/ 6/85	2.7	3,240	Kingsley Resevoir
	Oak Springs	Deschuces R.	--	5/21/85	3.0	3,450	Laurence Resevoir
	Oak Springs	Deschutes R.	--	6/14/85	2.6	3,510	Laurence Resevoir
	Oak Springs	Deschutes R.	--	8/15/85	2.4	2,700	Laurence Resevoir
	Oak Springs	Deschutes R.	--	4/25/85	3.1	6,565	Hood River, E. Fk.
	Oak Springs	Oeschutes R.	--	5/23/85	3.0	3,930	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	5/24/as	3.0	3,750	Hood River, E. Fk.
	Oak Springs	Oeschutes R.	--	6/10/85	2.6	3,380	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	6/27/85	3.7	4,070	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	7/29/85	2.9	6,873	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	8/22/85	2.5	1,625	Hood River, E. Fk.
1985	Oak Springs	Deschutes R.	--	5/13/86	3.8	4,705	Lost Lake
	Oak Springs	Deschutes R.	--	5/29/86	3.5	4.549	Lost Lake
	Oak Springs	Deschutes R.	--	8/25/86	2.8	2,828	Lost Lake
	Oak Springs	Deschuces R.	--	8/26/86	2.0	3,500	Lost Lake
	Oak Springs	Deschutes R.	--	4/23/86	3.1	1,001	Neal Creek
	Oak Springs	Deschures R.	--	5/21/86	2.6	1,001	Neal Creek
	Oak Springs	Deschutes R.	--	5/28/86	3.5	4,620	Kingsley Resevoir
	Oak Springs	Oeschutes R.	--	7/ 8/86	2.8	3,500	Kingsley Resevoir
	Oak Springs	Deschutes R.	--	4/17/86	3.5	4,463	Laurence Resevoir
	Oak Springs	Oeschutes R.	--	5/12/86	2.9	3,595	Laurence Resevoir
	Oak Springs	Oeschutes R.	--	8/27/86	2.8	1,260	Laurence Resevoir
	Oak Springs	Oeschutes R.	--	0127106	3.5	2,450	Laurence Resevoir
	Oak Springs	Deschures R.	--	5/22/86	3.5	4,375	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	7 i 3/86	2.0	3,500	Hood River, E. Fk.
	Oak Springs	Oeschures R.	--	7/25/86	3.5	4,025	Hood River, E. Fk.
1986	Oak Springs	Oeschutes R.	--	5/ 4/87	3.1	3,953	Lost Lake
	Oak Springs	Deschutes R.	--	5/ 5/87	4.0	2,100	Lost Lake
	Oak Springs	Deschutes R.	--	6/10/87	3.0	1,200	Lost Lake
	Oak Springs	Deschutes R.	--	6/10/87	3.2	1,808	Lost Lake
	Oak Springs	Oeschutes R.	--	6/18/87	3.2	3,036	Lost Lake
	Oak Springs	Oeschutes R.	--	8/ 5/87	2.1	2,305	Lost Lake
	Oak Springs	Deschutes R.	--	4/22/87	3.3	1,000	Neal Creek
	Oak Springs	Deschutes R.	--	5/22/87	3.5	1,032	Neat Creek
	Oak Springs	Deschutes R.	--	4/22/87	3.3	502	Odell Creek
	Oak Springs	Deschutes R.	--	6/18/87	2.0	3,960	Kingsley Resevoir
	Oak Springs	Oeschutes R.	--	7/21/87	2.0	2,996	Kingsley Resevoir

Table 7. (continued).

Brood Year	Hatchery	Brood stock	Clark	Dete	Sire (fish/Lb)	Number	Release site
1986	Oek Springs	Deschutes R.	--	4/16/87	3.4	4,012	Laurence Resevoi r
	Oak Springs	Oeschutes R.	--	5/20/87	2.6	1,441	Laurence Resevoir
	Oak Springs	Deschutes R.	--	5/20/87	3.9	2,574	Laurence Resevoir
	Oak Springs	Deschutes R.	--	4/23/87	3.3	4,006	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	6/24/87	2.7	3,499	Hood River, E. Fk.
	Oak Springs	Deschutes R.	--	7/23/87	2.5	3.250	Hod River, E. Fk.

APPENDIX H

Water Quality Information

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404171 243000000020
45 42 31.0 121 30 17.0 3
HOOD RIVER AT HOOD RIVER
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BELOW YAKIMA RIVER
21400000 830806 HQ 17070105019 0000.140 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				83/01/13	83/02/14	83/03/10	83/06/29	83/10/26	83/12/02	83/12/13	84/02/15	84/03/19
INITIAL TIME				1300	1235	1210	1200	1030	0950	0955	0850	1045
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	6.5	6.2	9.0	19.0	6.0	3.0	5.5	4.5	6.5
00011	WATER	TEMP	FAHN	43.7$	43.2$	48.2$	66.25	42.8$	37.45	41.9$	40.15	43.75
00061	STREAM	FLOW,	INST-CFS				560		840		2110	
00065	STREAM	STAGE	FEET			6.81						
00076	TURB	TRBIDMTR	HACH FTU	3.0	4.0	6.0	2.0	2.0	2.0	5.0	6.0	2.0
00080	COLOR	PT-CO	UNITS	5	15	15	5	5	5	10	20	10
00094	CNDUCTVY	FIELD	MICROMHO	47	47	40	32	69	50	42	45	45
00095	CNDUCTVY	AT 25C	MICROMHO	48			58		52			
00300	DO		MG/L	12.3	12.3	11.4	11.0	12.5	13.4	12.9	12.9	12.9
00301	DO	SATUR	PERCENT	100.0	98.0	98.0	117.0	100.0	99.0	102.0	100.0	104.0
00310	BOD	5 DAY	MG/L	1.0	.6	1.2	1.0	1.2	2.1	2.2	1.5	1.6
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	7.0	5.0K	5.0K
00400	PH		SU	7.70	7.60	7.60	7.80	7.60	7.60	7.20	7.60	7.30
00403	PH	LAB	SU	7.5								
00410	T ALK	CACO3	MG/L	18								
00431	T ALK	FIELD	MG/L	19	24	18	25	30	28	20	20	19
00500	RESIDUE	TOTAL	MG/L	61	60	63	65	76	53	63	56	48
00530	RESIDUE	TOT NFLT	MG/L	2	2	10	3	2	2	12	5	2
00610	NH3+NH4-	N TOTAL	MG/L	.030	.020K	.030	.030	.020	.020	.030	.030	.020
00612	UN-IONZD	NH3-N	MG/L	.0002$	.0001$	.0002$	.0007$	.0001$	.00008$	.00006$	.0001$	.00006$
00619	UN-IONZD	NH3-NH3	MG/L	.0003$	.0001$	.0002$	.0008$	.0001$	.0001$	.00007$	.0002$	.00007$
00625	TOT KJEL	N	MG/L				.200K	.200K	.200K	.200K	.500	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.29	.36	.22	.09	.11	.19	.26	.27	.16
00665	PHOS-TOT		MG/L P	.022	.076	.009	.029	.060	.026	.054	.052	.022
00671	PHOS-DIS	ORTHO	MG/L P				.013	.033				
00680	T ORG C	C	MG/L	1.0	6.0	1.0	2.0	1.0	1.0K	1.0K	1.0K	1.0K
00900	TOT HARD	CACO3	MG/L	16	19	16	19	23	18	15	17	15
00915	CALCIUM	CA,DISS	MG/L		4.6	3.6	4.7	5.7	4.4	3.9	4.2	3.8
00925	MGNSIUM	MG,DISS	MG/L		1.8	1.6	1.8	2.1	1.6	1.3	1.5	1.4
00930	SODIUM	NA,DISS	MG/L		2.60	2.10	3.20	4.10	3.10	2.90	2.50	2.60
31505	TOT COLI	MPN CONF	/100ML	93	150	150	36	91	2400	2100	230	91
31615	FEC COLI	MPNECMED	/100ML	43	73	30K	30K	36	930	150	91	36
32209	CHLRPHYL	A	UG/L				3.9	1.0				
32213	PHPHTN-A	FLR MTHD	UG/L				1.43	.81				
46570	CAL HARD	CA MG	MG/L		19$	16$	19s	23$	18$	15$	17s	15$

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404171 243000000020
45 42 31.0 121 30 17.0 3
HOOD RIVER AT HOOD RIVER
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BELOW YAKIMA RIVER
21400000 830806 HQ 17070105019 0000.140 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				84/04/23	84/06/27	84/09/20	84/12/06	85/02/14	85/04/10	85/04/23	85/05/21	85/07/23
INITIAL TIME				1130	1120	1115	0945	1045	1335	1335	1510	0948
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
32209	CHLRPHYL	A	UG/L	2.5	1.6	1.3			3.2			1.8
32213	PHPHTN-A	FLR MTHD	UG/L	1.35	.64	.96			3.04			1.46
46570	CAL HARD	CA MG	MG/L	16$	16$	21$	23$	22s	13$		14$	19$
74041	WQF	SAMPLE	UPDATED							861016	861016	

INITIAL DATE				85/08/13	85/10/03	86/02/26	86/03/18	86/07/29	86/08/25	86/09/22	86/10/27	87/01/27
INITIAL TIME				1215	1020	0935	1005	0916	0910	0909	0945	1400
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	17.5	11.5	6.0	7.0	15.0	14.5	10.0	11.5	5.0
00011	WATER	TEMP	FAHN	63.5$	52.7$	42.8$	44.6$	59.0$	58.1$	50.0$	52.7$	41.0$
00061	STREAM	FLOW,	INST-CFS		378			320			320	
00065	STREAM	STAGE	FEET		2.52					1.50		
00076	TURB	TRBIDMTR	HACH FTU	7.0	3.0	10.0	2.0	7.0	18.0	3.0	10.0	4.0
00080	COLOR	PT-CO	UNITS	5K	5K	10	5	5	10	5	15	10
00094	CNDUCTVY	FIELD	MICROMHO	75	60	38	57	66	64	74	64	76
00095	CNDUCTVY	AT 25C	MICROMHO				50					
00300	DO		MG/L	10.4	11.2	13.1	12.5	10.3	10.1	11.1	11.2	13.1
00301	DO	SATUR	PERCENT	108.0	102.0	105.0	102.0	101.0	102.0	98.0	102.0	1.5
00310	BOD	5 DAY	MG/L	1.2	1.0	2.0	1.6	.9	1.0		2.0	102.0
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	6.0	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K
00400	PH		SU	7.70		7.30	7.70	7.20	7.80	7.90	7.50	7.40
00403	PH	LAB	SU		8.0		7.6					
00410	T ALK	CACO3	MG/L		29		21					
00431	T ALK	FIELD	MG/L	24	26	13	21	29	28	32	27	23
00500	RESIDUE	TOTAL	MG/L	81	74	73	60	5	108	80	94	48
00530	RESIDUE	TOT NFLT	MG/L	14	7	27	2	16	33	2	29	5
00610	NH3+NH4-	N TOTAL	MG/L	.020	.020	.020	.020K	.020K	.030	.020K	.020K	.020
00612	UN-IONZD	NH3-N	MG/L	.0003$	.0004$	.00005$	.0001$	.00009$	.0005$	.0003$	.0001$	.00006$
00619	UN-IONZD	NH3-NH3	MG/L	.0004$	.0005$	.00007$	.0002$	.0001$	.0006$	.0004$	.0002$	.00008$
00625	TOT KJEL	N	MG/L	.300	.200K	.200	.200	.200	.200	.200K	.200	.300
00630	NO2&NO3	N-TOTAL	MG/L	.17	.13	.17	.32	2.00	.22	.16	.05	.36
00665	PHOS-TOT		MG/L P	.086	.049	.640	.038	.100	.150	.040	.100	.040
00671	PHOS-DIS	ORTHO	MG/L P	.025	.022	.007	.012	.017	.026	.027	.019	.023
00680	T ORG C	C	MG/L	1.0K	1.0K	2.0	1.0K	1.0K	1.0K	1.0K	2.0	1.0K
00900	TOT HARD	CACO3	MG/L	22	23	10	18	24	23	26	23	19
00915	CALCIUM	CA,DISS	MG/L	5.4	5.7	2.7	4.2	5.7	5.4	6.2	5.5	4.6
00925	MGNSIUM	MG,DISS	MG/L	2.1	2.2	.9	1.8	2.5	2.4	2.6	2.2	1.8
00930	SODIUM	NA,DISS	MG/L	3.70	4.00	1.70	3.00	3.90	3.80	4.60	4.00	3.30

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404171 243000000020
45 42 31.0 121 30 17.0 3
HOOD RIVER AT HOOD RIVER
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BELOW YAKIMA RIVER
21400000 830806 HQ 17070105019 0000.140 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			85/08/13	85/10/03	86/02/26	86/03/18	86/07/29	86/08/25	86/09/22	86/10/27	87/01/27
INITIAL TIME			1215	1020	0935	1005	0916	0910	0909	0945	1400
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00935 PTSSIUM	K,DISS	MG/L	1.00	1.20	.60	.90	1.10	1.20	1.20	1.30	1.00
00940 CHLORIDE	TOTAL	MG/L	1	3	1	2	1	3	1	2	2
00945 SULFATE	SO4-TOT	MG/L	2	2	1	1	2	3	2	2	2
31505 TOT COLI	MPN CONF	/100ML	2400	930							
31615 FEC COLI	MPNECMED	/100ML	230	230	9	43	93	240	240	240	93
31639 ENTCOCCI	GR D,MF	#/100ML			5K	4	172	232	80	124	24
32209 CHLRPHYL	A	UG/L	2.1	1.0			3.4		1.4	4.8	
32213 PHPHTN-A	FLR MTHD	UG/L	.89	1.00			1.70		1.60	3.60	
46570 CAL HARD	CA MG	MG/L	22$	23$	10$	18$	25$	23$	26$	23$	19$
74041 WQF	SAMPLE	UPDATED		871210	871210		870617	870617	861120	870120	870330

INITIAL DATE			87/02/24	87/04/27	87/05/26	87/07/01	87/08/04	87/10/19	87/11/23	87/12/21	88/01/20
INITIAL TIME			1330	0930	1010	1600	1000	1040	1200	0935	0930
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010 WATER	TEMP	CENT	6.5	10.0	12.0	20.0	17.5	9.5	6.0	4.0	3.2
00011 WATER	TEMP	FAHN	43.7$	50.0$	53.68	68.0$	63.55	49.1$	42.8$	39.2$	37.8$
00061 STREAM	FLOW,	INST-CFS		1070			210	210	320	560	
00065 STREAM	STAGE	FEET					1.80				
00076 TURB	TRBIDMTR	HACH FTU	1.0	1.0	2.0	24.0	9.0	2.0	1.0	1.0	2.0
00080 COLOR	PT-CO	UNITS	5K								
00094 CNDUCTVY	FIELD	MICROMHO	50	47	55	53	67	99	61	49	50
00095 CNDUCTVY	AT 25C	MICROMHO	50								
00300 DO		MG/L	13.1	12.0	11.5	9.2	10.0	12.7	12.8	13.7	13.8
00301 DO	SATUR	PERCENT	1.4	106.0	106.0	100.0	104.0	111.0	102.0	105.0	102.0
00310 BOD	5 DAY	MG/L	109.0	2.3	1.6	1.0	.5	1.9	2.0	2.2	1.9
00335 COD	LOWLEVEL	MG/L	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K
00400 PH		SU	7.50	7.60	7.40	8.20	7.90	7.90	7.30	7.60	7.50
00431 T ALK	FIELD	MG/L	23	18	21	23	26	34	28	23	26
00500 RESIDUE	TOTAL	MG/L	60	54	68	100	95	89	96	58J	52
00530 RESIDUE	TOT NFLT	MG/L	3	1	3	43	17	2	10	3	1
00610 NH3+NH4-	N TOTAL	MG/L	.020K	.020K	.020K	.020	.020	.020K	.020K	.020K	.020K
00612 UN-IONZD	NH3-N	MG/L	00009$	.0001$	.0001$	.001$	.0005$	.0003$	00005$	.00009$	.00007$
00619 UN-IONZD	NH3-NH3	MG/L	.0001$	.0002$	.0001$	.001$	.0006$	.0003$	00007$	.0001$	.00008$
00625 TOT KJEL	N	MG/L	.200K	.200	.200K	.300	.500	.200K	.300	.200K	.200K
00630 NO2&NO3	N-TOTAL	MG/L	.20	.03	.012	.13	.21	.15	.12	.28	.40
00665 PHOS-TOT		MG/L P	.030	.020		[illegible]	.080	.040	.070	.030	.040
00671 PHOS-DIS	ORTHO	MG/L P	.018	.030	.016	.039	.026	.011	.013	.018	.017
00680 T ORG C	C	MG/L	1.0K	1.0K	1.0K	1.0K	1.0	1.0K	2.0	1.0K	1.0

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404171 243000000020
45 42 31.0 121 30 17.0 3
HOOD RIVER AT HOOD RIVER
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BELOW YAKIMA RIVER
21400000 830806 HQ 17070105019 0000.140 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				87/02/24	87/04/27	87/05/26	87/07/01	87/08/04	87/10/19	87/11/23	87/12/21	88/01/20
INITIAL TIME				1330	0930	1010	1600	1000	1040	1200	0935	0930
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00900	TOT HARD	CACO3	MG/L	19								
00915	CALCIUM	CA,DISS	MG/L	4.8								
00925	MGNSIUM	MG,DISS	MG/L	1.7								
31615	FEC COLI	MPNECMED	/100ML	4	23	43	93	93	93	240	23	43
31639	ENTCOCCI	GR D,MF	#/100ML	18K	10	25	40	410	30	175	30	10
32209	CHLRPHYL	A	UG/L		9.1	2.2	3.2	2.3	1.5			
32213	PHPHTN-A	FLR MTHD	UG/L		4.90	2.10	1.80	2.80	2.60			
46570	CAL HARD	CA MG	MG/L	19$								
74041	WQF	SAMPLE	UPDATED	871207	870720	870717	871001	871001	880202	880114	880311	880311

INITIAL DATE				88/02/18	88/04/12	88/05/04	88/06/17	88/07/18	88/07/19	88/08/15	88/09/26	88/10/24
INITIAL TIME				1000	1030	0925	0900	0925	1530	1000	1130	1040
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	6.0	8.5	6.5	8.5	6.5	19.0	15.0	13.0	9.5
00011	WATER	TEMP	FAHN	42.8$	47.3$	43.7$	47.3$	43.7s	66.2$	59.0$	55.4$	49.1$
00061	STREAM	FLOW,	INST-CFS	950								
00076	TURB	TRBIDMTR	HACH FTU	1.0	1.0	2.0	1.0	2.0	4.0	6.0	4.0	4.0
00094	CNDUCTVY	FIELD	MICROMHO	47	43	45	43	45	54	59	65	71
00095	CNDUCTVY	AT 25C	MICROMHO	49							71	
00300	DO		MG/L	13.5	12.3	13.3	12.3	13.3	10.2	10.8	11.2	11.9
00301	DO	SATUR	PERCENT	108.0	105.0	108.0	105.0	108.0	109.0	106.0	106.0	104.0
00310	BOD	5 DAY	MG/L	1.9	1.7	2.4	1.7	2.4	1.0	1.2	1.9	1.4
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	5.0K	10.0	5.0K
00400	PH		SU	7.50	7.40	7.60	7.40	7.60	8.20	7.80	7.80	7.60
00403	PH	LAB	SU	7.5							7.2	
00410	T ALK	CACO3	MG/L	19							32	
00431	T ALK	FIELD	MG/L	22	21	18	21	18	28	30	31	28
00500	RESIDUE	TOTAL	MG/L	64	42	43	42	43	65	73	110	76
00530	RESIDUE	TOT NFLT	MG/L	2	1	2	1	2	---6	7	35	10
00610	NH3+NH4-	N TOTAL	MG/L	.020	.100	.070	.100	.070	.0020	.020K	.020	.020
00612	UN-IONZD	NH3-N	MG/L	.00009$	.0004$	.0004$	.0004$	.0004$		.0003$	.0003$	0001$
00619	UN-IONZD	NH3-NH3	MG/L	.0001$	.0005$	.0005$	.0005$	.0005$	.001$	.0004$	.0004$	.0002$
00625	TOT KJEL	N	MG/L	.200K	.200K	.200K	.200K	.200K	.200	.200K	.200	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.31	.12	.10	.12	.10	.12	.21	.18	.12
00665	PHOS-TOT		MG/L P	.030	.020	.020	.020	.020	.050	.060	.120	.050
00671	PHOS-DIS	ORTHO	MG/L P	.012	.007	.008	.007	.008	.023	.024	.026	.028
00680	T ORG C	C	MG/L	1.0	1.0	1.0K	1.0	1.0K	1.0	1.0	1.0	1.0K
31615	FEC COLI	MPNECMED	/100ML	23	4	39	4	39	23	93	93	39

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404171 243000000020
45 42 31.0 121 30 17.0 3
HOOD RIVER AT HOOD RIVER
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BELOW YAKIMA RIVER
21400000 830806 HQ 17070105019 0000.140 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				88/02/18	88/04/12	88/05/04	88/06/17	88/07/18	88/07/19	88/08/15	88/09/26	88/10/24
INITIAL TIME				1000	1030	0925	0900	0925	1530	1000	1130	1040
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
31639	ENTCGCCI	GR D,MF	#/100ML	5	10	20	10	20	20	105	200	60
32209	CHLRPHYL	A	UG/L		3.8	1.6	3.8	1.6	.2	1.7	3.1	
32213	PHPHTN-A	FLR MTHD	UG/L		2.00	2.30	2.00	2.30	1.10	2.20	4.40	
74041	WQF	SAMPLE	UPDATED	880429	880801	880801	880802	880802	891005	890214	890213	890214

INITIAL DATE				88/11/22	89/03/30	89/05/09	89/07/10	89/08/21
INITIAL TIME				1030	1030	0935	0935	0910
MEDIUM				WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	7.0	3.5	10.0	14.0	15.5
00011	WATER	TEMP	FAHN	44.65	38.3$	50.0s	57.28	59.9$
00061	STREAM	FLOW,	INST-CFS					360
00065	STREAM	STAGE	FEET					2.60
00076	TURB	TRBIDMTR	HACH FTU	9.0	2.0	2.0	2.0	6.0
00094	CNDUCTVY	FIELD	MICROMHO	39	49	42	57	71
00300	DO		MG/L	12.0	13.6	11.6	11.0	10.3
00301	DO	SATUR	PERCENT	98.0	102.0	102.7$	106.0	103.0
00310	BOD	5 DAY	MG/L	1.9	2.8	1.2	1.0	1.3
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	5.0K	5.0K	5.0K
00400	PH		SU	7.50	7.20	7.40	7.80	8.10
00431	T ALK	FIELD	MG/L	14	19	17	23	25
00500	RESIDUE	TOTAL	MG/L	63	54	52	68	97
00530	RESIDUE	TOT NFLT	MG/L	29	4	...8	...6	17
00610	NH3+NH4-	N TOTAL	MG/L	.020K	,040	.0001$	.0005$	.030
00612	UN-IONZD	NH3-N	MG/L	.00009$	.00007$			.001$
00619	UN-IONZD	NH3-NH3	MG/L	.0001$	.00008$	.0002$	.0006$	.001$
00625	TOT KJEL	N	MG/L	.200	.300	.300	.200K	.200
00630	NO2&NO3	N-TOTAL	MG/L	.20	.24	.08	.15	.26
00665	PHOS-TOT		MG/L P	.250	.040	.050	.040	.090
00671	PHOS-DIS	ORTHO	MG/L P	.023	.009	.009	.018	.025
00680	T ORG C	C	MG/L	3.0	1.0K	2.0	1.0K	1.0K
31615	FEC COLI	MPNECMED	/100ML	460	93	39	93	93
31639	ENTCOCCI	GR D,MF	#/100ML	285	5K	15	60	130
32209	CHLRPHYL	A	UG/L			4.1	2.8	2.5
32213	PHPHTN-A	FLR MTHD	UG/L			2.90	3.00	2.70
74041	WQF	SAMPLE	UPDATED	890214	890605	890627	890906	891005

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402920 243000000610
45 39 13.9 121 32 52.8 4
HOOD RIVER fd TUCKER BRIDGE
41065 OREGON WASCO
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0005.220 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	79/10/11
INITIAL TIME			1715	1410	1320	1405	1545	1315	1240	1315	1205
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00940	CHLORIDE	TOTAL	MG/L							2	1
00945	SULFATE	SO4-TOT	MG/L							3	2
00955	SILICA	DISOLVED	MG/L								24.0
31505	TOT COLI	MPN CONF	/100ML			60	230		45	200	150
31615	FEC COLI	MPNECMED	/100ML			60	45K		45	45	91

INITIAL DATE			79/11/16	79/12/20	80/01/17	80/02/14	80/03/20	80/04/10	80/05/15	80/06/12	80/07/17
INITIAL TIME			1140	1420	1415	1410	1345	1425	1300	1345	1620
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00008	LAB	IDENT.	NUMBER	791071	791211	800028	800143	000249	800345	800476	800506	000720
00010	WATER	TEMP	CENT	5.0	6.0	5.5	1.5	7.5	8.9	8.9	10.5	17.0
00011	WATER	TEMP	FAHN	41.0$	42.8$	41.9$	34.7$	45.50	48.0$	48.0$	50.9s	62.6$
00060	STREAM	FLOW	CFS	440	1140	1950	886	1120	1710	1020	627	430
00061	STREAM	FLOW,	INST-CFS	330	1070	2400	814	1065	1900	968	540	345
00065	STREAM	STAGE	FEET	2.52	4.38		3.88 .	4.37		4.19	3.24	2.50
00076	TURB	TRBIDMTR	HACH FTU	2.0	1.0	3.0	2.0	1.0	3.0	3.0	1.0	9.0
00080	COLOR	PT-CO	UNITS	10	10	20	15	5	10	5	5	15
00094	CNDUCTVY	FIELD	MICROMHO	64	40	41	45	47	47	44	46	50
00095	CNDUCTVY	AT 25C	MICROMHO	62	39	39	47	47	49	38	53	47
00300	DO		MG/L	12.9	12.3	11.2	13.6	12.3	12.2	11.6	11.0	9.8
00301	DO	SATUR	PERCENT	100.0	98.0	87.5$	66.0	109.0	105.0	100.0	90.0	101.0
00310	BOD	5 DAY	MG/L	1.6	1.5		2.4	1.2	.9	.9	1.0	.9
00335	COD	LOWLEVEL	MG/L	8.0	9.0	7.0	5.0K	7.0	10.0	5.0K	8.0	5.0K
00400	PH		SU	7.20	6.50	6.20	7.00	7.50	7.50	7.00		7.60
00403	PH	LAB	SU	7.4	6.6	6.9	6.8	7.2	7.3	7.2	7.2	7.2
00410	T ALK	CACO3	MG/L	24	16	18	21	20	21	10	19	20
00431	T ALK	FIELD	MG/L	26	16	16	22	21	22	20		23
00500	RESIDUE	TOTAL	MG/L	58	49	61	49	40	50	43	63	77
00530	RESIDUE	TOT NFLT	MG/L	4	4	6	2	2	6	5	4	18
00610	NH3+NH4-	N TOTAL	MG/L	.060	.040	.050	.030	.010		.020	.040	.060
00612	UN-IONZD	NH3-N	MG/L	.0001$	.00002$	.00001$	.00003$	.00005$		.00003$	.0001$	.0007$
00615	NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K
00619	UN-IONZD	NH3-NH3	MG/L	.0001$	.00002$	.00001$	.00003$	.00006$		.00004$	.0001$	.0009$
00625	TOT KJEL	N	MG/L	.200	.200K	.200K	.200K	.200K		.300	.200K	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.54	.10	.18	.18	.19		.02	.02	.02
00665	PHOS-TOT		MG/L P	.073	.025	.029	.038	.033	.175	.028	.039	.074
00671	PHOS-DIS	ORTHO	MG/L P	.028	.011	.015	.015	.013	.013	.010	012	.021
00680	T ORG C	C	MG/L	4.0	2.0	2.0	4.0	6.0	2.0	1.0	'2.0	2.0

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28

PGM=ALLPARM
402920 243000000610
45 39 13.9 121 32 52.8 4
HOOD RIVER @ TUCKER BRIDGE
41065 OREGON WASCO
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0005.220 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			79/11/16	79/12/20	80/01/17	80/02/14	80/03/20	80/04/10	80/05/15	80/06/12	80/07/17
INITIAL TIME			1140	1420	1415	1410	1345	1425	1300	1345	1628
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00900 TOT HARD	CACO3	MG/L	21	13	14	16	15	16	15	16	18
00915 CALCIUM	CA,DISS	MG/L	4.9			4.2			3.4		
00925 MGNSIUM	MG,DISS	MG/L	2.0			1.7			1.4		
00930 SODIUM	NA,DISS	MG/L	3.90	2.30	2.30	2.90	2.80	2.60	2.40	3.00	2.90
00935 PTSSIUM	K,DISS	MG/L	1.00	.40	.60	.70	.60	.70	.50	.80	.80
00940 CHLORIDE	TOTAL	MG/L	3	1	1	1	1	1	.9	1	.9
00945 SULFATE	SO4-TOT	MG/L	2	1	1	1	1	2	1	2	2
00951 FLUORIDE	F,TOTAL	MG/L	.10K			.10K			.10K		
00955 SILICA	DISOLVED	MG/L	28.6	20.4	19.4	24.6	24.5	20.0	18.4	19.8	16.1
01002 ARSENIC	AS,TOT	UG/L	5K			5K			5K		
01007 BARIUM	BA,TOT	UG/L	100K			100K			100K		
01022 BORON	B,TOT	UG/L	200K			200K			200K		
01027 CADMIUM	CD,TOT	UG/L	1K			2			1K		
01034 CHROMIUM	CR,TOT	UG/L	50K			50K			50K		
01042 COPPER	CU,TOT	UG/L	50K			50K			50K		
01045 IRON	FE,TOT	UG/L	50K			70			120		
01051 LEAD	PB,TOT	UG/L	10K			10K			10K		
01055 MANGNESE	MN	UG/L	20.0K			50.0K			20.0K		
01077 SILVER	AG,TOT	UG/L	10.0K			1.0K			1.0K		
01092 ZINC	ZN,TOT	UG/L	10K			10K			10K		
01147 SELENIUM	SE,TOT	UG/L	5K			5K			5K		
31505 TOT COLI	MPN CONF	/100ML	150	150	73	30K	23	930	30	2400	73
31615 FEC COLI	MPNECMED	/100ML	30	150	30K	30K	4	36	30	36	30K
32209 CHLRPHYL	A	UG/L						8.6	1.2	1.5	1.5
32213 PHPHTN-A	FLR MTHD	UG/L						3.41	1.03	1.45	1.60
46570 CAL HARD	CA MG	MG/L	20$			17$			14$		
71900 MERCURY	HG,TOTAL	UG/L	.5K			1.0K			.5K		

INITIAL DATE			80/08/14	80/09/18	80/11/06	80/12/11	81/01/15	81/01/15	81/01/15	81/01/15	81/02/12
INITIAL TIME			1300	1505	1310	1325	1225	1230	1250	1255	1330
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00002 HSAMPLOC	% FROM	RT BANK						50.0	25.0	75.0	
00008 LAB	IDENT.	NUMBER	800878	801009	801156	801284	810053	810054	810055	810056	810350
00010 WATER	TEMP	CENT	16.5	12.5	8.5	4.5	3.0	3.0	3.0	3.0	4.3
00011 WATER	TEMP	FAHN	61.7$	54.5$	47.3$	40.1$	37.4$	37.4$	37.4$	37.4$	39.7$
00060 STREAM	FLOW	CFS	294	294	572	743	877	877	877	877	1302
00061 STREAM	FLOW,	INST-CFS	204	213	383	664	818				1330
00065 STREAM	STAGE	FEET	1.94	1.99	2.72	3.54	3.89				4.80

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402920 243000000610
45 39 13.9 121 32 52.8 4
HOOD RIVER @ TUCKER BRIDGE
41065 OREGON WASCO
PACIFIC NORTHWEST 131091
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0005.220 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			80/08/14	80/09/18	80/11/06	80/12/11	81/01/15	81/01/15	81/01/15	81/01/15	81/02/12
	INITIAL TIME			1300	1505	1310	1325	1225	1230	1250	1255	1330
	MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00076	TURB	TRBIDMTR	EACH FTU	0.0	7.0	7.0	1.0	2.0	2.0	2.0	2.0	3.0
00080	COLOR	PT-CO	UNITS	5	5	5	5	10	10	5	10	10
00094	CNDUCTVY	FIELD	MICROMHO	59	63	62	45	53	53	53	53	65
00095	CNDUCTVY	AT 25C	MICROMHO	68								
00116	INTNSVE	SURVEY	IDENT						504100	504100	504100	
00300	DO		MG/L	10.1	10.8	11.3	13.9	13.7	13.0	13.8	13.8	13.6
00301	DO	SATUR	PERCENT	103.0	101.0	104.0	107.0	101.0	102.0	102.0	102.0	105.0
00310	BOD	5 DAY	MG/L	.6	1.4	.9	1.9	2.0	2.1	1.8	2.2	2.0
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	8.0	6.0	5.0	5.0K	5.0K	5.0	15.0
00400	PH		SU	7.40	6.50	6.90	6.80	6.30	6.50	6.40	6.50	6.70
00403	PH	LAB	SU	7.2								
00410	T ALK	CACO3	MG/L	23								
00431	T ALK	FIELD	MG/L	24	21	24	19	21	20	20	19	18
00500	RESIDUE	TOTAL	MG/L	68	82	75	54	33	56	48	50	57
00530	RESIDUE	TOT NFLT	MG/L	11	13	21	2	2	2	2	3	15
00610	NH3+NH4-	N TOTAL	MG/L	.020K	.060	.040	.040	.040	.040	.040	.040	.020K
00612	UN-IONZD	NH3-N	MG/L	.0002$	.00004$	.00005$	.00003$	000008$	.00001$	.00001$	.00001$	.00001$
00615	NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K
00619	UN-IONZD	NH3-NH3	MG/L	.0002$	.00005$	.00006$	.00004$	.00001$	.00002$	.00001$	.00002$	.00001$
00625	TOT KJEL	N	MG/L	.200K	.200K	.200						.200K
00630	NO2&NO3	N-TOTAL	MG/L	.03	.02K	.04	.16	.17	.17	.17	.17	.12
00665	PHOS-TOT		MG/L P	.062	.053	.080	.035	.029	.029	.027	.026	.048
00671	PHOS-DIS	ORTHO	MG/L P	.025	.028	.015	.033	.020	.019	.017	.017	.014
00680	T ORG C	C	MG/L	1.0	1.0K	4.0	2.0	2.0	2.0	2.0	2.0	2.0
00900	TOT HARD	CACO3	MG/L	20	20	20	16	19	18	18	17	14
00915	CALCIUM	CA,DISS	MG/L	4.9			4.4					
00925	MGNSIUM	MG,DISS	MG/L	1.9			1.6					
00930	SODIUM	NA,DISS	MG/L	3.00	3.70		2.70					
00935	PTSSIUM	K,DISS	MG/L	.80	.80		.70					
00940	CHLORIDE	TOTAL	MG/L	.9	1		1					
00945	SULFATE	SO4-TOT	MG/L	2	2		2					
00951	FLUORIDE	F,TOTAL	MG/L	.10K			.10K					
00955	SILICA	DISOLVED	MG/L	25.7	23.0	27.4	25.2	31.0	30.6	29.2	22.4	
01002	ARSENIC	AS,TOT	UG/L	5K			5K					
01007	BARIUM	BA,TOT	UG/L	100K			100K					
01022	BORON	B,TOT	UG/L	200K			200K					
01027	CADMIUM	CD,TOT	UG/L	1K			1K					
01034	CHROMIUM	CR,TOT	UG/L	2K			2K					

(SAMPLE CONTINUED ON NEXT PAGE)

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DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				80/08/14	80/09/18	80/11/06	80/12/11	81/01/15	81/01/15	81/01/15	81/01/15	81/02/12
INITIAL TIME				1300	1505	1310	1325	1225	1230	1250	1255	1330
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
01042	COPPER	CU,TOT	UG/L	2K			2K					
01045	IRON	FE,TOT	UG/L	300			50					
01051	LEAD	PB,TOT	UG/L	10K			10K					
01055	MANGNESE	MN	UG/L	180.0			20.0K					
01077	SILVER	AG,TOT	UG/L	1.0K			1.0K					
01092	ZINC	ZN,TOT	UG/L	10K			10K					
01147	SELENIUM	SE,TOT	UG/L	5K								
31505	TOT COLI	MPN CONF	/100ML	930	230	43	91	36	230	30K	150	91
31615	FEC COLI	MPNECMED	/100ML	36	36	15	30K	30K	30K	30K	30K	30K
32209	CHLRPHYL	A	UG/L	.6	1.4							
32213	PHPHTN-A	FLR MTHD	UG/L	.62	1.38							
46570	CAL HARD	CA MG	MG/L	20$			18$					
71900	MERCURY	HG,TOTAL	UG/L	.5K			.5K					

INITIAL DATE				81/03/12	81/04/16	81/05/14	81/06/11	81/07/16	81/08/13	81/09/17	81/10/22	81/11/16
INITIAL TIME				1430	1410	1304	1355	1330	1435	1330	1335	1100
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00008	LAB	IDENT.	NUMBER	810435	811058	011146	811266	811358	011465	811643	811756	811845
00010	WATER	TEMP	CENT	9.4	9.5	11.1	12.0	17.0	20.0	15.5	6.5	6.5
00011	WATER	TEMP	FAHN	48.9$	49.1$	52.0$	53.69	62.6$	68.0$	59.9$	43.7$	43.7$
00060	STREAM	FLOW	CFS	876	1013	713	1400	394	372	292	368	717
00061	STREAM	FLOW,	INST-CFS	887	1055	711	1600	411	505	280	374	715
00065	STREAM	STAGE	FEET	4.03	4.35	3.65		2.82	2.62	2.31	2.69	3.64
00076	TURB	TRBIDMTR	HACH FTU	1.0K	1.0	1.0	2.0	2.0	24.0	44.0	2.0	2.0
00080	COLOR	PT-CO	UNITS	5	5	10	30	1K	5	10	5	5
00094	CNDUCTVY	FIELD	MICROMHO	53	40	53	40	56	57	61	62	55
00095	CNDUCTVY	AT 25C	MICROMHO							61	65	
00300	DO		MG/L	12.2	12.1	11.3	11.3	10.0	9.5	10.2	13.2	12.9
00301	DO	SATUR	PERCENT	107.0	107.0	102.0	'105.0	103.0	103.0	107.0	114.0	104.0
00310	BOD	5 DAY	MG/L	1.3	1.5	1.0	1.2	1.3	.4	1.1	1.8	2.0
00335	COD	LOWLEVEL	MG/L	7.0	5.0K	7.0	8.0	5.0K	5.0K	5.0K	5.0K	5.0
00400	PH		SU	7.20	7.30	7.00	6.70	7.20	7.30	7.30	6.00	6.90
00403	PH	LAB	SU								7.7	
00410	T ALK	CACO3	MG/L					20		20	20	
00431	T ALK	FIELD	MG/L	24	21	21	18	25	23	25	27	22
00500	RESIDUE	TOTAL	MG/L	53	50	52	45	62	101	181	66	61
00530	RESIDUE	TOT NFLT	MG/L	1	6	3	6	5	44	106	2	8
00610	NH3+NH4-	N TOTAL	MG/L	.020K	.020	.020	.020	.020	.020K	.070	.020	.050K

(SAMPLE CONTINUED ON NEXT PAGE)

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COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
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/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			81/03/12	81/04/16	81/05/14	81/06/11	81/07/16	81/08/13	81/09/17	81/10/22	81/11/16
INITIAL TIME			1430	1410	1304	1355	1330	1435	1330	1335	1100
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00612 UN-IONZD	NH3-N	MG/L	.00006$	.00007$	.00004$	.00002$	.0001$	.0002$	.0004$	.00002$	.00006$
00615 NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K
00619 UN-IONZD	NH3-NH3	MG/L	.00007$	.00009$	.00005$	.00003$	0001$	.0002$	.0005$	.00002$	.00007$
00625 TOT KJEL	N	MG/L	.200K	.200K	.200K	.200K	.20QK	.200K	.200K	.200K	.200K
00630 NO2&NO3	N-TOTAL	MG/L	.12	.02	.02	.08	.03@	(05	.07	.04	.06
00665 PHOS-TOT		MG/L P	.027	.027	.028	.028		.---	.260	.087	.050
00671 PHOS-DIS	ORTHO	MG/L P	.016	.010	.009	.014	.016	.035	.040	.070	.016
00680 T ORG C	C	MG/L	1.0	2.0	2.0	8.0	6.0	2.0	6.0	1.0K	3.0
00900 TOT HARD	CACO3	MG/L	19	15	16	15	18	21	22	23	19
00915 CALCIUM	CA,DISS	MG/L	4.6			4.1				5.9	
00925 MGNSIUM	MG,DISS	MG/L	1.7			1.4				2.2	
00930 SODIUM	NA,DISS	MG/L	3.20			2.20				4.40	
00935 PTSSIUM	K,DISS	MG/L	.80			.50				1.00	
00940 CHLORIDE	TOTAL	MG/L	1							2	
00945 SULFATE	SO4-TOT	MG/L	3			2				4	
00951 FLUORIDE	F,TOTAL	MG/L	.10K			.10K				.10K	
00955 SILICA	DISOLVED	MG/L	30.6			20.0				27.0	
01000 ARSENIC	AS,DISS	UG/L								5K	
01002 ARSENIC	AS,TOT	UG/L	5K			5K				5K	
01022 BORON	B,TOT	UG/L	200K			200K				200K	
01025 CADMIUM	CD,DISS	UG/L								1K	
01027 CADMIUM	CD,TOT	UG/L	1K			1K				1K	
01030 CHROMIUM	CR,DISS	UG/L								2K	
01034 CHROMIUM	CR,TOT	UG/L	2K			2K				2K	
01040 COPPER	CU,DISS	UG/L								2K	
01042 COPPER	CU,TOT	UG/L	2K			3				2K	
01045 IRON	FE,TOT	UG/L	60			180				70	
01046 IRON	FE,DISS	UG/L								100J	
01049 LEAD	PB,DISS	UG/L								10K	
01051 LEAD	PB,TOT	UG/L	10K			10K				10	
01055 MANGNESE	MN	UG/L	20.0K			20.0K				30.0	
01056 MANGNESE	MN,DISS	UG/L								40.0J	
01090 ZINC	ZN,DISS	UG/L								10K	
01092 ZINC	ZN,TOT	UG/L	50			10K				10K	
31505 TOT COLI	MPN CONF	/100ML	30K	30K	150	430	36	930	91	230	73
31615 FEC COLI	MPNECMED	/100ML	30K	30K	73	91	36	91	30K	36	30K
32209 CHLRPHYL	A	UG/L		5.1	4.1	1.5	1.1	1.0	2.9	.7	
32213 PHPHTN-A	FLR MTHD	UG/L		2.32	1.12	.005K	.08	.75	2.65	.47	

(SAMPLE CONTINUED ON NEXT PAGE)

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/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			81/03/12	81/04/16	81/05/14	81/06/11	81/07/16	81/08/13	81/09/17	81/10/22	81/11/16
INITIAL TIME			1430	1410	1304	1355	1330	1435	1330	1335	1100
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
46570	CAL AARD	CA MG	MG/L	18$		16$				24$	
71890	MERCURY	HG,DISS	UG/L							.5K	
71900	MERCURY	HG,TOTAL	UG/L	.5K		.5K				.5K	

INITIAL DATE			81/12/10	82/02/11	82/03/11	82/04/14	82/05/25	82/07/15	82/08/18	82/09/29	82/10/26
INITIAL TIME			1255	1320	1030	1215	0025	1435	1150	1055	1100
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00008	LAB	IDENT.	NUMBER	011093	020020	820091	820146				
00010	WATER	TEMP	CENT	5.0	2.5	5.0	5.0	10.8	13.0	15.5	9.0	8.0
00011	WATER	TEMP	FAHN	41.0$	36.5$	41.0$	41.0$	51.4$	55.4$	59.9$	48.29	46.45
00035	WIND	VELOCITY	MPH								2.9	
00057	IND OF	FLOW	CHECKED									0
00060	STREAM	FLOW	CFS	1510	990	2150	1460	1380	603	374	476	632
00061	STREAM	FLOW,	INST-CFS	1460	973	2380	1418		523	337	419	574
00065	STREAM	STAGE	FEET	5.00	4.20	6.10	4.94		3.17	2.55	2.05	3.31
00076	TURB	TRBIDMTR	HACH FTU	3.0	1.0	3.0	2.0	2.0	7.0	4.0	2.0	3.0
00080	COLOR	PT-CO	UNITS	1K	1K	1K	5	5	10	5	5	10
00094	CNDUCTVY	FIELD	MICROMHO	49	47	40	43	42	43	55	50	69
00095	CNDUCTVY	AT 25C	MICROMHO	44					48			
00300	DO		MG/L	13.0	14.0	12.6	13.1	11.1	10.9	10.5	11.6	11.3
00301	DO	SATUR	PERCENT	101.0	103.0	98.0	102.0	100.0	103.0	104.0	100.0	95.0
00310	BOD	5 DAY	MG/L	1.7	2.1	1.5	3.1	1.2	.7	.6	.7	.6
00335	COD	LOWLEVEL	MG/L	5.0K	5.0K	5.0K	5.0K	1.0	5.0K	5.0K	5.0	5.0K
00400	PH		SU	7.40	7.00	7.00	7.10	7.50	7.50	7.60	7.10	6.80
00403	PH	LAB	SU				7.1					
00410	T ALK	CACO3	MG/L				16					22
00431	T ALK	FIELD	MG/L	18	22	14	18	10	22	24	23	20
00500	RESIDUE	TOTAL	MG/L	57	47	40	38	55	70	65	60	71
00530	RESIDUE	TOT NFLT	MG/L	4	2	6	1	6	10	5	2	6
00610	NH3+NH4-	N TOTAL	MG/L	.040	.030	.020K	.020	.020K	.030	.020	.020	.020
00612	UN-IONZD	NH3-N	MG/L	.0001$	.00003$	.00002$	.00003$	.0001$	.0002$	.0002$	00004$	.00002$
00615	NO2-N	TOTAL	MG/L	.020	.020K	.020K	.020K	.020K	.020K	.020K		
00619	UN-IONZD	NH3-NH3	MG/L	.0002$	.00004$	.00003$	.00004$	.0002$	.0003$	.0003$	00005$	.00002$
00625	TOT KJEL	N	MG/L	.200K	.200K	.200K	.200K	.400	.200K	.200K	.200K	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.16	.24	.16	.12	.02	.03	.06	.06	.03
00665	PHOS-TOT		MG/L P	.021	.103	.088	.025	.039	.083	.040	.035	.035
00671	PHOS-DIS	ORTHO	MG/L P	.013	.015	.013	.007	.005	.019	.021	.021	.019
00600	T ORG C	C	MG/L	2.0			2.0	1.0	1.0	3.0	3.0	3.0

(SAMPLE CONTINUED ON NEXT PAGE)

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DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				81/12/10	82/02/11	82/03/11	82/04/14	82/05/25	82/07/15	82/08/18	82/09/29	82/10/26
INITIAL TIME				1255	1320	1030	1215	0825	1435	1150	1055	1100
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00900	TOT HARD	CACO3	MG/L	15	17	11	14	16	16	19	20	18
00915	CALCIUM	CA,DISS	MG/L				3.6					
00925	MGNSIUM	MG,DISS	MG/L				1.3					
00930	SODIUM	NA,DISS	MG/L				3.00					
00935	PTSSIUM	K,DISS	MG/L				.70					
00940	CHLORIDE	TOTAL	MG/L				1					
00945	SULFATE	SO4-TOT	MG/L				.-1					
00951	FLUORIDE	F,TOTAL	MG/L				1910K					
00955	SILICA	DISOLVED	MG/L									
01022	BORON	B,TOT	UG/L				200K					
31505	TOT COLI	MPN CONF	/100ML	91	91	91	36	30K	73	91	91	91
31615	FEC COLI	MPNECMED	/100ML	36	36	91	36	30K	30	30K	36	91
32209	CHLRPHYL	A	UG/L				1.4	4.4	1.2	.6	.3	1.8
32213	PHPHTN-A	FLR MTHD	UG/L				.01K	1.05	.30	.19	.01K	.75
46570	CAL HARD	CA MG	MG/L				14$					

INITIAL DATE				82/11/18	83/04/20	83/05/25	83/07/28	83/08/25	86/06/09
INITIAL TIME				1100	1235	1215	0955	1400	1030
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	7.5	11.0	15.0	15.0	19.8	11.2
00011	WATER	TEMP	FAHN	45.5$	51.8$	59.0$	59.0$	67.6$	52.2$
00057	IND OF	FLOW	CHECKED	0	0	0	0	0	
00060	STREAM	FLOW	CFS	1420	1090	1010	551	351	
00061	STREAM	FLOW,	INST-CFS			1000		360	705
00065	STREAM	STAGE	FEET	4.92		4.15			3.52
00076	TURB	TRBIDMTR	HACH FTU	2.0	1.0	2.0	9.0	6.0	3.0
00080	COLOR	PT-CO	UNITS	16	5K	5	5	5	5
00094	CNDUCTVY	FIELD	MICROMHO	37	53	41	62	64	49
00095	CNDUCTVY	AT 25C	MICROMHO						
00300	DO		MG/L	11.7	11.8	11.3	10.5	10.0	11.6
00301	DO	SATUR	PERCENT	97.0	106.0	111.0	103.0	109.0	105.0
00310	BOD	5 DAY	MG/L	1.3	1.5	1.6	.7	.2	1.2
00335	COD	LOWLEVEL	MG/L	5.0K	5.0	5.0K	5.0K	5.0K	5.0K
00400	PH		SU	7.00	8.10	8.10	8.00	8.10	7.40
00403	PH	LAB	SU				7.2		
00410	T ALK	CACO3	MG/L				25		
00431	T ALK	FIELD	MG/L	18	25	24		31	20
00500	RESIDUE	TOTAL	MG/L	42	60	54	86	77	52

(SAMPLE CONTINUED ON NEXT PAGE) .

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402920 243000000610
45 39 13.9 121 32 52.8 4
HOOD RIVER @ TUCKER BRIDGE
41065 OREGON WASCO
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0005.220 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				82/11/18	83/04/20	83/05/25	83/07/28	83/08/25	86/06/09
INITIAL TIME				1100	1235	1215	0955	1400	1030
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER
00530	RESIDUE	TOT NFLT	MG/L	6	2	4	21	13	8
00610	NH3+NH4-	N TOTAL	MG/L	.040	.020K	.020	.020K	.020	.020K
00612	UN-IONZD	NH3-N	MG/L	.00006$	.0005$	.0007$	.0005$	.0009$	.0001$
00619	UN-IONZD	NH3-NH3	MG/L	.00007$	.0006$	.0008$	.0006$	.001$	.0001$
00625	TOT KJEL	N	MG/L		.200K	.200K	.200	.200K	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.12	.13	.08	.16	.16	.03
00665	PHOS-TOT		MG/L P	.040	.076	.034	.065	.114	.034
00671	PHOS-DIS	ORTHO	MG/L P		.008	.020	.017	.031	.013
00680	T ORG C	C	MG/L	2.0	2.0	4.0	1.0	1.0K	1.0K
00900	TOT HARD	CACO3	MG/L	14	20	17	20	24	16
00915	CALCIUM	CA,DISS	MG/L		5.0	4.2	4.8	6.1	3.8
00925	MGNSIUM	MG,DISS	MG/L		2.0	1.5	1.9	2.2	1.5
00930	SODIUM	NA,DISS	MG/L		3.00	3.00	3.40	4.30	3.10
00935	PTSSIUM	K,DISS	MG/L						.90
00940	CHLORIDE	TOTAL	MG/L						.5
00945	SULFATE	SO4-TOT	MG/L						1
31505	TOT COLI	MPN CONF	/100ML	210	36	240	4600	230	
31615	FEC COLI	MPNECMED	/100ML	110	30K	23	4600	91	43
31639	ENTCOCCI	GR D,MF	#/100ML						8
32209	CHLRPHYL	A	UG/L		3.9	5.3	1.7	2.7	1.3
32213	PHPHTN-A	FLR MTHD	UG/L		1.37	1.87	.52	1.13	.88
46570	CAL HARD	CA MG	MG/L		21$	17$	20$	24$	16$
74041	WQF	SAMPLE	UPDATED						860915

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				65/07/27	66/09/06	67/04/11	67/07/05	67/07/05	67/09/26	68/04/24	68/06/25	68/08/21
INITIAL TIME				1245	1100	0930	0950		1710	1050	1000	1155
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	17.0	17.0	6.0	17.0		18.0	9.0	16.0	16.0
00011	WATER	TEMP	FAHN	62.6$	62.6$	42.8$	62.6$		64.4$	48.2$	60.8$	60.8$
00057	IND OF	FLOW	CHECKED	0	0	0	0	0	0	0	0	0
00060	STREAM	FLOW	CFS	440	270	716	521	521	251	697	398	223
00070	TURB	JKSN	JTU	14.0	11.0	7.0		15.0	14.0	1.0	24.0	10.0
00080	COLOR	PT-CO	UNITS	2	7	0		5	3	1	4	4
00095	CNDUCTVY	AT 25C	MICROMHO	67	81	54	94		72	51	67	77
00300	DO		MG/L	9.6	9.9	12.6	8.7		10.1	13.0	9.9	10.5
00301	DO	SATUR	PERCENT	99.0	102.0	101.0	90.0		106.0	112.0	99.0	105.0
00310	BOD	5 DAY	W/L	1.8	.6	1.9	.7		2.1	1.8	3.7	.8
00400	PH		SU	7.40	7.50	8.20	6.90		8.00	8.40	8.00	8.30
00410	T ALK	CACO3	MG/L	24	32	24		41	35	20	26	34
00500	RESIDUE	TOTAL	MG/L	77	99	61		113	118	74	76	100
00530	RESIDUE	TOT NFLT	MG/L	21	35	5		18	20	6	19	18
00610	NH3+NH4-	N TOTAL	MG/L	.240	.600	.180		.250	.110	.230	.180	.250
00612	UN-IONZD	NH3-N	MG/L	.002$	.006$	.004$			.004$	.010$	.005$	.014$
00619	UN-IONZD	NH3-NH3	MG/L	.002$	.007$	.005$			.004$	.012$	.006$	.017$
00620	NO3-N	TOTAL	MG/L	.040	.020	.010		.010	.060	.010	.010	.130
00660	ORTHOPO4	PO4	MG/L	.02	.04	.01K		.10	.10	.04	.02	.01K
00900	TOT HARD	CACO3	MG/L	26	29	30		37	35	20	24	27
00940	CHLORIDE	TOTAL	MG/L	2	8	2		3	.8	2	2	2
00945	SULFATE	SO4-TOT	MG/L	1	5	3		6	6	3	6	6
31505	TOT COLI	MPN CONF	/100ML	2400	7000L	62	700		7000	230	620	2400

INITIAL DATE				69/03/11	69/05/19	69/06/24	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10	71/03/23
INITIAL TIME				1245	1515	0755	1140	1245	0940	0945	1020	1430
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT		8.5	10.5	18.0	11.0	6.0	16.5	11.5	7.0
00011	WATER	TEMP	FAHN		47.3$	50.9$	64.4$	51.8$	42.8$	61.7$	52.7$	44.6$
00057	IND OF	FLOW	CHECKED	0	0	0	0	0	0	0	0	0
00060	STREAM	FLOW	CFS	702	3110	1350	339	457	1000	788	312	1410
00070	TURB	JKSN	JTU		6.0	60.0	11.0	1.0	3.0	11.0	18.0	3.0
00080	COLOR	PT-CO	UNITS		1	5	3	1	0	0	0	0
00095	CNDUCTVY	AT 25C	MICROMHO		34	42	70	72	59	52	84	54
00300	DO		MG/L		12.3	10.6	10.1	11.6	13.6	10.2	11.1	12.5

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				69/03/11	69/05/19	69/06/24	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10	71/03/23
INITIAL TIME				1245	1515	0755	1140	1245	0940	0945	1020	1430
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00301	DO	SATUR	PERCENT		105.0	95.0	106.0	105.0	109.0	104.0	101.0	102.0
00310	BOD	5 DAY	MG/L		1.4		2.2	1.2	2.3	.9	1.4	1.9
00400	PH		SU		6.90	7.10	7.90	7.50	8.10	7.40	7.30	7.10
00410	T ALK	CACO3	MG/L		13	16	30	31	23	21	32	22
00500	RESIDUE	TOTAL	MG/L		70	189	90	80	61	88	93	85
00530	RESIDUE	TOT NFLT	MG/L		26	123	50	4	6	24	21	6
00610	NH3+NH4-	N TOTAL	MG/L		.420	.070	.220	.020	.050	.070	.320	.150
00612	UN-IONZD	NH3-N	MG/L		.0005$	.0002$	.006$	.0001$	.0008$	.0005$	.001$	.0003$
00619	UN-IONZD	NH3-NH3	MG/L		.0007$	.0002$	.007$	.0002$	.001$	.0006$	.002$	.0003$
00620	NO3-N	TOTAL	MG/L		.---			.140	.050	.120	.240	.010K
00660	ORTHOPO4	PO4	MG/L		110	.02	.04	.01	.01	.02	.04	.02
00900	TOT HARD	CACO3	MG/L		13	14	25	31	18	16	26	19
00940	CHLORIDE	TOTAL	MG/L		8	1	2	2	2	2	3	2
00945	SULFATE	SO4-TOT	MG/L		2	4	5	4	3	3	5	3
31505	TOT COLI	MPN CONF	/100ML		130	2400	2400	230	62	2400	2400	230
31615	FEC COLI	MPNECMED	/100ML	45K			2400		5K		2400	45K

INITIAL DATE				71/06/21	71/06/22	71/09/13	72/02/01	72/07/03	72/10/03	73/02/06	73/07/17	73/10/08
INITIAL TIME				1355	0945	1500	1450	1000	1310	1800	1530	1520
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	14.0		15.0	2.0	13.0	13.0	3.0	22.5	11.0
00011	WATER	TEMP	FAHN	57.2$		59.0$	35.6$	55.4$	55.4$	37.4$	72.5$	51.8$
00057	IND OF	FLOW	CHECKED	0	0	0	0	0	0	0	0	0
00060	STREAM	FLOW	CFS	1370	1460	474	1230	825	441	782	349	361
00070	TURB	JKSN	JTU	4.0		12.0	25.0	8.0	10.0	3.0	10.0	2.0
00080	COLOR	PT-CO	UNITS	3			3	0	5	0	10	5
00095	CNDUCTVY	AT 25C	MICROMHO	42		63	674	63	88			
00300	DO		MG/L	10.7		10.3	13.8	10.9	11.3	12.8	9.8	11.4
00301	00	SATUR	PERCENT	103.0		101.0	100.0	103.0	107.0	94.8$	111.4$	102.7$
00310	BOD	5 DAY	MG/L	1.2		1.6	1.9	.9	1.5			
00400	PH		SU	7.30		7.40	7.10	7.40	7.60			
00410	T ALK	CACO3	MG/L	17		26	21	19	29	21	22	29
00500	RESIDUE	TOTAL	MG/L	56		118	67	76	91	59	94	73
00530	RESIDUE	TOT NFLT	MG/L	10		12	6	12	18	6	41	7
00610	NH3+NH4-	N TOTAL	MG/L	.080		.030	.090	.320	.060	.010	.080	.090
00612	UN-IONZD	NH3-N	MG/L	.0004$		.0002$	.0001$	.002$	.0006$			
00619	UN-IONZD	NH3-NH3	MG/L	.0005$		.0002$	.0001$	.002$	.0007$			
00620	NO3-N	TOTAL	MG/L	.040		.130	.290	.200	.250	.210	.160	.160

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	75/09/08	77/10/19	77/11/16	77/12/21
INITIAL TIME			1500	1635	1230	1145	1804	1240	1035	0945	1030
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00630 NO2&NO3	N-TOTAL	MG/L							.08	.11	.26
00650 T PO4	PO4	MG/L	.40	.20		.20	.40	.50			
00660 ORTHOPO4	PO4	MG/L	.11	.04	.11	.02	.04	.03			
00665 PHOS-TOT		MG/L P							.084	.044	.038
00671 PHOS-DIS	ORTHO	MG/L P							.027	.016	.012
00680 T ORG C	C	MG/L							4.0	3.0	4.0
00900 TOT HARD	CACO3	MG/L	19	19	27	21	20	23	25	11	15
00930 SODIUM	NA,DISS	MG/L	3.10	3.20		3.20	3.20	4.00	3.50	1.70	2.20
00935 PTSSIUM	K,DISS	MG/L	.90	.90		.80	1.10	1.60	.60	.70	.60
00940 CHLORIDE	TOTAL	MG/L	2	1	2	3	2	3	2	2	2
00945 SULFATE	SO4-TOT	MG/L	2	3	3	2	3	5	3	.9	2
31505 TOT COLI	MPN CONF	/100ML	230	2400		620	2400	620	620	620	230
31615 FEC COLI	MPNECMED	/100ML	45K	45K		230	230	60	60	60	60

INITIAL DATE			78/01/25	78/02/21	78/03/22	78/04/19	78/05/17	78/06/21	78/07/12	78/08/16	78/09/13
INITIAL TIME			1140	1010	0810	0920	1000	1020	1035	1010	1130
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00008 LAB	IDENT.	NUMBER	700037	780094	780185	780234	780303	780389	780452	700587	780713
00010 WATER	TEMP	CENT	4.0	6.0	7.0	8.5	10.0	18.0	15.5	14.0	13.0
00011 WATER	TEMP	FAHN	39.25	42.8$	44.65	47.3$	50.0$	64.49	59.9s	57.25	55.49
00057 IND OF	FLOW	CHECKED	0	0	0	0	0	0	0	0	0
00060 STREAM	FLOW	CFS	1290	1020	1310	823	1020	475	340	396	382
00076 TURB	TRBIDMTR	HACH FTU	3.0	1.0	1.0	2.0	2.0	2.0	4.0	23.0	5.0
00080 COLOR	PT-CO	UNITS	5	5	5	5	5	5	1K	20	10
00094 CNDUCTVY	FIELD	MICROMHO	56	51	50	58	44	57	61	54	59
00095 CNDUCTVY	AT 25C	MICROMHO	52	59	51	59	49	63	60	57	66
00300 DO		MG/L	13.0	12.7	12.2	12.4	11.7	10.2	10.5	10.3	10.8
00301 DO	SATUR	PERCENT	99.0	102.0	100.0	92.0	104.0	107.0	104.0	99.0	102.0
00310 BOD	5 DAY	MG/L	1.7	1.3	.4	1.6	1.1	.6	.9	.8	.8
00335 COD	LOWLEVEL	MG/L	5.0K	5.0K	6.0	8.0	5.0	5.0K	6.0	7.0	5.0K
00400 PH		SU	7.60	7.00	7.50	7.70	7.70	7.90	7.90	7.50	7.70
00403 PH	LAB	SU	7.3	7.6	7.7	7.0	7.6	7.4	7.6	7.4	7.7
00410 T ALK	CACO3	MG/L	18	20	19	26	20	23	24	24	26
00431 T ALK	FIELD	MG/L		22	23	26	20	25	28		26
00500 RESIDUE	TOTAL	MG/L	55	64	60	61	51	58	57	115	68
00530 RESIDUE	TOT NFLT	MG/L	7	1K	5	10	1	2	2	50	5
00610 NH3+NH4-	N TOTAL	MG/L	.060	.090	.110	.070	.070	.100	.070	.190	.050
00612 UN-IONZD	NH3-N	MG/L	.0003$	.0001$	.0005$	.0006$	.0006$	.003$	.002$	.002$	.0006$

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				78/01/25	78102121	78103122	78104119	70105117	70106121	78/07/12	78/08/16	78/09/13
INITIAL TIME				1140	1010	0810	0920	1000	1020	1035	1010	1130
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00615	NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K
00619	UN-IONZD	NH3-NH3	MG/L	.0003$	.0001$	.0006$	.0007$	.0008$	.003$	.002$	.002$	.0007$
00625	TOT KJEL	N	MG/L	.100	.300	.300	.400	.300	.300	.500	.500	.200K
00630	NO2&NO3	N-TOTAL	MG/L	.25	.23	.08	.04	.05	.16	.04	.15	.19
00665	PHOS-TOT		MG/L P	.066	.080	.048	.098	.055	.052	.057	.111	.065
00671	PHOS-DIS	ORTHO	MG/L P	.020	.041	.006	.009	.012	.019	.019	.042	.033
00680	T ORG C	C	MG/L	4.0	2.0	2.0	4.0	6.0	2.0	2.0	3.0	4.0
00900	TOT HARD	CACO3	MG/L	17	18	16	21	16	21	21	19	19
00930	SODIUM	NA,DISS	MG/L	3.20	3.40	2.80	3.30	2.70	3.40	3.60	5.50	3.00
00935	PTSSIUM	K,DISS	MG/L	.90	.90	.70	.90	.80	1.20	1.00	.80	.90
00940	CHLORIDE	TOTAL	MG/L	2	1	2	1	1	2	2	1	1
00945	SULFATE	SO4-TOT	MG/L	2	.9	3	.4	1	2	1	8	3
31505	TOT COLI	MPN CONF	/100ML	620	230	390	91	230		230	430	930
31615	FEC COLI	MPNECMED	/100ML		230	140	36	36		91	230	36
32209	CHLRPHYL	A	UG/L					2.3	2.3	1.0	2.2	1.1

INITIAL DATE				70110125	78/11/15	78112120	79/01/17	79/02/22	79103121	79/04/18	79105116	79106120
INITIAL TIME				1745	1515	1430	1535	1440	1430	1530	1505	1600
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
DEPTH-FT(SMK)												0
00008	LAB	IDENT.	NUMBER		700938	781034	790055	790178	790247	790319	790431	790533
00010	WATER	TEMP	CENT	9.0	1.5	4.0	1.0	6.0	10.0	9.0	15.0	17.5
00011	WATER	TEMP	FABN	40.23	34.78	39.25	33.83	42.03	50.05	40.23	59.03	63.53
00057	IND OF	FLOW	CHECKED	0	0	0	0					
00060	STREAM	FLOW	CFS	342	364	569	400	8465	3444	10917	3060	980
00061	STREAM	FLOW,	INST-CFS						990	990		490
00065	STREAM	STAGE	FEET						3.90	3.90		2.60
00076	TURB	TRBIDMTR	HACH FTU	2.0	2.0	2.0	1.0	3.0	2.0	3.0	3.0	4.0
00080	COLOR	PT-CO	UNITS	5	5	1K	1K	5	1K	5	5	10
00094	CNDUCTVY	FIELD	MICROMHO	67	61	48	02	61	55	50	50	60
00095	CNDUCTVY	AT 25C	MICROMHO	77	60	65	66	65	55	51	51	59
00300	DO		MG/L	11.7	14.3	13.3	13.8	12.8	11.8	12.5	10.7	10.2
00301	00	SATUR	PERCENT	101.0	102.0	102.0	98.0	102.0	105.0	108.0	98.0	106.0
00310	BOD	5 DAY	MG/L	.7	2.4	1.7	2.4	1.6	1.5	2.0	1.3	.9
00335	coo	LOWLEVEL	MG/L	14.0	8.0	15.0	7.0	12.0	5.0K	7.0	7.0	5.0
00400	PH		SU	7.50	7.50		7.10	7.10	7.40	8.00	7.20	6.70
00403	PH	LAB	SU	8.0	7.7	7.0	7.0	7.3	7.4	7.6	7.7	7.0
00410	T ALK	CACO3	MG/L	28	34	21	26	24	21	19	16	22

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				78/10/25	78/11/15	70112120	79/01/17	79/02/22	79/03/21	79/04/18	79105116	79106120
INITIAL TIME				1745	1515	1430	1535	1440	1430	1530	1505	1600
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
DEPTH-FT(SMK)												0
00431	T ALK	FIELD	MG/L	28	20		22	24	22	19	18	22
00500	RESIDUE	TOTAL	MG/L	71	73	66	69	70	31	54	55	65
00530	RESIDUE	TOT NFLT	MG/L	5	4	3	5	4	4	4	7	10
00610	NH3+NH4-	N TOTAL	MG/L	.140	.050	.170	.070	.210	.070	.030	.070	.060
00612	UN-IONZD	NH3-N	MG/L	.0008$	.0001$	.0002$	.00008$	.0004$	.0003$	.0005$	.0003$	.00010$
00615	NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K	.020K
00619	UN-IONZD	NH3-NH3	MG/L	.0009$	.0002$	.0002$	.00010$	.0004$	.0004$	.0006$	.0004$	.0001$
00625	TOT KJEL	N	MG/L	.300	.200	.200	.300	.500	.200K	.200	.400	.200
00630	NO2&NO3	N-TOTAL	MG/L	.10	.10	.14	.16	.46	.20	.02	.03	.11
00665	PHOS-TOT		MG/L P	.048	.041	.051	.050	.074	.038	.048	.076	.051
00671	PROS-OIS	ORTHO	MG/L P	.030	.026	.025	.019	.034	.017	.032	.008	.027
00680	T ORG C	C	MG/L	7.0	4.0	8.0	9.0	8.0	4.0	9.0	4.0	2.0
00900	TOT HARD	CACO3	MG/L	25	25	17	20	21	18	15	14	20
00930	SODIUM	NA,DISS	MG/L	5.50	4.40	3.50	4.40	4.20	3.60	2.90	3.10	3.50
00935	PTSSIUM	K,DISS	MG/L	1.60	1.00	1.00	1.10	1.10	1.00	.80	.80	1.00
00940	CHLORIDE	TOTAL	MG/L	3	2	2	2	3	2	1	2	1
00945	SULFATE	SO4-TOT	MG/L	4	2	1	2	3	2	3	3	2
00955	SILICA	DISOLVED	MG/L	33.4	29.9	25.9	29.8	26.2	24.7	22.9	20.3	21.6
31505	TOT COLI	MPN CONF	/100ML	93	150	36	30K	230	430	210	30K	230
31615	FEC COLI	MPNECMED	/100ML	36	30K	30K	30K	30K	91	30K	30K	230
32209	CHLRPHYL	A	UG/L	.8	.7	.7	.5	.5	.8	5.9	8.1	3.1
32213	PHPHTN-A	FLR MTHD	UG/L					.41	.49	3.20	7.02	1.44

INITIAL DATE				79/07/18	79/08/22	79100122	79109119	82/12/14
INITIAL TIME				1530	1530	1545	1455	1215
MEDIUM				WATER	WATER	WATER	WATER	WATER
00008	LAB	IDENT.	NUMBER	790594	790690		790060	
00010	WATER	TEMP	CENT	22.5	19.0	19.0	16.0	5.0
00011	WATER	TEMP	FAHN	72.58	66.23	66.23	60.8$	41.0$
00057	IND OF	FLOW	CHECKED					0
00060	STREAM	FLOW	CFS	569	495	495	403	931
00061	STREAM	FLOW,	INST-CFS		400	400	325	872
00065	STREAM	STAGE	FEET		2.30	2.30	2.00	
00076	TURB	TRBIDMTR	HACH FTU	24.0	20.0	30.0	27.0	4.0
00080	COLOR	PT-CO	UNITS	20	10	5	5	5
00094	CNDUCTVX	FIELD	MICROMHO	61	60	65	68	62
00095	CNDUCTVY	AT 25C	MICROMHO	55	69	68	67	

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402355 243000000180
45 42 00.0 121 31 00.0 4
HOOD RIVER ABOVE PP&L
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0000.980 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			79/07/18	79108122	79108122	79109119	02112114
	INITIAL TIME			1530	1530	1545	1455	1215
	MEDIUM			WATER	WATER	WATER	WATER	WATER
00116	INTNSVE	SURVEY	IDENT			504100		
	DO		MG/L	9.2	9.4	9.4	9.7	12.4
00301	DO	SATUR.	PERCENT	104.0	100.0	100.0	97.0	97.0
00310	BOD	5 DAY	MG/L	.8	.8	1.0	2.0	1.3
00335	COD	LOWLEVEL	MG/L	3.0	11.0	8.0	7.0	6.0
00400	PH		SU	7.00	7.50	7.50	7.20	
00403	PH	LAB	SU	7.0	7.3	7.4	7.6	7.2
00410	T ALK	CACO3	MG/L	20	26	25	26	20
00431	T ALK	FIELD	MG/L	21	27	26	26	
00500	RESIDUE	TOTAL	MG/L	89	121	121	109	79
00530	RESIDUE	TOT NFLT	MG/L	34	40	48	40	4
00610	NH3+NH4-	N TOTAL	MG/L	.050	.040	.040	.090	.020
00612	UN-IONZD	NH3-N	MG/L	.0002$	.0005$	.0005$	.0004$	.00004$
00615	NO2-N	TOTAL	MG/L	.020K	.020K	.020K	.020K	
00619	UN-IONZD	NH3-NH3	MG/L	.0003$	.0006$	.0006$	.0005$	.00005$
00625	TOT KJEL	N	MG/L	.200	.200	.200	.400	
00630	NO2&NO3	N-TOTAL	MG/L	.02	.18	.18	.10	.27
00665	PHOS-TOT		MG/L P	.133	.162	.181	.181	.148
00671	PHOS-DIS	ORTHO	MG/L P	.041	041	.043	.046	
00680	T ORG C	C	MG/L	4.0	'7.0	5.0	5.0	1.0K
00900	TOT HARD	CACO3	MG/L	18	22	22	23	21
00930	SODIUM	NA,DISS	MG/L	3.30	3.70	3.70	4.70	
00935	PTSSIUM	K,DISS	MG/L	1.00	1.00	1.00	1.20	
00940	CHLORIDE	TOTAL	MG/L	1	2	2	2	
00945	SULFATE	SO4-TOT	MG/L	1	1	1	3	
00955	SILICA	DISOLVED	MG/L	23.9	26.3	26.0	26.4	
31505	TOT COLI	MPN CONF	/100ML	930	2400	11000	2400	390
31615	FEC COLI	MPNECMED	/100ML	36	150	390	230	91
32209	CHLRPHYL	A	UG/L	4.5	2.8	2.3	5.9	
32213	PHPHTN-A	FLR MTHD	UG/L	2.06	2.73	2.32	5.97	

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402920 243000000610
45 39 13.9 121 32 52.8 4
HOOD RIVER @ TUCKER BRIDGE
41065 OREGON WASCO
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0005.220 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73102106	73/07/17	73/10/08	74/03/25	74/08/06	74110129	75/03/25	75/07/14	79/10/11
INITIAL TIME				1715	1410	1320	1405	1545	1315	1240	1315	1205
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	4.0	19.0	9.0	6.5	15.0		5.5	12.0	9.5
00011	WATER	TEMP	FAHN	39.2$	66.2$	48.2$	43.7$	59.0$		41.9$	53.6$	49.1$
00060	STREAM	FLOW	CFS	782	349	361	1200	762	438	1300	665	244
00061	STREAM	FLOW,	INST-CFS									146
00065	STREAM	STAGE	FEET									1.60
00070	TURB	JKSN	JTU		13.0	3.0	1.0	5.0	3.0		20.0	
00076	TURB	TRBIDMTR	HACH FTU									8.0
00080	COLOR	PT-CO	UNITS								15	5
00094	CNDUCTVY	FIELD	MICROMHO				59	51		56		61
00095	CNDUCTVY	AT 25C	MICROMHO								61	65
00300	DO		MG/L	13.1	9.8	11.6	12.8	10.5		13.2	10.9	11.0
00301	DO	SATUR	PERCENT	100.0$	104.3$	100.0$	104.0	103.0		104.0	101.0	96.0
00310	BOD	5 DAY	MG/L				1.7	.9		1.9	.9	.7
00335	COD	LOWLEVEL	MG/L									9.0
00400	PH		SU				7.50	7.50		7.10	7.00	7.30
00403	PH	LAB	SU									7.5
00410	T ALK	CACO3	MG/L								17	27
00431	T ALK	FIELD	MG/L									28
00500	RESIDUE	TOTAL	MG/L								106	81
00530	RESIDUE	TOT NFLT	MG/L								49	13
00610	NH3+NH4-	N TOTAL	MG/L								.040	.050
00612	UN-IONZD	NH3-N	MG/L								.00009$	.0002$
00615	NO2-N	TOTAL	MG/L									.020K
00619	UN-IONZD	NH3-NH3	MG/L								.0001$	.0002$
00620	NO3-N	TOTAL	MG/L								.060	
00625	TOT KJEL	N	MG/L									.200
00630	NO2&NO3	N-TOTAL	MG/L									.05
00650	T PO4	PO4	MG/L								.30	
00660	ORTHOPO4	PO4	MG/L								.05	
00665	PHOS-TOT		MG/L P									.084
00671	PHOS-DIS	ORTHO	MG/L P									.025
00680	T ORG C	C	MG/L									2.0
00900	TOT HARD	CACO3	MG/L								15	23
00930	SODIUM	NA,DISS	MG/L								3.10	4.10
00935	PTSSIUM	K,DISS	MG/L								.90	1.00

(SAMPLE CONTINUED ON NEXT PAGE)

402356 243000001030
45 36 17.7 121 37 52.0 4
HOOD RIVER ABOVE RAPIDS
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0011.660 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				68/06/25	68/08/21	69/03/11	69/05/19	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10
INITIAL TIME				1100	1245	1145	1305	1050	1145	1040	1045	1200
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	14.0	13.5		7.0	13.0	8.0	5.0	14.0	11.0
00011	WATER	TEMP	FAHN	57.23	56.33		44.69	55.4$	46.45	41.0$	57.23	51.8$
00070	TURB	JKSN	JTU	26.0	14.0		3.0	27.0	1.0	.0	22.0	18.0
00080	COLOR	PT-CO	UNITS	1	3		0	1	1	0	0	0
00095	CNDUCTVY	AT 25C	MICROMHO	62	65		72	52	67	58	37	72
00300	DO		MG/L	10.1	10.1		12.1	10.4	11.2	12.6	10.3	11.6
00301	DO	SATUR	PERCENT	97.0	96.0		99.0	98.0	94.0	98.0	99.0	105.0
00310	BOD	5 DAY	MG/L	1.1	.6		1.4	1.3	1.7	2.8	.9	2.4
00400	PH		SU	7.50	7.60		6.00	7.30	7.30	7.50	7.30	7.30
00410	T ALK	CACO3	MG/L	11	30		8	22	29	23	11	25
00500	RESIDUE	TOTAL	MG/L	91	113		59	148	76	61	99	100
00530	RESIDUE	TOT NFLT	MG/L	53	34		13	94	3	2	84	40
00610	NH3+NH4-	N TOTAL	MG/L	.240	.220		.110	.030	.010	.050	.020	.140
00612	UN-IONZD	NH3-N	MG/L	.002$	.002$		.0001$	.0001$	.00003$	.0002$	.0001$	.0006$
00619	UN-IONZD	NH3-NH3	MG/L	.002$	.003$		.0001$	.0002$	.00004$	.0002$	.0001$	.0007$
00620	NO3-N	TOTAL	MG/L	.020	.040		.050K	.050	.040	.060	.060K	.090
00660	ORTHOPO4	PO4	MG/L	.03	.04		.01K	.05	.02	.01K	.03	.03
00760	SWL	PBI	MG/L	10								
00900	TOT HARD	CACO3	MG/L	19	24		7	17	21	18	17	26
00940	CHLORIDE	TOTAL	MG/L	2	2		5	2	1	1	.9	2
00945	SULFATE	SO4-TOT	MG/L	13	4		.9	4	4	3	3	6
31505	TOT COLI	MPN CONF	/100ML	240	620		45K	620	210	240	2400	7000
31615	FEC COLI	MPNECMED	/100ML			45K		620		5K		7000

INITIAL DATE				71/03/23	71/06/21	71/09/13	72/02/01	72/07/03	72/10/03	73/02/06	73/07/17	73/10/08
INITIAL TIME				1330	1300	1315	1400	1230	1210	1605	1300	1235
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	7.0	13.0	12.5	1.5	12.0	10.0	3.0	17.0	8.5
00011	WATER	TEMP	FAHN	44.6$	55.4$	54.5$	34.75	53.69	50.03	37.4s	62.6$	47.3$
00070	TURB	JKSN	JTU	2.0	3.0	8.0	22.0	3.0	4.0	9.0	20.0	3.0
00080	COLOR	PT-CO	UNITS	1	1		4	0	5	2	10	0
00095	CNDUCTVY	AT 25C	MICROMHO	52	38	55	647	51	75			
00300	00		MG/L	12.2	10.4	10.5	13.5	10.8	11.0	12.8	10.0	11.5
00301	DO	SATUR	PERCENT	100.0	98.0	98.0	97.0	100.0	97.0	94.8$	103.1$	96.6$
00310	BOD	5 DAY	MG/L	3.3	1.6	2.8	3.0	.6	1.7			

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402356 243000001030
45 36 17.7 121 37 52.0 4
HOOD RIVER ABOVE RAPIDS
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0011.660 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				71/03/23	71/06/21	71/09/13	72/02/01	72/07/03	72/10/03	73/02/06	73/07/17	73/10/08
INITIAL TIME				1330	1300	1315	1400	1230	1210	1605	1300	1235
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00400	PH		SU	7.10	7.10	7.20	7.00	7.00	7.40			
00410	T ALK	CACO3	MG/L	23	16	22	20	15	26	23	20	27
00500	RESIDUE	TOTAL	MG/L	89	64	91	75	53	84	64	161	83
00530	RESIDUE	TOT NFLT	MG/L	8	11	20	4	6	8	10	63	11
00610	NH3+NH4-	N TOTAL	MG/L	.00160	.020	.020	.020K	.340	.080	.260	.280	.120
00612	UN-IONZD	NH3-N	MG/L		.00006$	.00007$	.00002$	.0007$	.0004$			
00619	UN-IONZD	NH3-NH3	MG/L	.0004$	.00007$	00009$	.00002$	.0009$	.0005$			
00620	NO3-N	TOTAL	MG/L	.010K	.020K	.070	.320	.070	.040	.190	.050	.020
00660	ORTHOPO4	PO4	MG/L	.11	.04	.05	.02	.04	.10	.03	.12	.06
00900	TOT HARD	CACO3	MG/L	18	14	18	17	11	21	21	18	21
00930	SODIUM	NA,DISS	MG/L					2.20	4.20			
00935	PTSSIUM	K, DISS	MG/L					1.00	.50			
00940	CHLORIDE	TOTAL	MG/L	1	.8	.9	1	3	.8	2	3	1
00945	SULFATE	SO4-TOT	MG/L	2	3	3	2	.1K	2	3	4	2
31505	TOT COLI	MPN CONF	/100ML	230	7000L	2400	7000L	45K	2400			
31615	FEC COLI	MPNECMED	/100ML	60	60	230		45K	60			

INITIAL DATE				74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	75/09/08
INITIAL TIME				1310	1510	1430	1325	1355	1355
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	7.5	14.0		5.5	13.0	14.0
00011	WATER	TEMP	FAHN	45.5$	57.2$		41.9$	55.4$	57.2$
00070	TURB	JKSN	JTU	2.0	19.0	3.0	2.0	1.0	8.0
00080	COLOR	PT-CO	UNITS	5	5	5	5	20	5
00094	CNDUCTVY	FIELD	MICROMHO	74	51		65		70
00095	CNDUCTVY	AT 25C	MICROMHO	75	54		65	58	73
00300	DO		MG/L	12.1	10.2		12.6	10.4	10.5
00301	DO	SATUR	PERCENT	103.0	100.0		104.0	100.0	103.0
00310	BOD	5 DAY	MG/L	1.2	1.0		1.3	1.7	1.4
00400	PH		SU	7.30	7.50		7.10	7.00	7.50
00410	T ALK	CACO3	MG/L	24	15	25	22	15	22
00500	RESIDUE	TOTAL	MG/L	64	118	78	66	48	97
00530	RESIDUE	TOT NFLT	MG/L	3	68	6	4	5	16
00610	NH3+NH4-	N TOTAL	MG/L	.120	.040	.010K	.010K	.050	.150
00612	UN-IONZD	NH3-N	MG/L	.0004$	.0003$		.00002$	.0001$	.001$
00619	UN-IONZD	NH3-NH3	MG/L	.0004$	.0004$		.00002$	.0001$	.001$
00620	NO3-N	TOTAL	MG/L	.120	.040	.070	.170	.060	.060
00650	T PO4	PO4	MG/L	.10K	.10K		.10	.10	.30

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402356 243000001030
45 36 17.7 121 37 52.0 4
HOOD RIVER ABOVE RAPIDS
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105019 0011.660 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	75/09/08
INITIAL TIME			1310	1510	1430	1325	1355	1355
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER
00660 ORTHOPO4	PO4	MG/L	.04	.08	.07	.06	.03	.08
00900 TOT HARD	CACO3	MG/L	17	15	21	19	13	19
00930 SODIUM	NA,DISS	MG/L	4.50	2.80		3.70	2.50	3.70
00935 PTSSIUM	K,DISS	MG/L	1.30	.70		.60	.70	1.10
00940 CHLORIDE	TOTAL	MG/L	2	2	2	2	2	2
00945 SULFATE	SO4-TOT	MG/L	2	3	2	2	.9	7
31505 TOT COLI	MPN CONF	/100ML	230	620		230	230	60
31615 FEC COLI	MPNECMED	/100ML	45K	620		45	230	45

/TYPA/AMBNT/STREAM

402357 243000001350
43 34 54.9 121 37 20.9 4
HOOD RIVER ABOVE U.S. PLYWOOD
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070302002 0017.930 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				65/07/27	66/09/06	67/04/11	67/07/05	67/07/05	67/09/26	68/04/24	68/06/25	68/08/21
INITIAL TIME				1355	1215	1020	1033		1610	1235	1200	1310
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	15.0	12.0	6.0	9.5		15.5	8.0	14.0	14.0
00011	WATER	TEMP	FAHN	59.0$	53.6$	42.8$	49.1s		59.9$	46.4$	57.28	57.2$
00070	TURB	JKSN	JTU	25.0	7.0	7.0		58.0	20.0	2.0	15.0	
00000	COLOR	PT-CO	UNITS	7	3	0		2	3	1	1	
00095	CNDUCTVY	AT 25C	MICROMHO	58	77	52	64		55	56	55	
00300	DO		MG/L	9.3	10.2	11.1	10.5		9.3	11.8	9.6	9.9
00301	DO	SATUR	PERCENT	91.0	95.0	89.0	92.0		92.0	99.0	92.0	95.0
00310	BOD	5 DAY	MG/L	2.1	.2	.2	.5		.6	.5	.6	.2
00400	PH		SU	7.20	1.20	7.30	6.90		7.30	7.70	7.50	7.50
00410	T ALK	CAC03	MG/L	20	33	24		26	26	23	20	
00500	RESIDUE	TOTAL	MG/L	88	90	67		104	180	76	96	
00530	RESIDUE	TOT NFLT	MG/L	38	25			116	37	7	41	
00610	NH3+NH4-	N TOTAL	MG/L	,370	.360	.140		.390	.180	.120	.090	
00612	UN-IONZD	NH3-N	MG/L	.002$	.001$	.0004$			.001$	.0009$	.0007s	
00619	UN-IONZD	NH3-NH3	MG/L	.002$	.002$	.0005$			.001$	.001$	.0009$	
00620	NO3-N	TOTAL	MG/L	.070	010K	.010K		.030	.110	.020	.030	
00660	ORTHOP04	P04	MG/L	.04	.01K	01K		.02	.11	04	.01	
00900	TOT HARD	CACO3	MG/L	20	28	'23		25	26	'20	la	
00940	CHLORIDE	TOTAL	MG/L	1	a	2		3	.6	2	2	
00945	SULFATE	SO4-TOT	MG/L	1	2	1		13	5	3	5	
31505	TOT COLI	MPN CONF	/100ML	230	230	6	45K		700L	130	62	700

INITIAL DATE				69/05/19	69/11/03	73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25
INITIAL TIME				1250	1205	1635	1245	1210	1255	1500	1400	1300
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	7.5		3.0	16.0	a.0	6.8	13.5		5.0
00011	WATER	TEMP	FAHN	45.59		37.49	60.8$	46.43	44.2$	56.35		41.0s
00070	TURB	JKSN	JTU	5.0	4.0	3.0	25.0	2.0	2.0	19.0	2.0	2.0
00000	COLOR	PT-CO	UNITS	0	1	0	5	0	5	5	5	5
00094	CNDUCTVY	FIELD	MICROMHO						60	50		65
00095	CNDUCTW	AT 25C	MICROMHO						67	52		65
00300	DO		MG/L	12.1		12.8	10.1	11.4	12.1	10.4		12.5
00301	DO	SATUR	PERCENT	100.0		94.8$	101.0$	95.8$	103.0	102.0		101.0
00310	BOD	5 DAY	MG/L	1.5					.7	.4		.4
00400	PH		SU	6.90					7.30	7.50		7.10

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402357 243000001350
43 34 54.9 121 37 28.9 4
HOOD RIVER ABOVE U.S. PLYWOOD
41065 OREGON WASCO
PACIFIC NORTNWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070302002 0017.930 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			69/05/19	69/11/03	73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25
INITIAL TIME			1250	1205	1635	1245	1210	1255	1500	1400	1300
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00410 T ALK	CACO3	MG/L	16	29	19	20	26	18	15	26	20
00500 RESIDUE	TOTAL	MG/L	75	88	63	148	96	59	133	73	64
00530 RESIDUE	TOT NFLT	MG/L	16	4	6	42	8	1	81	3	3
00610 NH3+NH4-	N TOTAL	MG/L	.140	.090	.080		.080	.090	.020	.040	.010K
00612 UN-IONZD	NH3-N	MG/L	.0002$					.0003$	.0002$		.00002$
00619 UN-IONZD	NH3-NH3	MG/L	.0002$					.0003$	.0002$		.00002$
00620 NO3-N	TOTAL	MG/L	.050K	.100	.200	.030	.040	.130	.050	.070	.200
00650 T PO4	PO4	MG/L						.30	.40		.10
00660 ORTEOP04	PO4	MG/L	.01K	.02	.01	.09	.02	.06	.04	.03	.05
00900 TOT BARD	CACO3	MG/L	14	26	20	19	22	17	12	19	18
00930 SODIUM	NA,DISS	MG/L						3.50	2.80		3.70
00935 PTSSIUM	K,DISS	MG/L						1.10	.70		.80
00940 CHLORIDE	TOTAL	W/L	11	2	2	4	3	5	2	1	3
00945 SULFATE	SO4-TOT	MG/L	3	3	4	4	2	2	3		2
31505 TOT COLI	MPN CONF	/100ML	700					230	2400		230
31615 FEC COLI	MPNECMED	/100ML						45K	2400		60

INITIAL DATE			75/07/14	
INITIAL TIME			1335	
MEDIUM			WATER	
00010 WATER	TEMP	CENT	10.0	
00011 WATER	TEMP	FARN	50.09	
00070 TURB	JKSN	JTU	25.0	
00080 COLOR	PT-CO	UNITS	30	
00095 CNDUCTVY	AT 25C	MICROHHO	59	
00300 DO		MG/L	10.7	
00301 DO	SATUR	PERCENT	98.0	
00310 BOD	5 DAY	MG/L	.4	
00400 PA		SU	7.00	
00410 T ALK	CACO3	MG/L	15	
00500 RESIDUE	TOTAL	MG/L	137	
00530 RESIDUE	TOT NFLT	MG/L	74	
00610 NH3+NH4-	N TOTAL	MG/L	.070	
00612 UN-IONZD	NH3-N	MG/L	.0001$	
00619 UN-IONZD	NH3-NH3	MG/L	.0002$	
00620 NO3-N	TOTAL	MG/L	.090	
00650 T PO4	PO4	MG/L	.40	
00660 ORTHOPO4	PO4	MG/L	.06	

(SAMPLE CONTINUED ON NMT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402357 243000001350
43 34 54.9 121 37 28.9 4
HOOD RIVER ABOVE U.S. PLYWOOD
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070302002 0017.930 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			75/07/14
INITIAL TIME			1335
MEDIUM			WATER
00900 TOT HARD	CACO3	MG/L	13
00930 SODIUM	NA,DISS	MG/L	2.90
00935 PTSSIUM	K,DISS	MG/L	.90
00940 CHLORIDE	TOTAL	MG/L	2
00945 SULFATE	SO4-TOT	MG/L	2
31505 TOT COLI	MPN CONF	/100ML	230
31615 FEC COLI	MPNECMED	/100ML	60

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404089 243010000140
45 39 04.3 121 30 54.9 4
NEAL CR @ COUNTY ROAD BRIDGE
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 17070105019 0004.900 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	75/09/08
INITIAL TIME				1740	1510	1400	1445	1615	1255	1210	1610	1300
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	4.5	21.0	9.0	8.0	18.0		6.0	15.0	16.0
00011	WATER	TEMP	FAHN	40.1$	69.8$	48.2$	46.4$	64.45		42.8$	59.0$	60.8$
00070	TURB	JKSN	JTU	10.0	8.0	4.0	6.0	10.0	2.0	9.0	5.0	6.0
00080	COLOR	PT-CO	UNITS	3	20	5	15	15	10	20	20	10
00094	CNDUCTVY	FIELD	MICROMHO				102	108		95		90
00095	CNDUCTVY	AT 25C	MICROMHO				104	120		100	130	100
00300	DO		MG/L	12.3	9.2	11.2	11.9	9.3		12.4	9.5	10.3
00301	DO	SATUP	PERCENT	93.9$	102.25	96.6$	103.0	99.0		102.0	95.0	106.0
00310	BOD	5 DAY	MG/L				.8	1.0		.7	1.0	1.5
00400	PH		SU				7.30	7.80		7.10	7.30	8.00
00410	T ALK	CAC03	MG/L	43	43	35	35	40	39	38	43	32
00500	RESIDUE	TOTAL	MG/L	103	116	112	95	98	100	109	122	91
00530	RESIDUE	TOT NFLT	MG/L	7	14	14	4	6	6	13	7	10
00610	NH3+NH4-	N TOTAL	MG/L	.050	.160	.090	.110	.010	.040	.010	.090	.270
00612	UN-IONZD	NH3-N	MG/L				.0003$	.0002$		.00002$	.0005$	.008$
00619	UN-IONZD	NH3-NH3	MG/L				.0004$	.0003$		.00002$	.0006$	.009$
00620	NO3-N	TOTAL	MG/L	.770	.570	.290	.450	.660	.270	.600	.710	.100
00650	T PO4	PO4	MG/L				.30	1.00		.30	.40	.40
00660	ORTHOPO4	PO4	MG/L	.01	.21	.10	.29	.12	.11	.06	.15	.06
00900	TOT HARD	CACO3	MG/L	46	37	28	29	36	31	33	39	29
00930	SODIUM	NA,DISS	MG/L				4.30	5.20		4.50	5.00	4.30
00935	PTSSIUM	K,DISS	MG/L				1.40	1.60		1.10	1.70	1.70
00940	CHLORIDE	TOTAL	MG/L	3	5	3	3	2	2	3	3	3
00945	SULFATE	SO4-TOT	MG/L	6	5	3	2	4	4	4	5	5
31505	TOT COLI	MPN CONF	/100ML				620	2400		2400	2400	620
31615	PEC COLI	MPNECMED	/100ML				130	620		2400	2400	230

/TYPA/AMBNT/STREAM

404090 243015000100
45 38 41.6 121 32 37.7 4
ODELL CR 200YDS BELOW STP
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 17070105019 0005.310 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25	75/07/14	75/09/08
INITIAL TIME				1730	1425	1340	1430	1600	1340	1225	1730	1315
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	5.0	20.0	10.5	8.5	10.0		7.0	15.0	16.5
00011	WATER	TEMP	FAHN	41.0$	68.0$	50.9$	47.39	64.49		44.63	59.0$	61.75
00070	TURB	JKSN	JTU	9.0	10.0	6.0	9.0	10.0	3.0	9.0	6.0	7.0
00080	COLOR	PT-CO	UNITS	0	5	5	15	15	15	15	15	15
00094	CNDUCTVY	FIELD	MICROMHO				103	109		90		120
00095	CNDUCTVY	AT 25C	HICROMHO				106	123		95	118	172
00300	DO		MG/L	11.9	9.4	10.6	10.7	9.2		12.0	9.5	9.7
00301	DO	SATUR	PERCENT	93.0$	102.2$	93.8$	93.0	99.0		101.0	95.0	101.0
00310	BOD	5 DAY	MG/L				.1K	.4		.8	1.2	4.2
00400	PH		SU				7.20	7.40		7.10	7.10	7.30
00410	T ALK	CACO3	MG/L	34	39	39	34	38	38	34	30	52
00500	RESIDUE	TOTAL	MG/L	103	123	103	95	107	99	114	108	166
00530	RESIDUE	TOT NFLT	MC/L	13	20	11	13	13	6	16	14	21
00610	NH3+NH4-	N TOTAL	MG/L	.120	.200	.160	.190	.250	.010K	.010	.120	2.400
00612	UN-IONZD	NH3-N	MG/L				.0005$	.002$		.00002$	.0004$	.015$
00619	UN-IONZD	NH3-NH3	MG/L				.0006$	.003$		.00002$	.0005$	.018$
00620	NO3-N	TOTAL	MG/L	1.000	.710	.500	.800	.770	.400	.720	.650	,570
00650	T PO4	PO4	MG/L				.60	.40		.40	.50	5.40
00660	ORTHOPO4	PO4	MG/L	.10	1.68	.44	.33	.36	.39	.14	.31	4.20
00900	TOT HARD	CACO3	MG/L	44	33	32	31	34	33	30	32	40
00930	*SODIUM	NA,DISS	MG/L				4.40	6.20		4.20	5.10	9.60
00935	PTSSIUM	K,DISS	MG/L				1.20	1.40		.90	1.60	2.80
00940	CBLORIDE	TOTAL	MG/L	4	6	4	2	3	2	3	3	6
00945	SULFATE	SO4-TOT	MG/L	11	4	3	2	4	3	3	8	10
31505	TOT COLI	MPN CONF	/100ML				45K	60		7000	7000	45
31615	FEC COLI	MPNECMED	/100ML				45K	45K		2400	7000	45

/TYPA/AMBNT/STREAM

402358 243020000001
45 36 15.2 121 37 54.3 4
WEST FORK HOOD RIVER AT MOUTH
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105021 0000.100 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				65/07/27	66/09/06	67/04/11	67/07/05	67/07/05	67/09/26	68/04/24	68/06/25	68/08/21
INITIAL TIME					1245	1050	1100		1620	1315	1115	1240
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	16.0	14.0	5.0	13.5		14.0	7.5	13.0	12.0
00011	WATER	TEMP	FAHN	60. 8$	57.2$	41.08	56.39		57.29	45.59	55.49	53.69
00070	TURB	JKSN	JTU					10.0	5.0	2.0	13.0	6.0
00000	COLOR	PT-CO	UNITS					1	3	2	1	1
00095	CNDUCTVY	AT 25C	HICROMHO				45		51	39	43	48
00300	DO		MG/L	9.4	9.9	11.7	10.1		9.9	12.2	7.2	10.7
00301	DO	SATUR	PERCENT	94.0	95.0	91.0	96.0		95.0	101.0	68.0	99.0
00310	BOD	5 DAY	MG/L	1.0	.2	.9	.3		.0K	.a		.6
00400	PH		SU	7.30	7.30	7.10	7.10		7.00	7.30	7.50	7.50
00410	T ALK	CACO3	MG/L					17	27	lb	18	21
00500	RESIDUE	TOTAL	MG/L					61	71	55	45	59
00530	RESIDUE	TOT NFLT	MG/L					1.3	17	4	19	a
00610	NH3+NH4-	N TOTAL	MG/L					250	.120	.050	.230	.150
00612	UN-IONZD	NH3-N	MG/L						.002$	.0002$	.002$	.oola
00619	UN-IONZD	NH3-NH3	MG/L						.002$	.0002$	.002$	.001$
00620	NO3-N	TOTAL	MG/L					.010K	.060	.010	.030	.040
00660	ORTHOPO4	PO4	MG/L					.02	.05	.05	.01K	.01K
00900	TOT HARD	CAC03	MG/L					17	27	15	19	17
00940	CHLORIDE	TOTAL	MG/L					6	.5	2	2	1
00945	SULFATE	S04 -TOT	MG/L					3	2	1	4	2
31505	TOT COLI	MPN CONF	/100ML	23	230	23	60		23	23	23	23

INITIAL DATE				69/03/11	69/05/19	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10	71/03/23	71/06/21
INITIAL TIME				1145	1305	1050	1145	1050	1045	1130	1330	1255
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT		8.5	13.0	0.0	4.5	14.5	11.0	7.0	12.5
00011	WATER	TEMP	FAHN		47.39	55.49	46.49	40.19	58.19	51.89	44.69	54.59
00070	TURB	JKSN	JTU		3.0	2.0	.0	.0		2.0	1.0	1.0
00080	COLOR	PT-CO	UNITS		1	0	0	0		0	0	4
00095	CNDUCTVY	AT 25C	MICROMHO		38	56	47	36	36	54	38	29
00300	DO		MG/L		12.1	10.3	11.8	12.9	10.2	11.2	12.7	11.0
00301	DO	SATUR	PERCENT		103.0	97: 0	99.0	100.0	99.0	101.0	104.0	103.0
00310	BOD	5 DAY	MG/L		1.6	.4	.7	1.3	.6	.7	1.7	1.0
00400	PH		SU		6.90	7.30	6.90	7.40	7.30	7.30	6.90	7.10
00410	T ALK	CAC03	MG/L		15	22	17	lb		23	17	12

(SAMPLE CONTINUED ON NMT PAGE)

402358 243020000001
45 36 15.2 121 37 54.3 4
WEST FORK HOOD RIVER AT MOUTH
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105021 0000.100 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				69/03/11	69/05/19	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10	71/03/23	71/06/21
INITIAL TIME				1145	1305	1050	1145	1050	1045	1130	1330	1255
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00500	RESIDUE	TOTAL	MG/L		85	60	48	40		56	42	45
00530	RESIDUE	TOT NFLT	MG/L		14	10	1K	2		4	3	2
00610	NH3+NH4-	N TOTAL	MG/L		.100	.0005$	.010K	.050		.080	.010K	.030
00612	UN-IONZD	NH3-N	MG/L		.0001$		.00001$	.0001$		.0003$	.00001$	.00008$
00619	UN-IONZD	NH3-NH3	MG/L		.0002$	.0006$	.00002$	.0002$		.0004$	.00001$	.0001$
00620	NO3-N	TOTAL	MG/L		.050K	.030	020K	.050K		.050	.020K	.020K
00660	ORTHOPO4	PO4	MG/L		.01	.02	.01	.03		.01	.01K	.04
00900	TOT HARD	CACO3	MG/L		16	15	19	12		16	12	10
00940	CHLORIDE	TOTAL	MG/L		6	1	.6	2		2	1	.8
00945	SULFATE	SO4-TOT	MG/L		.9	2	4	1		1	.1K	.5K
31505	TOT COLI	MPN CONF	/100ML		240	45K	60	62	23	45K	60	45K
31615	FEC COLI	MPNECMED	/100ML	45K		45K		6		45K	45K	45K

INITIAL DATE				71/06/22	71/09/13	72/02/01	72/07/03	72/10/03	73/02/06	73/07/17	73/10/08	74/03/25
INITIAL TIME				1045	1310	1355	1210	1200	1610	1300	1235	1310
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT		12.0	1.0	12.5	9.5	3.0	18.0	7.5	6.0
00011	WATER	TEMP	FAHN		53.6$	33.8$	54.5$	49.1$	37.4$	64.4$	45.5$	42.8$
00070	TURB	JKSN	JTU		1.0	11.0	3.0	1.0	4.0	1.0	.0	1.0
00080	COLOR	PT-CO	UNITS			3	0	5	2	5	0	0
00094	CNDUCTVY	FIELD	MICROMHO									45
00095	CNDUCTVY	AT 25C	MICROMHO		44	462	49	59	50			45
00300	DO		MG/L		10.9	13.9	10.9	11.7	13.1	10.2	12.1	12.8
00301	DO	SATUR	PERCENT		101.0	99.0	102.0	102.0	97.0$	107.4$	99.2$	105.0
00310	BOD	5 DAY	MG/L		.7	1.7	1.1	1.0				1.1
00400	PH		SU		7.30	7.00	7.00	7.40				7.20
00410	T ALK	CACO3	MG/L		20	16	11	21	14	18	18	14
00500	RESIDUE	TOTAL	MG/L		35	42	50	52	53	39	50	35
00530	RESIDUE	TOT NFLT	MG/L		2	4	6	1	2	8	0	1
00610	NH3+NH4-	N TOTAL	MG/L		.020	.020	.230	.010K	.260	.040	.030	.060
00612	UN-IONZD	NH3-N	MG/L		.00009$	00002$	.0005$	.00004$				.0001$
00619	UN-IONZD	NH3-NH3	MG/L		.0001$	.00002$	.0006$	.00005$				.0002$
00620	NO3-N	TOTAL	MG/L		.050K	.090	.050	.020	.050	.020	.010K	.010
00625	TOT KJEL	N	MG/L						.300			
00650	T PO4	PO4	MG/L						.30			.10
00660	ORTHOPO4	PO4	MG/L		.03	.03	.01K	.01K	.01K	.04	.03	.04
00900	TOT HARD	CACO3	MG/L		17	15	14	17	15	14	14	10
00930	SODIUM	NA,DISS	MG/L				2.50	3.00	2.80			2.10

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402358 243020000001
45 36 15.2 121 37 54.3 4
WEST FORK HOOD RIVER AT MOUTH
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105021 0000.100 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			71/06/22	71/09/13	72/02/01	72/07/03	72/10/03	73/02/06	73/07/17	73/10/08	74/03/25
INITIAL TIME			1045	1310	1355	1210	1200	1610	1300	1235	1310
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00935 PTSSIUM	K,DISS	MG/L				1.00	.50	.50			.60
00940 CHLORIDE	TOTAL	MG/L		.8	2	2	.8	1	2	2	.8
00945 SULFATE	SO4-TOT	MG/L		.8	.8	.1K	.01K	3	.8	.1K	.7
31505 TOT COLI	MPN CONF	/100ML		45K	45K	60	230				60
31615 FEC COLI	MPNECMED	/100ML	6	45K		45K	45K				45K

INITIAL DATE			74/08/06	74/10/29	75/03/25	75/07/14	75/09/08
INITIAL TIME			1515	1430	1320	1355	1400
MEDIUM			WATER	WATER	WATER	WATER	WATER
00008 LAB	IDENT.	NUMBER				19	
00010 WATER	TEMP	CENT	14.5		5.0	12.0	14.0
00011 WATER	TEMP	FAHN	58.1$		41.0$	53.6$	57.2$
00070 TURB	JKSN	JTU	4.0	2.0	1.0K	30.0	1.0K
00080 COLOR	PT-CO	UNITS	15	1K	5	20	2K
00094 CNDUCTVY	FIELD	MICROMHO	49		45		55
00095 CNDUCTVY	AT 25C	MICROMHO	50		45	77	59
00300 DO		MG/L	10.5		13.2	10.5	10.8
00301 DO	SATUR	PERCENT	104.0		106.0	99.0	106.0
00310 BOD	5 DAY	MG/L	.4		.7	.8	1.3
00400 PH		SU	7.30		7.10	7.00	7.50
00410 T ALK	CACO3	MG/L	15	22	17	18	19
00500 RESIDUE	TOTAL	MG/L	47	61	39	17	43
00530 RESIDUE	TOT NFLT	MG/L	5	2	1	.270	.062
00610 NH3+NH4-	N TOTAL	MG/L	.020	.010K	.010K		
00612 UN-IONZD	NH3-N	MG/L	.0001$		.00002$	.0006$	.0005$
00619 UN-IONZD	NH3-NH3	MG/L	.0001$		.00002$	.0007$	.0006$
00620 103-N	TOTAL	MG/L	.030	.070	.040	.090	.040
00650 T PO4	PO4	MG/L	.90		.10	.60	.20
00660 ORTHOPO4	PO4	MG/L	.03	.03	.04	.06	.02
00900 TOT HARD	CACO3	MG/L	13	17	15	15	16
00930 SODIUM	NA,DISS	MG/L	3.00		2.30	4.20	2.80
00935 PTSSIUM	K,DISS	MG/L	.70		.60	1.90	.80
00940 CHLORIDE	TOTAL	MG/L	2	1	2	3	2
00945 SULFATE	SO4-TOT	MG/L	2	.5	.6	6	2
31505 TOT COLI	MPN CONF	/100ML	45K		45	60	60
31615 FEC COLI	MPNECMED	/100ML	45K		45	45K	45

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402304 243025000060
45 34 16.0 121 37 01.9 4
EAST FK HOOD R AT PARKDALE RD BR
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
/TYPA/AMBNT/STREAM COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105023 0000.530 OFF
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL TIME				69/05/19	69/08/25	69/11/03	70/04/27	70/06/22	70/09/10	71/03/23	71/09/13	72/02/01
MEDIUM				1250 WATER	1010 WATER	1205 WATER	1020 WATER	1105 WATER	1100 WATER	1245 WATER	1220 WATER	1330 WATER
00010	WATER	TEMP	CENT		13.0	9.5	4.0	14.0	11.0	7.0	12.0	2.0
00011	WATER	TEMP	FAHN		55.4$	49.1$	39.2$	57.2$	51.8$	44.65	53.68	35.6$
00070	TURB	JKSN	JTU	5.0	13.0	4.0	1.0	8.0	30.0	4.0	4.0	33.0
00080	COLOR	PT-CO	UNITS	0	1	1	1	0	0	2		5
00095	CNDUCTVY	AT 25C	MICROMHO		60		60	45	78	62	60	700
00300	DO		MG/L		10.0	11.4	12.8	10.1	10.9	12.1	10.6	13.2
00301	DO	SATUR	PERCENT		94.0	100.0	98.0	97.0	98.0	99.0	98.0	96.0
00310	BOD	5 DAY	MG/L		.1	.6	1.3	.7	1.0	1.7	.7	1.2
00400	PH		SU		7.30	7.40	7.50	7.30	7.30	7.10	7.30	7.10
00410	T ALK	CACO3	MG/L	16	25	29	25	17	29	24	25	21
00500	RESIDUE	TOTAL	MG/L	75	91	88	48	53	127	84	69	73
00530	RESIDUE	TOT NFLT	MG/L	16	27	4	3	15	44	8	8	6
00610	NH3+NH4-	N TOTAL	MG/L	.140	.050	.090	.040	.010K	.210	.010K	.050	.030
00612	UN-IONZD	NH3-N	MG/L		.0002$	.0004$	.0001$	.00005$	.0008$	.00002$	.0002$	00004$
00619	UN-IONZD	NH3-NH3	MG/L		.0003$	.0005$	.0002$	.00006$	.001$	.00002$	.0003$	00004$
00620	NO3-N	TOTAL	MG/L	.050K	.070	.100	.090	.070	.120	.270	.050K	.270
00660	ORTHOPO4	PO4	MG/L	.01K	.04	.02	.01K	.01			.05	.03
00900	TOT HARD	CACO3	MG/L	14	19	26	19	12	'22 07	.02	19	18
00940	CHLORIDE	TOTAL	MG/L	11	2	2	2	2	2	2	2	1
00945	SULFATE	SO4-TOT	MG/L	3	5	3	3	.5K	3	3	4	3
31505	TOT COLI	MPN CONF	/100ML		7000	230	130	700	2400	2400	7000	2400

INITIAL DATE				72/07/03	72/10/03	73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25
INITIAL TIME				1250	1130	1420	1230	1200	1240	1440	1515	1400
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	12.0	9.0	3.0	18.5		6.0	14.0		5.5
00011	WATER	TEMP	FAHN	53.6$	48.2$	37.4$	65.35	4:::s	42.88	57.25		41.9$
00070	TURB	JKSN	JTU	5.0	3.0	8.0	7.0	3.0	2.0	3.0	2.0	3.0
00080	COLOR	PT-CO	UNITS	0	5	2	5	0	5	5	5	15
00094	CNDUCTVY	FIELD	MICROMHO						73	51		70
00095	CNDUCTVY	AT 25C	MICROMHO	53	76	83			71	54		72
00300	DO		MG/L	10.5	11.3	12.7	9.6	11.6	12.0	10.1		12.7
00301	DO	SATUR	PERCENT	97.0	97.0	94.1$	101.1$	95.1$	99.0	100.0		105.0
00310	BOD	5 DAY	MG/L	.6	.8				.8	.3		.9
00400	PH		SU	7.20	7.60				7.40	7.50		7.10

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

402304 243025000060
45 34 16.0 121 37 01.9 4
EAST FK HOOD R AT PARKDALE RD BR
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105023 0000.530 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			72/07/03	72/10/03	73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25
INITIAL TIME			1250	1130	1420	1230	1200	1240	1440	1515	1400
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00410 T ALK	CACO3	MG/L	15	25	19	23	27	21	16	26	24
00500 RESIDUE	TOTAL	MG/L	60	76	76	68	83	73	57	74	78
00530 RESIDUE	TOT NFLT	MG/L	8	4	10	10	8	3	6	4	8
00610 NH3+NH4-	N TOTAL	MG/L	.310	.010K	.300	.040	.050	.090	.010K	.010K	.010K
00612 UN-IONZD	NH3-N	MG/L	.001$	.00007$				.0003$	.00008$		.00002$
00619 UN-IONZD	NH3-NH3	MG/L	.001$	.00008$				.0004$	.00010$		.00002$
00620 NO3-N	TOTAL	MG/L	.280	.040	.250	.090	.070	.160	.060	.060	.280
00625 TOT KJEL	N	MG/L			.300						
00650 T PO4	PO4	MG/L			.10			.20	.10		.20
00660 ORTHOPO4	PO4	MG/L	.01	.01	.05	.15	.03	.07	.02	.03	.05
00900 TOT HARD	CACO3	MG/L	13	20	22	19	23	18	14	19	20
00930 SODIUM	NA,DISS	MG/L	2.10	4.80	4.50			3.90	3.00		4.10
00935 PTSSIUM	K,DISS	MG/L	1.00	1.50	2.00			1.30	.70		.80
00940 CHLORIDE	TOTAL	MG/L	2	1	2	4	3	2	.9	1	2
00945 SULFATE	SO4-TOT	MG/L	.3	2	8	2	1	2	2	2	2
31505 TOT COLI	MPN CONF	/100ML	230	1300				230	2400		620
31615 PEC COLI	MPNECMED	/100ML	45K	45K				230	230		230

INITIAL DATE			75/07/14	75/09/08	
INITIAL TIME			1415	1445	
MEDIUM			WATER	WATER	
00010 WATER	TEMP	CENT	11.0	15.0	
00011 WATER	TEMP	FAHN	51.8$	59.0$	
00070 TURB	JKSN	JTU	4.0	2.0	
00080 COLOR	PT-CO	UNITS	10	5	
00094 CNDUCTVY	FIELD	MICROMHO		70	
00095 CNDUCTVY	AT 25C	MICROMHO	61	78	
00300 DO		MG/L	10.2	9.9	
00301 DO	SATUR	PERCENT	95.0	99.0	
00310 BOD	5 DAY	MG/L	1.2	.6	
00400 PH		SU	7.00	7.50	
00410 T ALK	CACO3	MG/L	18	23	
00500 RESIDUE	TOTAL	MG/L	68	65	
00530 RESIDUE	TOT NFLT	MG/L	12	6	
00610 NH3+NH4-	N TOTAL	MG/L	.140	.110	
00612 UN-IONZD	NH3-N	MG/L	.0003$	.0009$	
00619 UN-IONZD	NH3-NH3	MG/L	.0003$	.001$	
00620 NO3-N	TOTAL	MG/L	.050	.060	

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28

PGM=ALLPARM

402304 243025000060
45 34 16.0 121 37 01.9 4
EAST FK HOOD R AT PARKDALE RD BR
41065 OREGON WASCO
PACIFIC NORTHWEST 131000
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105023 0000.530 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			75/07/14	75/09/08
	INITIAL TIME			1415	1445
	MEDIUM			WATER	WATER
00650	T PO4	PO4	MG/L	.30	.30
00660	ORTHOPO4	PO4	MG/L	.04	.02
00900	TOT HARD	CACO3	MG/L	14	19
00930	SODIUM	NA,DISS	MG/L	3.30	3.80
00935	PTSSIUM	K,DISS	MG/L	1.10	1.40
00940	CHLORIDE	TOTAL	MG/L	2	2
00945	SULFATE	SO4-TOT	MG/L	2	4
31505	TOT COLI	MPN CONF	/100ML	2400	7000
31615	FEC COLI	MPNECMED	/100ML	2400	230

STORET RETRIEVAL DATE 90/06/28 PGM=ALLPARM

404091 243025000720

45 29 59.0 121 33 41.0 4

E FK HOOD R @ BASELINE RD BRIDGE

41027 OREGON HOOD RIVER

PACIFIC NORTHWEST 131091

/TYPA/AMBNT/STREAM

COLUMBIA RIVER BASIN BELOW YAKIMA RIVER

21400000 HQ 17070105023 0007.540 OFF

0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25	75/07/14
INITIAL TIME				1230	1150	1135	1215	1340	1545	1500	1500
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	2.0	12.0	5.0	5.0	11.0		5.0	9.0
00011	WATER	TEMP	FAHN	35.68	53.65	41.0$	41.0$	51.8$		41.0$	48.2$
00070	TURB	JKSN	JTU		5.0	2.0	1.0	2.0	2.0		3.0
00080	COLOR	PT-CO	UNITS								5
00094	CNDUCTVY	FIELD	MICROMHO				75	49		68	
00095	CNDUCTVY	AT 25C	MICROMHO								57
00300	DO		MG/L	12.7	10.4	11.8	11.8	10.6		12.3	10.5
00301	DO	SATUR	PERCENT	92.0$	96.3$	92.2$	99.0	103.0		103.0	98.0
00310	BOD	5 DAY	MG/L				.5	.3		.4	.4
00400	PH		SU				7.30	7.50		7.10	7.00
00410	T ALK	CACO3	MG/L								14
00500	RESIDUE	TOTAL	MG/L								61
00530	RESIDUE	TOT NFLT	MG/L								10
00610	NH3+NH4-	N TOTAL	MG/L								.170
00612	UN-IONZD	NH3-N	MG/L								.0003$
00619	UN-IONZD	NH3-NH3	MG/L								.0004$
00620	NO3-N	TOTAL	MG/L								.040
00650	T PO4	PO4	MG/L								.10
00660	ORTHOPO4	PO4	MG/L								.03
00900	TOT HARD	CACO3	MG/L								12
00930	SODIUM	NA,DISS	MG/L								2.70
00935	PTSSIUM	K,DISS	MG/L								.80
00940	CHLORIDE	TOTAL	MG/L								2
00945	SULFATE	SO4-TOT	MG/L								2
31505	TOT COLI	MPN CONF	/100ML				230	45K		45	45
31615	FEC COLI	MPNECMED	/100ML				60	45K		45	45

/TYPA/AMBNT/STREAM

404092 243025001970
45 20 17.8 121 34 15.2 4
E FK HOOD R @ HWY 35 BRIDGE
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 17070105
0000 FEET DEPTH

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/03/25	75/07/14
INITIAL TIME				2000	1130	1110	1145	1300	1600	1525	1520
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	1.0	9.0	2.5	3.0	8.5		3.0	6.0
00011	WATER	TEMP	FAHN	33.8$	48.2$	36.5$	37.4$	47.3$		37.4$	42.8$
00070	TURB	JKSN	JTU	1.0	7.0	1.0	1.0	4.0	2.0	1.0	3.0
00080	COLOR	PT-CO	UNITS	0	5	0	5	5	1K	5	2K
00094	CNDUCTVY	FIELD	MICROMHO				78	43		68	
00095	CNDUCTVY	AT 25C	MICROMHO				73	44		66	47
00300	DO		MG/L	12.4	10.5	11.8	11.8	10.7		12.0	10.6
00301	DO	SATUR	PERCENT	87.3$	90.5$	85.5$	100.0	104.0		102.0	97.0
00310	BOD	5 DAY	MG/L				1.6	.5		.3	.5
00400	PH		SU				7.30	7.50		7.10	6.50
00410	T ALK	CACO3	MG/L	17	15	26	16	11	27	22	11
00500	RESIDUE	TOTAL	MG/L	58	106	91	72	56	70	62	53
00530	RESIDUE	TOT NFLT	MG/L	2	22	5	1	13	5	2	9
00610	NH3+NH4-	N TOTAL	MG/L	.100	.080	.060	.120	.010K	.100	.010	.060
00612	UN-IONZD	NH3-N	MG/L				.0003$	.00005$		.00001$	.00003$
00619	UN-IONZD	NH3-NH3	MG/L				.0003$	.00006$		.00002$	.00003$
00620	NO3-N	TOTAL	MG/L	.060	.040	.010K	.030	.050	.030	.040	.040
00650	T PO4	PO4	MG/L				.20	.40		.10	.10
00660	ORTHOPO4	PO4	MG/L	.01K	.17	.02	.07	.01	.01	.04	.03
00900	TOT HARD	CACO3	MG/L	19	13	23	17	9	22	19	11
00930	SODIUM	NA,DISS	MG/L				3.50	2.40		3.80	2.10
00935	PTSSIUM	K,DISS	MG/L				1.20	.40		.80	.60
00940	CHLORIDE	TOTAL	MG/L	2	3	2	5	2	1	3	2
00945	SULFATE	SO4-TOT	MG/L	5	2	3	2	3	3	2	3
31505	TOT COLI	MPN CONF	/100ML				130	130		45	45K
31615	FEC COLI	MPNECMED	/100ML				45K	45K		45	45K

404093 243025100010
45 34 15.2 121 37 06.7 4
TROUT CREEK @ MOUTH
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105023 0000.530 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

INITIAL DATE				73/02/06	73/07/17	73/10/08	74/03/25	74/08/06	74/10/29	75/01/21	75/03/25	75/06/24
INITIAL TIME				1400	1215	1150	1230	1430	1455	1045	1405	1400
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	4.0	11.0	7.0	7.0	16.0			6.5	
00011	WATER	TEMP	FAHN	39.2$	51.8$	44.6$	44.6$	60.8$			43.7$	
00070	TURB	JKSN	JTU	4.0	3.0	2.0	1.0	3.0	2.0	7.0	2.0	
00080	COLOR	PT-CO	UNITS	2	5	5	5	5	10		15	
00094	CNDUCTVY	FIELD	MICROMHO				77	83			70	
00095	CNDUCTVY	AT 25C	MICROMHO				78	90			73	230
00300	DO		MG/L	12.5	9.6	11.4	11.8	9.5			12.2	
00301	DO	SATUR	PERCENT	95.4$	86.5$	93.4$	102.0	100.0			105.0	
00310	BOD	5 DAY	MG/L				.6	.5			.7	
00400	PH		SU				7.30	7.50			7.10	
00410	T ALK	CACO3	MG/L	18	32	29	19	26	27	106	21	
00500	RESIDUE	TOTAL	MG/L	77	91	83	71	84	83	309	75	
00530	RESIDUE	TOT NFLT	MG/L	6	7	1	2	5	4	24	4	
00610	NH3+NH4-	N TOTAL	MG/L	070	080	.180	.100	.010	.020	.080	.010	
00612	UN-IONZD	NH3-N	MG/L				.0003$	.00009$			.00002$	
00619	UN-IONZD	NH3-NH3	MG/L				.0004$	.0001$			.00002$	
00620	NO3-N	TOTAL	MG/L	.960	.690	.450	.990	.600	.200	.640	1.010	
00650	T PO4	PO4	MG/L				.20	.10			.20	.30
00660	ORTHOPO4	PO4	MG/L	.02	.51	.19	.09	.09	.15	.16	.07	
00900	TOT HARD	CACO3	MG/L	22	23	23	19	21	20	103	18	
00930	SODIUM	NA,DISS	MG/L				4.00	5.80			4.10	4.30
00935	PTSSIUM	K,DISS	MG/L				1.20	1.20			1.00	1.60
00940	CHLORIDE	TOTAL	MG/L	3	4	2	4	2	2	7	2	
00945	SULFATE	SO4-TOT	MG/L	5	3	3	2	2	2	26	2	
31505	TOT COLI	MPN CONF	/100ML				620	620			500	
31615	FEC COLI	MPNECMED	/100ML				45K	46			60	

INITIAL DATE				75/07/14	75/09/08
INITIAL TIME				1420	1500
MEDIUM				WATER	WATER
00010	WATER	TEMP	CENT	13.0	13.0
00011	WATER	TEMP	FAHN	55.4$	55.4$
00070	TURB	JKSN	JTU	2.0	2.0
00080	COLOR	PT-CO	UNITS	5	5
00094	CNDUCTVY	FIELD	MICROMHO		85

(SAMPLE CONTINUED ON NEXT PAGE)

STORET RETRIEVAL DATE 90/06/28

PGM=ALLPARM
404093 243025100010
45 34 15.2 121 37 06.7 4
TROUT CREEK @ MOUTH
41027 OREGON HOOD RIVER
PACIFIC NORTHWEST 131091
COLUMBIA RIVER BASIN BELOW YAKIMA RIVER
21400000 HQ 17070105023 0000.530 OFF
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATA LOCKED FOR 090 DAYS.

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			75/07/14	75/09/08
	INITIAL TIME			1420	1500
	MEDIUM			WATER	WATER
00095	CNDUCTVY	AT 25C	MICROMHO	83	86
00300	DO		MG/L	9.9	10.2
00301	DO	SATUR	PERCENT	97.0	100.0
00310	BOD	5 DAY	MG/L	.9	.8
00400	PH		SU	7.00	7.50
00410	T ALK	CACO3	MG/L	23	25
00500	RESIDUE	TOTAL	MG/L	87	88
00530	RESIDUE	TOT NFLT	MG/L	9	6
00610	NH3+NH4-	N TOTAL	MG/L	.040	.110
00612	UN-IONZD	NH3-N	MG/L	.00009$	.0008$
00619	UN-IONZD	NH3-NH3	MG/L	.0001$	.0010$
00620	NO3-N	TOTAL	MG/L	.420	.380
00650	T PO4	PO4	MG/L	.30	.50
00660	ORTHOPO4	PO4	MG/L	.18	.16
00900	TOT HARD	CACO3	MG/L	20	22
00930	SODIUM	NA,DISS	MG/L	4.60	4.80
00935	PTSSIUM	K,DISS	MG/L	1.20	1.40
00940	CHLORIDE	TOTAL	MG/L	3	2
00945	SULFATE	SO4-TOT	MG/L	2	3
31505	TOT COLI	MPN CONF	/100ML	230	2400
31615	FEC COLI	MPNECMED	/100ML	60	45

THAT'S ALL FOLKS

APPENDIX I

GENETIC RISK ASSESSMENT

PREPARED BY STEVE CRAMER

TABLE OF CONTENTS

Page

List of Figures i

List of Tables.. iii

Introduction 1

Classification and Types of Genetic Risk 5
- Risk Type 1 : Extinction 5
- Risk Type 2 : Loss of Within Population Variability 6
  - ***Genetic Drift..*** 6
  - ***Founder Effects*** 7
- Risk Type 3 : Loss of Population Identity 8
- Risk Type 4 : Domestication Selection 10

How to Minimize Genetic Risk 10
- Harvest Management 11
- Brood Source 11
- Breeding Practices 12
- Rearing and Release Practices 12
- Monitoring and Evaluation Practices 13

Characterization of Target Populations 13
- Genetic Basis of Life-History Traits 13
- Summer Steelhead 15
  - ***Indigenous Life History*** 18
  - ***Genetic Information*** 24
  - ***Hatchery Influences on the Indigenous Stock*** 25
  - ***Abundance Trends*** 39
- Winter Steelhead 39
  - ***Indigenous Life History*** 41
  - ***Genetic Information*** 51
  - ***Hatchery Influences on the Indigenous Stock*** 51
  - ***Abundance Trends*** 54
- Spring Chinook 56
  - ***Indigenous Life History*** 56
  - ***Donor Stock Life History*** 57
  - ***Genetic Information*** 61

Stock Specific Risk Analysis **62**
Summer Steelhead 62
Winter Steelhead 68
Spring Chinook 71
Fall Chinook (Non Target) 77
Coho Salmon (Non Target) 77
Cutthroat Trout (Non Target) 78
Bull Trout (Non Target) 78
Mountain Whitefish (Non Target) 78

Recommendations **79**

Monitoring and Evaluation **80**
Uncertainties 81
Summer Steelhead ***81***
Winter Steelhead 81
Spring Chinook ***82***
Monitoring Activities 82
Summer and Winter Steelhead ***82***
Spring Chinook ***83***
Non-Target Species ***84***

REFERENCES **85**

APPENDICE **93**

List of Figures

Figure 1. Relative (to local fish) recovery rate for transferred hatchery coho salmon versus distance transferred. Rates are based on recoveries in the fisheries and at the hatchery. Releases from Big Creek Hatchery, Oregon (diamonds), were not used in fitting the curve.(From Reisenbichlerl988) 9
Figure 2. Return timing to Cowlitz Hatchery of F1 generation coho from parents selected for specific return times, indicated at right (from Cramer et al. 1991) 16
Figure 3. Map of Hood River Basin and sampling locations 17
Figure 4. Timing of steelhead passage at Powerdale Dam (km 7) during 1963-71, and of angler catch estimated from punch cards during 1956-1970 (ODFW data) 19
Figure 5. Timing of steelhead passage at Punchbowl Falls (km 20) during 1962-1964. 20
Figure 6. Timing of passage at Powerdale Dam (km 7) for summer steelhead compared to maturing steelhead and all steelhead combined. 22
Figure 7. Number of hatchery summer steelhead released annually in the Hood River Basin as smolts (< 15 fish/lb; ODFW data) 27
Figure 8. Migration timing at Powerdale Dam of summer steelhead taken for hatchery brood during 1962-1965, compared to all steelhead combined in the same years 28
Figure 9. Migration timing at Powerdale Dam of marked summer steelhead from Hood River stock during 1962-1968 and Washougal stock during 1969-71 30
Figure 10. Migration timing at Powerdale Dam for all steelhead during 1962-1964 compared to 1969-1971. 31
Figure 11. Time of angler catch of steelhead in the mainstem Hood River during 1987-1989, estimated from angler punch cards (ODFW data) 32
Figure 12. Timing and abundance of steelhead caught by anglers in Hood River during 1956-1970 compared to 1986-1989. 33
Figure 13. Migration timing of Skamania stock summer steelhead in several Columbia River tributaries. Data sources: Sandy River - counts at Marmot Dam, 1978-1984 from Howell et al.(1984); Clackamas River - counts at North Fork Dam, 1972-1983 from Howell et al. (1984);Skamania Hatchery - counts at entry, 1979-1983 from Howell et al. (1984);Kalama Falls - counts at hatchery for 2-salt fish, 1976-1983 form Leider et al.(1986) 34
Figure 14. Mean of aperiodic turbidity measurements in the Hood River near Powerdale Dam during 1983-88 (data from U.S.Environmental Protection Agency as reported in Hood River Subbasin Plan). 35

Figure 15. Ratio of hatchery to wild steelhead in Hood River and their temporal abundance as determined from scales obtained through an angler volunteer program during 1984-1990 (data through personal communication, Ken Kenaston, ODFW, Corvallis) 37
Figure 16. Mean spawning time of Skamania stock summer steelhead at South Santiam Hatchery during 1986-1990 (ODFW data). 38
Figure 17. Angler catch of steelhead in the Hood River during April-October compared to November-March during 1956-1989 as estimated from angler punch cards (ODFW data). 40
Figure 18. Timing of adult winter steelhead passage at. Powerdale Dam in 1955 (Haxton 1965) and at North Fork Dam, Clackamas River, during 1956- 1967 (Howell et al.1984). 42
Figure 19. Counts of adult steelhead passing Bonneville Dam during 1938-1950. These were the only years fish were counted during winter (USACE 1989). 44
Figure 20. Total adult steelhead counted over Bonneville Dam during December through February each year, 1938-1950 (USACE 1989). 45
Figure 21. Timing of capture of downstream migrant steelhead in diversion bypass traps on the East Fork Hood River and Neal Creek during 1961-1963 (Oregon State Game Commission 1963) 49
Figure 22. Time of angler catch of steelhead in the Hood River Basin during 1980, estimated from angler punch cards (ODFW data) 53
Figure 23. Total counts of summer steelhead and maturing steelhead passing Powerdale Dam during 1963-1969 (ODFW data) 55
Figure 24. Mean time of spawning for Round Butte, Carson and Klickitat spring chinook during 1986-1990 (data from ODFW, WDF, and USFWS f ~ e s) 5 8
Figure 25. Monthly mean temperatures of streams where spring chinook spawn in the Warm Springs River drainage and in Hood River. Data sources: Warm Springs River locations hatchery form Oregon Water Resources Department; Hood River locations from CTWIR 73
Figure 26. Monthly mean flows in Hood River and Warm Springs River during 1988-1990 (USGS data) 74

List of Tables

Table 1. Isozyme gene frequencies and sample sizes (#) as determined by electrophoresis from Skamania (Willamette) hatchery summer steelhead stocks. Numbers at top of each column are relative mobilities for each allele present in the enzyme system. Minus signs indicate cathodal migration (Schreck et al. 1984) 26

Table 2. Weekly temperatures (F) obtained with minimum-maximum thermometers from five Hood Basin streams in 1963 (from Oregon State Game Commission 1963) 50

Table 3. Percent age composition of hatchery spring chinook salmon that returned to Round Butte Hatchery, 1977-82 broods 60

Table 4. Percent age composition of hatchery and wild spring chinook salmon in the Warm Springs River, 1978-80 broods 60

NORTHEAST OREGON SALMON
and
STEELHEAD PRODUCTION FACILITIES

GENETIC RISK ASSESSMENT
of the
HOOD RIVER COMPONENT

Introduction

This report assesses the genetic risks associated with enhancing summer steeihead, winter steelbead and spring chinook in the Hood River basin. The Northwest Power Planning Council's (NPPC) Columbia River Fish and Wildlife Program for 1987 authorizes the planning, design, construction, operation, maintenance and evaluation of artificial production facilities to raise chinook salmon and steelhead for enhancement in the Hood, Umatilla, Walla Walla, Grande Ronde, and Imnaha rivers and elsewhere. These specific enhancement projects are collectively referred to as the Northeast Oregon Hatchery Program (NEOH). Enhancement of these populations is a part of the strategic plan to achieve the Program goal of doubling the adult run sizes in the Columbia Basin. Planning for the NEOH is now at the operational level, and the genetic risks reported here are an assessment of the specific operational plans presented in the Master Plan for the Hood River Component of the NEOH.

It was apparent to the conservation agencies participating in NPPC's planning process that conservation of the genetic resources in each fish stock was an important aspect of achieving sustained increases in the productivity of Columbia basin salmonids. Therefore, the NPPC established a policy that a Genetic Risk Assessment (GRA) be completed in planning for any production project under the Council's purview (Columbia River Basin Fish and Wildlife Program, Section 204, paragraph b). The purpose of the GRA is to

insure that due consideration has been given to production strategies such that genetic integrity of existing fish populations is not jeopardized. This document is presented to fulfill that requirement for the Hood River portion of NEOH (NEOH-Hood River).

This Genetic Risk Assessment is the beginning of a process to insure that no avoidable and irreversible losses of genetic diversity occur as the result of this enhancement project. Planners and managers have recognized that many uncertainties exist regarding the genetic resources of any given population and that population's ability to respond to environmental and manmade perturbations. Therefore, this assessment identifies these uncertainties for the affected populations and identifies monitoring and evaluation activities necessary to enable adaptive management of the enhancement project and the fisheries it will affect. Thus, in the words of Allendorf et al.(1990)," we are primarily concerned here that a population be able to successfully reproduce without significant loss of genetic material for a few generations while more detailed evaluations are made."

This GRA is affected by several agency policies and planning documents. The NPPC has published, "Principles for Genetic Conservation and Production Quality" (Riggs 1990)(hereafter referred to as "PRINCIPLES"). A capsulization of key points from "PRINCIPLES", along with additional genetic considerations were included in the Integrated System Plan (Columbia Basin Fish and Wildlife Authority 1990). The Oregon Department of Fish and Wildlife (ODFW) has a Wild Fish Management Policy that provides several specific guidelines for enhancement projects.

The Integrated System Plan identifies a conservation goal and establishes a framework for planning and implementation of production activities in the Columbia River Basin. The goal is:

> **"To maintain genetic resources of salmon and steelhead in native, naturalized, and artificially propagated populations with no avoidable and irreversible losses of genetic diversity resulting from management interventions or inactions."**

"PRINCIPLES" further lists three broad production approaches that can be applied to achieve this goal. These are the same three categories established in the Integrated System

Plan as genetic opportunities among which fisheries managers can choose for production planning. Because viable wild populations of several salmonid species exist in the Hood River Basin, planning for NEOH-Hood River is proceeding under "Production Approach 2", which calls for minimizing genetic risks to natural populations in the use of artificial propagation.

Management of wild fish in Oregon is further guided by the ODFW Wild Fish Management Policy, which defines a wild fish as a "naturally spawned fish belonging to an indigenous population". The Policy implies that to be considered viable, a wild population must have 300 spawners. The Policy sets principles intended to limit 1) interbreeding of hatchery and wild fish, and 2) increases in competition, predation, and disease among wild fish as a result of hatchery programs. The Policy allows the following options for supplementation of wild populations: (a) No planting, (b) plant sterile fish, (c) use wild brood and limit straying to 50% of the natural spawners, (d) use a reproductively isolated stock with no more than 10% overlap of strays with wild fish, (e) limit straying of dissimilar stocks to 10% of wild spawners. The Policy specifies that "genetically similar" means, (1) only wild fish are used for brood, (2) wild brood are incorporated every generation, (3) the brood taken each year are representatively sampled to avoid genetic change. The Policy states ODFW opposes actions that would, "cause a population to experience a decline in abundance that if continued for an additional 5 years would likely reduce the number of spawners to 300 fish. In addition, where a population has been depressed to a stable level of 300 or fewer spawners, the Department shall support and advocate actions to correct the cause of such population decrease." The Wild Fish Policy calls for a list of wild populations. Populations currently listed that may be influenced by NEOH-Hood River Component are cutthroat and rainbow in Hood River up to the West Fork, in the West and East Forks, fall chinook in the mainstem, coho throughout the basin, and bull trout in the mainstem.

Finally, the Hood River Master Plan and GRA are guided by the management goals established in the Hood River Subbasin Plan. These goals are:

(1) ***The rehabilitation program will be consistent with tribal treaty fishing rights, U.S. Canada-Pacific Salmon Treaty and columbia River Management Plant harvest and production agreements, and other applicable laws and regulations.***

(2) ***Re-build naturally sustaining spring chinook, summer and winter steelhead run in the Hood River drainage.***

(3) ***Provide sustainable Indian and non-Indian harvest of salmon and steelhead.***

(4) ***Maintain the genetic character of naturally producing populations of salmonids native to and reestablished in the Hood River drainage.***

(5) ***Contribute to tributary, Columbia River and ocean tribal and non-tribal fisheries, and the NPPC's interim goal of doubling salmon runs.***

(6) ***Achieve the adult return goals to the Hood River identified in the following table.***

	Run Size Goals		
	Natural	Hatchery	Total
Spring Chinook	400	1,300	1,700
Summer Steelhead	1,200	6,800	8,000
Winter Steelhead	1,200	3,800	5,000

Classification and Types of Genetic Risk

Introduction of Classifications

The Integrated System Plan (Columbia Basin Fish and Wildlife Authority 1990) specifies three types of genetic risk that are to be assessed in the GRA. These are:

(1) Loss of the population as a whole (extinction)

(2) Loss of diversity or genetic variation within the population (may occur through genetic drift or founder effects occurring for a variety of reasons).

(3) Loss of, or changes in, population identity including loss of diversity among populations, characteristics of adaptation within populations, or of other evolved features of genetic organization (may occur through interbreeding or inadvertent effects of artificial selection).

Busack (1990) distinguished a fourth type of risk (previously grouped with type 3) that will also be distinguished here:

(4) Changes in genetic composition as an adaptation to survival in a hatchery environment (domestication selection).

Risk Type 1 : Extinction

This is the risk of losing an entire population and the genetic diversity it carries. This is the most extreme of genetic risks and it would result in the irretrievable loss of all genes from a' population. Evidence continues to mount as new methods of measurement are developed and new data are gathered that all populations are genetically unique in some aspect. Extinction can be caused by any activity that reduces a population below the minimum viable level. Extinctions of salmonid population in the Columbia Basin have been numerous and were caused by such factors as overharvest, passage difficulties, and habitat degradation. Hatcheries have also played a role in some of these extinctions, such as the

Wallowa Lake sockeye where all of the spawners were taken for hatchery broodstock, but inappropriate hatchery practices resulted in no returns from the eggs and fry released (Cramer 1990). A disease outbreak in the hatchery necessitating destruction of broodstock could cause the population overall to fall below a minimum viable size. Another possibility is ecological displacement by large numbers of hatchery fish (Lichatowich and McIntyre 1987) causing the wild population to fall below the minimum viable number.

Risk Type 2 : Loss of Within Population Variability

Genetic variation is the foundation that enables populations to adapt to environmental variability. Fisher (1930) recognized the amount of genetic variation is positively correlated with the rate of evolutionary change by natural selection. This principle has been demonstrated by differences in survival between populations of fruit flies, ***Drosophila serrata,*** possessing different levels of genetic variability and subjected to environmental change (Ayala 1965). Loss of this genetic variation within a population generally occurs through either of two processes: (1) genetic drift and (2) selection - both purposeful and inadvertent.

Genetic Drift

Genetic drift is random changes in gene frequency that occur as a result of sampling error and is a problem common to finite populations. Genetic drift is most commonly identified by the loss of infrequent alleles and a resulting increase in homozygosity in small populations. If a population is large enough, this loss through random drift is compensated for by the creation of new variability by mutation. The rate of genetic drift is governed by the effective population size, rather than the simple number of fish in the population. The effective population size, N,, is the number of spawners that effectively contribute gametes to the next generation and is influenced by their proportion of contribution to that generation. Differential contributions of the two sexes to the progeny, variation in family

sizes, and annual variation in spawner abundance can make the effective population size much smaller than the total population. For example, Simon et al. (1986) demonstrated that effective population size of coho at Big Creek-Hatchery ranged from only 64 to 282, even though the average number of coho returning to the hatchery was 4,500. Simon et al. (1986) found further that survival from smolt to age 2+ was significantly correlated ($P < 0.01$) to effective population size. Similarly, Waples and Teel (1990) found effective population sizes of chinook salmon in some hatcheries to be less than 100 even when returns were greater than 1,000 fish. The loss of genetic variability to genetic drift has been documented on several occasions for salmonids (Allendorf and Phelps 1980; Ryman and Stahl 1980; Waples and Teel 1990) and is commonly discussed in hatchery manuals regarding spawner numbers and sex ratios (e.g., Hershberger and Iwamoto 1983; Kapuscinski and Jacobsen 1987).

Founder Effects

Founder effects are the loss of genetic variability when only a segment of the population, not representative of the whole, is used for broodstock. This effect appears to have been manifested in nearly every hatchery population of salmonids in the Columbia Basin (eg. see Cramer et al. 1990 regarding coho hatcheries). Most commonly, it results from the practice of taking eggs from the first fish arriving at the hatchery and then ceasing the egg take once the egg-incubation capacity of the hatchery is reached. Other common practices in hatcheries causing this loss in variability are the exclusion of jacks from spawning, selection for large body size, and selection of return timing to match or avoid periods of high harvest. Although selection for specific traits, such as time of return, can produce the desired result, other traits correlated to the target trait are also being selected simultaneously. Because we cannot predict how the entire gene complex of a population will be affected by selection for a specific trait, selection should be avoided where enhancement of natural populations is desired (Krueger et al. 1981). Several studies have demonstrated selective breeding in hatcheries has reduced viability due to loss of genetic

variability (Ryman 1970; Kincaid 1976; Allendorf and Utter 1979; Allendorf and Phelps 1980; Ryman and Stahl 1980). The danger of selection for time of return was demonstrated by Leary et al. (1989) who found enzyme frequencies of rainbow trout varied significantly over the spawning season, with greatest variability in mid season.

Risk Type 3 : Loss of Population Identity

If two populations are mixed, there may be no loss of genetic material overall, but the genetic distinctness of the two populations will be lost. Through the process of natural selection, populations have developed "coadapted complexes", or groups of genes that taken together result in high fitness for the native environment. For example, inland and coastal populations of rainbow trout can be distinguished by divergent allele frequencies at two enzyme loci (Allendorf and Utter 1979). Studies with hatchery releases have indicated hatchery fish derived from local populations perform much better in their native environment than hatchery fish from other populations (Bams 1976; Altukhov and Salmenkova 1986). Reisenchichler (1988) showed the distance transferred from the natal stream was negatively related to recovery rate for hatchery-reared coho salmon (Figure 1). Thus, new combinations of genes within coadapted complexes are likely to lower fitness. Mixing of populations is commonly caused by straying or outplanting of hatchery fish. Most hatchery populations have been affected to some degree by transfers between hatcheries to fill quotas in years of low return. Populations are also mixed when brood fish are taken at a dam where more than one population must pass (e.g., Bonneville Upriver Bright fall chinook, Carson spring chinook).

There are numerous examples in the published literature of population mixing and its deleterious effect on survival. Reisenbichler and McIntyre (1977) showed that survival of wild steelbead was reduced if they resulted from crosses of a wild fish with a hatchery fish. Chilcote et al. (1986) found that survival of wild Kalama steelhead was reduced to 43% of normal when a wild fish mated with a Skamania stock hatchery steelhead. Barns (1976) showed that homing and survival were reduced among pink salmon when hatchery

and wild fish were mated.

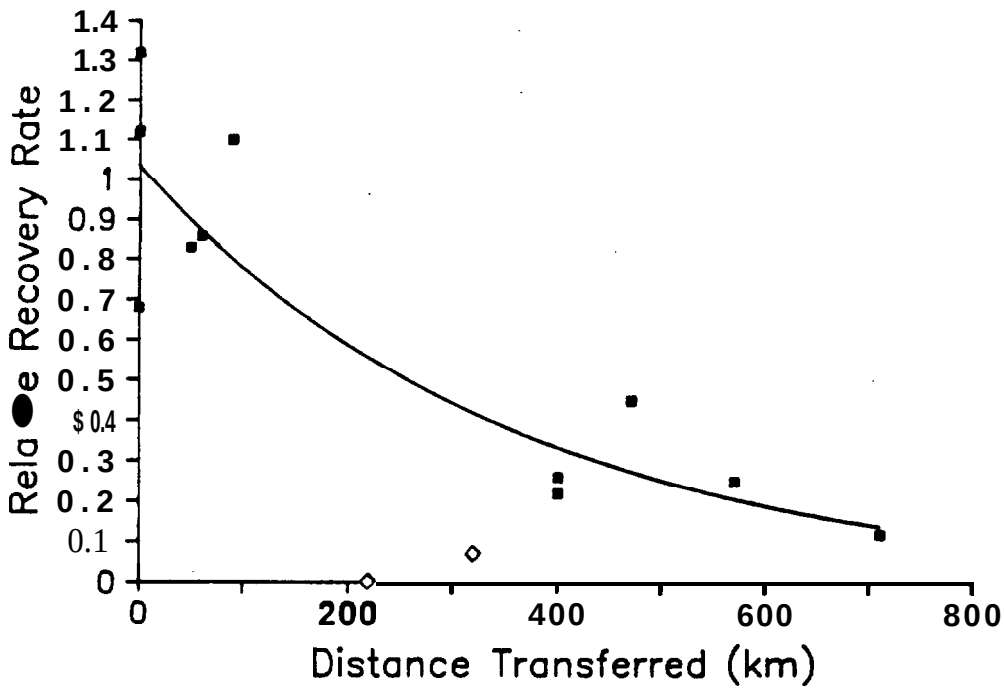


Figure 1. Relative (to local fish) recovery rate for transferred hatchery coho salmon versus distance transferred. Rates are based on recoveries in the fisheries and at the hatchery. Releases from Big Creek Hatchery, Oregon (diamonds), were not used in fitting the curve.(From Reisenbichler 1988).

The degree of genetic mixing that occurs when a hatchery fish are released in a wild population varies dramatically, depending on the ability of the hatchery fish to survive to maturity and on temporal isolation mechanisms. Wishard et al.(1984) found through electrophoretic studies there was a lack of interbreeding of hatchery and wild rainbow trout in streams in the desert region of southwestern Idaho, and concluded high temperatures probably caused poor survival or reproduction of non-native fish. Campton and Johnston (1985) used allozyme frequencies to detect introgression between native and introduced rainbow trout in the Yakima River of Washington. Studies by Campton and Johnston (1985) and Allendorf et al. (1980) indicated that native and introduced rainbow trout had randomly interbred to panmixia wherever the two forms came in contact. Leider et al. (1986) found that 36% of all wild summer steelhead in the Kalama River mated with hatchery fish, even though spawning by hatchery fish peaked one month earlier than wild fish.

Risk Type 4 : Domestication Selection

This is the risk of changes in genetic composition that occur from the unintentional selection for survival in a hatchery environment. This selection may result from culling the slow growing fish, from disease treatments, or from the effects of growth differences in the hatchery on survival to maturity. The results of Reisenbichler and McIntyre (1977) and of Chilcote et al. (1986) cited under Risk Type 3 might also be considered as evidence of domestication selection among steelhead. Nickelson et al. (1986) found that coastal hatchery coho in Oregon had a much lower fitness in their natal streams than wild fish.

How to Minimize Genetic Risk

Guidelines for minimizing genetic risks in Columbia River hatchery programs have been developed by Busack (1990) and Kapuscinski (1991). These guidelines can be subdivided according to the type of management activity involved. For the purposes of this

report, management activities relating to genetic risk will be subdivided into Harvest Management, Brood Source, Breeding Practices, Rearing and Release Practices, and Monitoring and Evaluation Practices. Guidelines are presented here in an abbreviated format. See Kapuscinski (1991) and Bussack (1990) for further discussion.

Harvest Management

- Use target fisheries. Set time and location restrictions that will minimize harvest of nontarget stocks.
- As an alternative, limit harvest rate to accommodate the weakest stock. Monitor catch by recoveries of Coded Wire Tags (CWTs) or through the use of Genetic Stock Identification (GSI) techniques with electrophoresis. GSI has been used successfully in the lower Columbia winter gillnet fishery to estimate catches of upper Columbia and Snake River spring chinook.
- Mark all hatchery fish and limit the taking of unmarked fish.
- Establish harvest refuges. For example, the West Fork of Hood River is closed to angling in order to provide a holding refuge for sumrner steelhead.

Brood Source

- Only enhance stocks that migrate in temporal or spatial windows of harvest opportunity.
- Use stocks that are similar to the natal stock with regard to life history patterns and allozyme frequencies.
- Identify distinct substocks within the basin and culture separately those to be supplemented.
- Use naturally produced fish for brood to the maximum proportion possible.
- Allow 50 % or 100 wild spawners of each substock to escape annually, whichever is greater.
- Ensure founders represent statistically significant sample of donor gene pool.

Breeding Practices

- Maintain largest possible effective population size annually. Waples and Teel (1990) showed Ne < 50 results in substantial genetic drift.
- Use split-cross matings if less than 100 spawners (Gharrett and Shirley 1985).
- Maintain a 1:1 sex ratio in daily matings (Withler 1988).
- Minimize variation in family size (Falconer 1981). Any egg transfers, culling, or other practices that might change family size should be applied equally across all families.
- Avoid selection, if the goal is to maintain the genetic integrity and diversity of the natural run. If new stocks are being introduced, select only for traits exhibited in the natal stock (if one existed) or for traits believed to have an adaptive advantage for the natural conditions.
- Take an equal proportion of returning fish for brood throughout the run. Also use fish of each age and size in proportion to their occurrence in the run.

Rearing and Release Practices

- If grading is necessary, rear and release "grade-outs" as well.
- Limit outplanting to areas that are spawner limited, ie natural production is well below the habitat's carrying capacity.
- Release smolts at time of peak readiness to migrate.
- Avoid release practices that cause high straying, such as trucking to the release point.
- Limit numbers released to the minimum necessary to accomplish management objectives.
- Evaluate releases of fingerlings as a means to minimize domestication selection(Krueger et al. 1981). This should only be used where the rearing capacity is substantially underused.

Monitoring and Evaluation Practices

- Electrophoretic analysis of hatchery and naturally produced adults and juveniles.
- Estimate harvest (total and proportion of population), including spatial and temporal distribution, age and H/W composition.
- Use constant fractional marking with CWT's (Hankin 1982)
- Install upstream and downstream traps to monitor abundance, growth, age, migration timing, species composition and stock composition.
- Seine or electrofish juveniles at standardized times and locations each year to determine abundance, growth, migration time, species composition.
- Survey spawning to evaluate spatial and temporal distribution and interactions between stocks and species.
- Sample scales to determine age of spawners and smolts
- Measure temperature, turbidity, silt load, and other variable water quality parameters suspected of influencing production or harvest.
- Monitor disease incidence in returning adults and emigrating juveniles.

Characterization of Target Populations

Available data on the life history and harvest of the target populations (summer steelhead, winter steelhead, and spring chinook) in the Hood River have not been thoroughly analyzed in other planning documents, so a detailed analysis is presented here. A thorough characterization of the existing populations and their management history is a prerequisite to identifying genetic risks associated with any enhancement project. This characterization has been identified in the Integrated System Plan as the first of seven key steps to genetic conservation and the importance of this step was reaffirmed by experts at the NPPC Production Principles Workshop (Riggs 1990).

Genetic Basis of Life-History Traits

As we examine life-history traits of the populations targeted by the Hood River Component of NEOH, it is important to understand the degree to which these traits are genetically controlled. This degree of genetic control is referred to as the "heritability" of a trait. Traits that affect survival, but are continually challenged by a highly variable environment, tend to have high heritabilities. Generally, the heritability for a given trait will decline as the genetic variability controlling that trait declines. Thus, the heritability of any given trait may vary between populations. The heritability of a trait is most often demonstrated either through selection experiments, or through stock comparisons under duplicated environmental conditions. Values of heritability, h^2, range from 0 to 1.0 with $h^2 = 1.0$ meaning that the phenotype of an individual was 100% determined by the genes transmitted from its parents. Thus, a heritability of 0.5 or above would mean that most of the phenotypic variation in a trait is determined genetically.

Time of river entry and time spawning have been found to be highly heritable traits among anadromous salmonids. Exact he&abilities have not been estimated and would differ between populations. Ricker (1972) reviewed evidence for the heritability of time of freshwater entry for chinook. Donaldson (1970) demonstrated that time of spawning was heritable among chinook, and Garrison and Rosentreter (1981) and Ayerst (1977) demonstrated it was heritable among steelhead. Royal (1972) showed that return timing had been advanced in Skamania Hatchery summer steelhead and Chambers Creek Hatchery winter steelhead. Olsen et al. (1991) found in an experiment with Deschutes summer steelhead at Round Butte Hatchery that the progeny of parents selected 'for early return timing also returned early. A highly graphic example of the heritability of river entry time is found in selective breeding experiments conducted by Hager and Hopley (1981) with Cowlitz River coho. They selected brood stock for several different return times and found that progeny from the select groups returned predominantly in the same time period as their parents (Figure 2). Thus, differences between stocks in time of river entry or time of spawning are likely to reflect genetic differences between stocks.

Age at maturity is also a heritable trait. Moller et al. (1979) estimated that $h^2 = 0.47$ for maturity rate at age 3 among steelhead. Similarly, Gall et al. (1988) found that age at spawning in rainbow trout was moderately to highly heritable. Nicholas and Hankin (1988) present findings from a selective breeding experiment with Elk River fall chinook that age at maturity was highly heritable.

The genetic control of ocean distribution has been demonstrated among chinook and coho by experiments beginning with the transfer of eggs between hatcheries. Garrison (1986) found that Rogue River spring chinook maintained their tendency to distribute in the ocean south of their rearing location, even when eggs were transported and juveniles reared and released in the lower Columbia River. Hopley et al. (1978) found that north and south migrating stocks of coho from lower Columbia hatcheries maintained their ocean distribution even as progeny of eggs that had been transferred between hatcheries.

Summer Steelhead

Summer steelhead spawn and rear throughout the basin and are concentrated primarily in the West Fork and the mainstem below the forks (Figure 3). Counts at Powerdale Dam (km 7, R 4.5) in the 1960's and estimates of angler catch, based on punch card returns, indicate several thousand steelhead return to the basin annually. The indigenous population has been supplemented since 1967 with about 100,000 smolts annually from Skamania stock reared at South Santiam Hatchery.

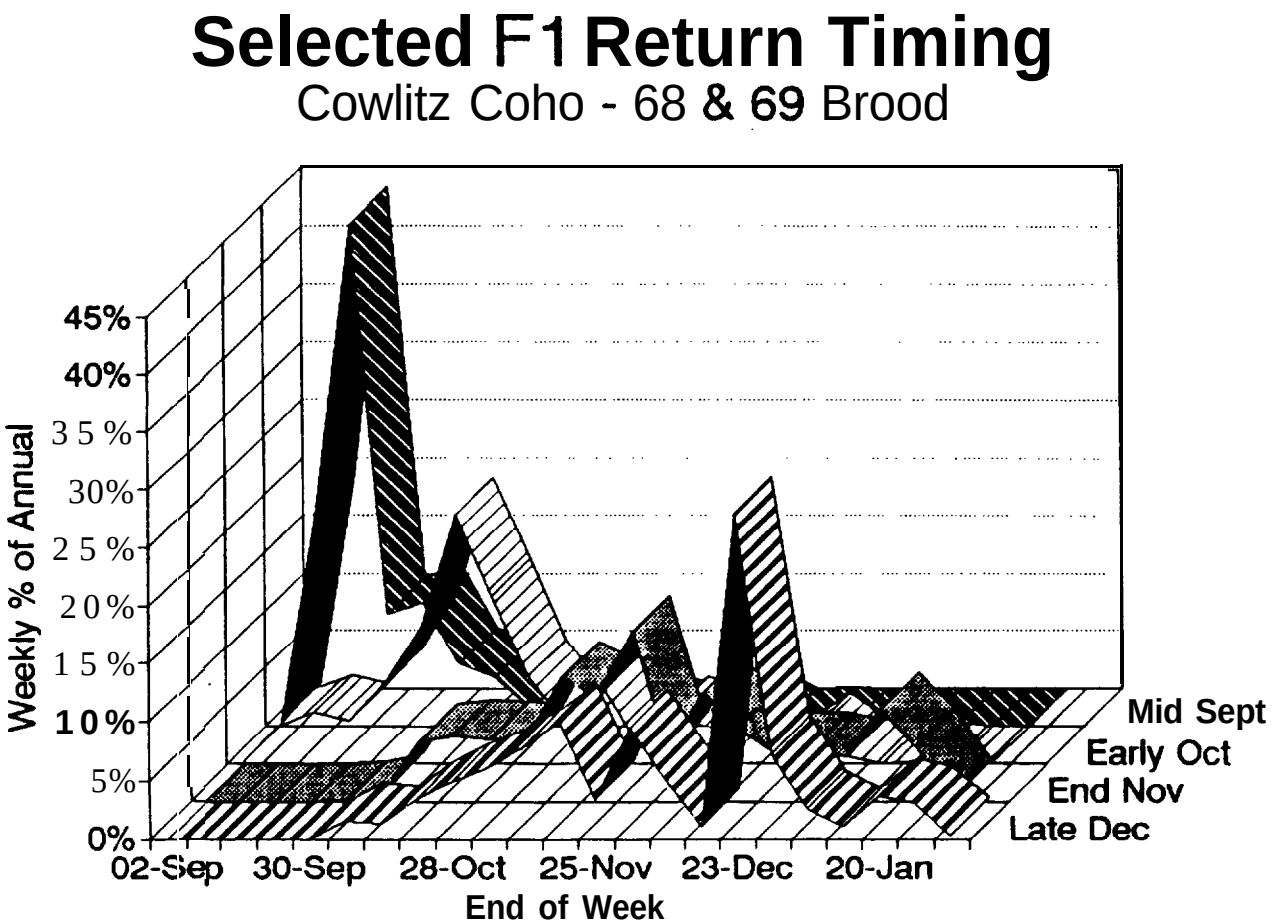


Figure 2. Return timing to Cowlitz Hatchery of F1 generation coho from parents selected for specific return times, indicated at right (from Cramer et al. 1991).

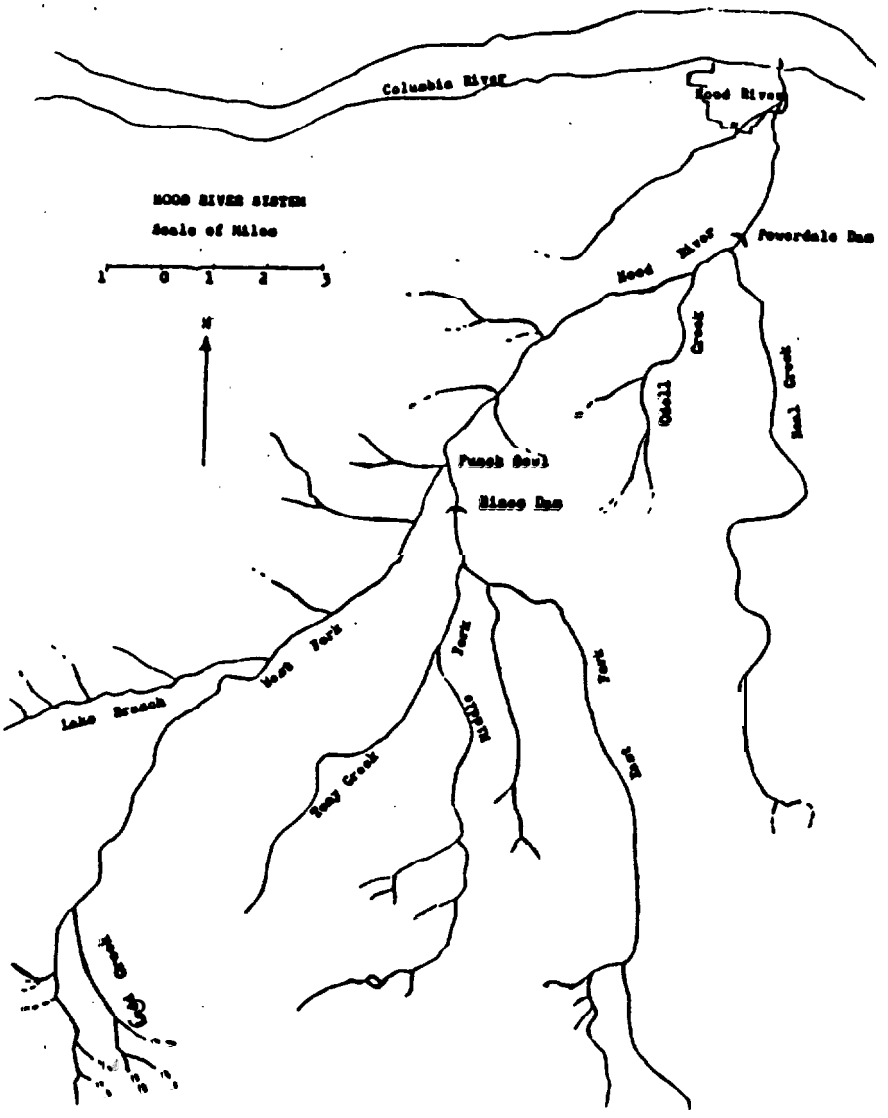


Figure 3. Map of Hood River Basin and sampling locations.

Indigenous Life History

The abundance and migration timing of indigenous Hood River steelhead was determined primarily from trapping of adult steelhead as they passed Powerdale Dam (km 7,R 4.5) during 1955, 1962-71, Punchbowl Falls (km 20, R 12.5) during 1962-71, and from catch estimates based on returns of angler punch cards. Nearly all steelhead spawn above Powerdale Dam (Figure 3), where passage was possible through ladders on both sides of the river until 1965 and only on the east side during 1965 forward. The Oregon Game Commission (Haxton 1965) fished a trap that captured all migrants in the east ladder during 1955 and 1962, but fish passing through the west ladder were not counted. Traps were fished in both ladders during 1963 and 1964, but some fish may have passed the dam without using the ladders during periods of high flow. The fishway on the west shore was washed out by the December 1964 flood and restoration of the dam eliminated the possibility of fish escaping over the spillways or through the roller gates during high flow (personal communication, John Haxton, ODFW, McMinnville). Thus, trapping in the east ladder during 1965-71 should have captured all fish passing the dam.

Passage at Powerdale Dam peaked in April-May in every year sampled, except 1968 (Appendix 1). Migration timing was protracted, with fish passing the dam in every month of the year, but 81% of all fish passed during March-June (Figure 4). Angler catch during 1956-1970 also peaked in April (Figure 4). Generally, about 90% of the fish passing Powerdale Dam during March through May were ripe and must have spawned shortly after passing the dam.

Passage of steelhead over Punchbowl Falls, however, peaked later during June-July (Figure 5). Evaluation of maturity of fish passing Punchbowl Falls during 1962-1964 revealed that about 70% of these fish entering the West Fork were immature and thus were classified as summer steelhead (Haxton 1965). Fish were tagged as they passed Powerdale Dam to assess migration rate to Punchbowl Falls. Recaptures of these tagged fish at Punchbowl Falls in 1963 demonstrated that much of the 2 month difference in peak passage

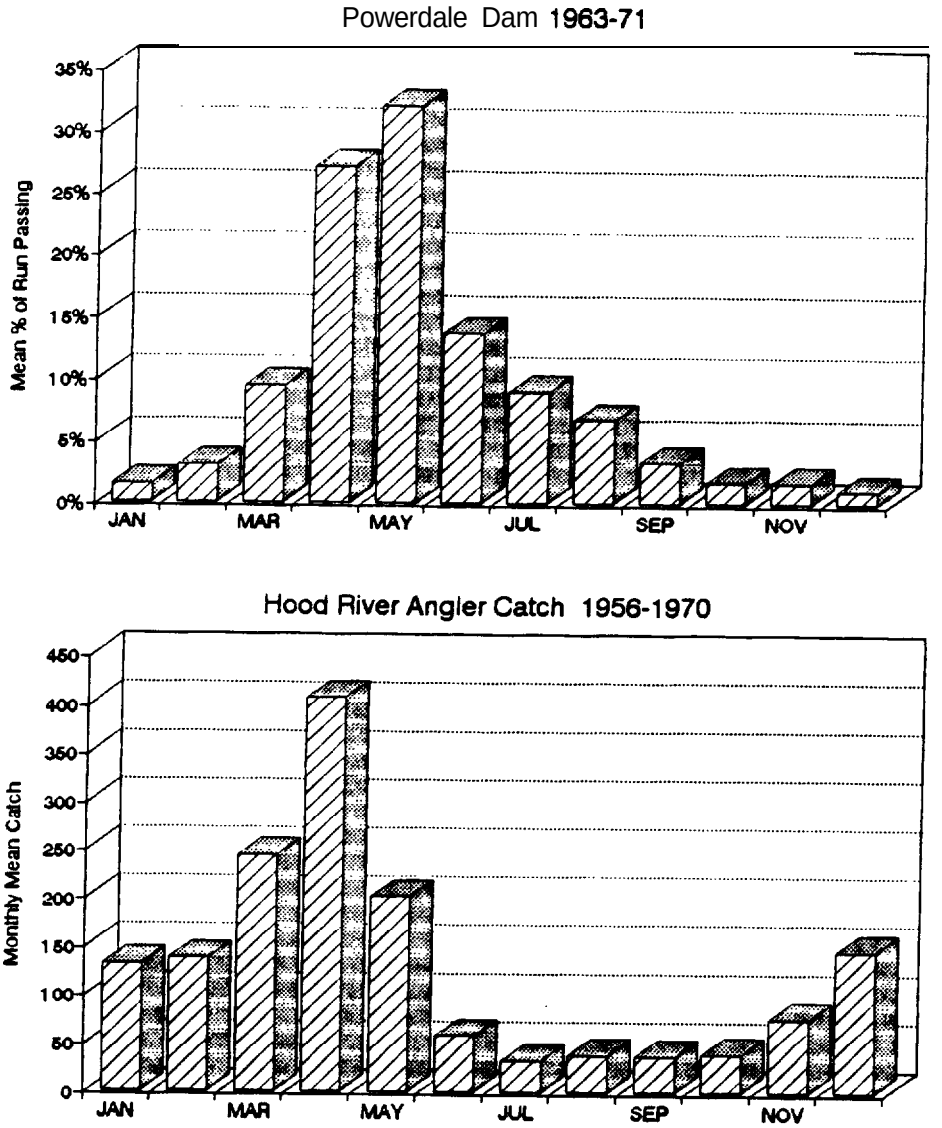


Figure 4. Timing of steelhead passage at **Powerdale** Dam (km 7) during **1963-71,** and of angler catch estimated from punch cards during 1956-1970 (ODFW data).

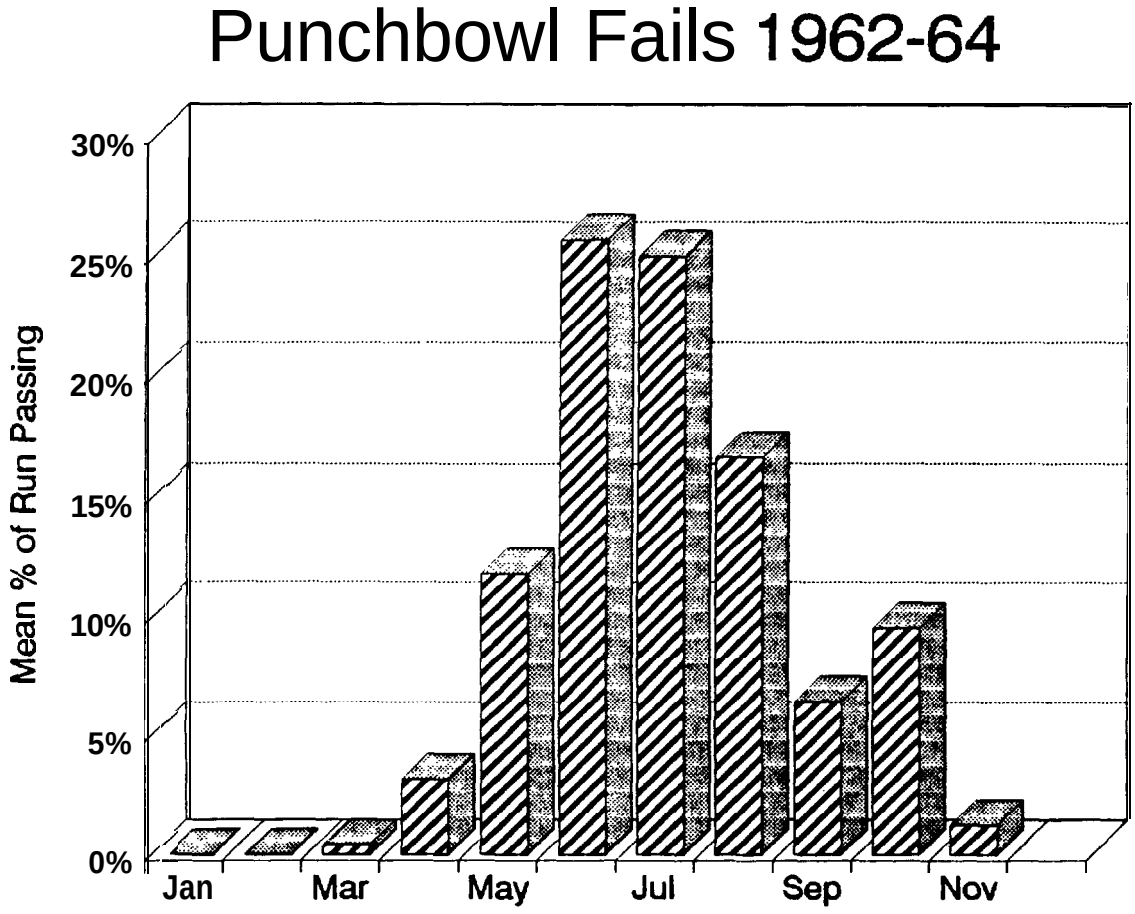


Figure 5. Timing of steelhead passage at Punchbowl Falls (km 20) during 1962-1964.

resulted from slow migration (0.2 mi/day [Haxton 1965]) between Powerdale Dam and Punchbowl falls. Counts of steelhead at Punchbowl Falls on the West Fork of Hood River, represented about 12% of the counts at Powerdale Dam in 1963.

Although migration of steelhead into Hood River typically shows a single peak in entry during April or May, the overall run timing actually is a composite of the migrations of maturing and immature fish. Mature fish are ready to spawn within a few months, while immature fish remain in the river upto a year before spawning. Maturing fish probably included fresh-run fish and fish that had overwintered in freshwater. Separation of maturing and immature fish at Powerdale Dam during 1963-71 revealed that passage of the fresh summer run (immature fish) actually peaked during June-July (Figure 6) and followed a pattern similar to that observed at Punchbowl Falls (see Figure 5).

There is evidence that a high proportion of summer-run fish overwinter in freshwater below Powerdale Dam. Haxton (1965) reports that 73 of 217 (33%) marked summer steelhead (Hood River stock reared in a hatchery) passing Powerdale Dam in 1962 were classified as winter steelhead based on their advanced state of maturity. It was not recorded whether these fish were freshrun or had spent a year in freshwater. During 1984-90, scales from adult steelhead were obtained through a volunteer angler program. The information recorded with these scales indicated that about half of the steelhead captured during November-March in the Hood River (mostly the lower mile) were hatchery summer run. Sampling of the winter (February-March) net fishery in Bonneville pool indicated that 95% of the steelhead catch in 1988 and 90% during 1989 were holdover summer run (data from personal communication with Don Swartz, ODFW, Clackamas). Thus, most of the winter fishery is supported by summer steelhead.

Evidence from other Columbia Basin stocks of summer steelhead indicates they may enter their natal stream after migrating substantial distances up other streams within the Columbia Basin during their summer and winter in freshwater. One AdRV marked steelhead released as a smolt in Hood River was captured and tagged as an adult at Sherars Falls in the Deschutes River on 10/2/78 and was recaptured by an angler in Hood River on 3/4/79. Sampling of the angler catch in the Deschutes River during 1983-1989 revealed

that 50% to 75% of the steelhead caught at Sherars Falls (R 40) were stray hatchery summer steelhead from other subbasins (Olsen et al. in press). Further, over 150 adult steelhead tagged by ODFW as they passed Sherars Falls, primarily during September and October, 1976-1986, were recaptured in other subbasins as early as November, but mostly in March as they spawned (Olsen et al. in press).

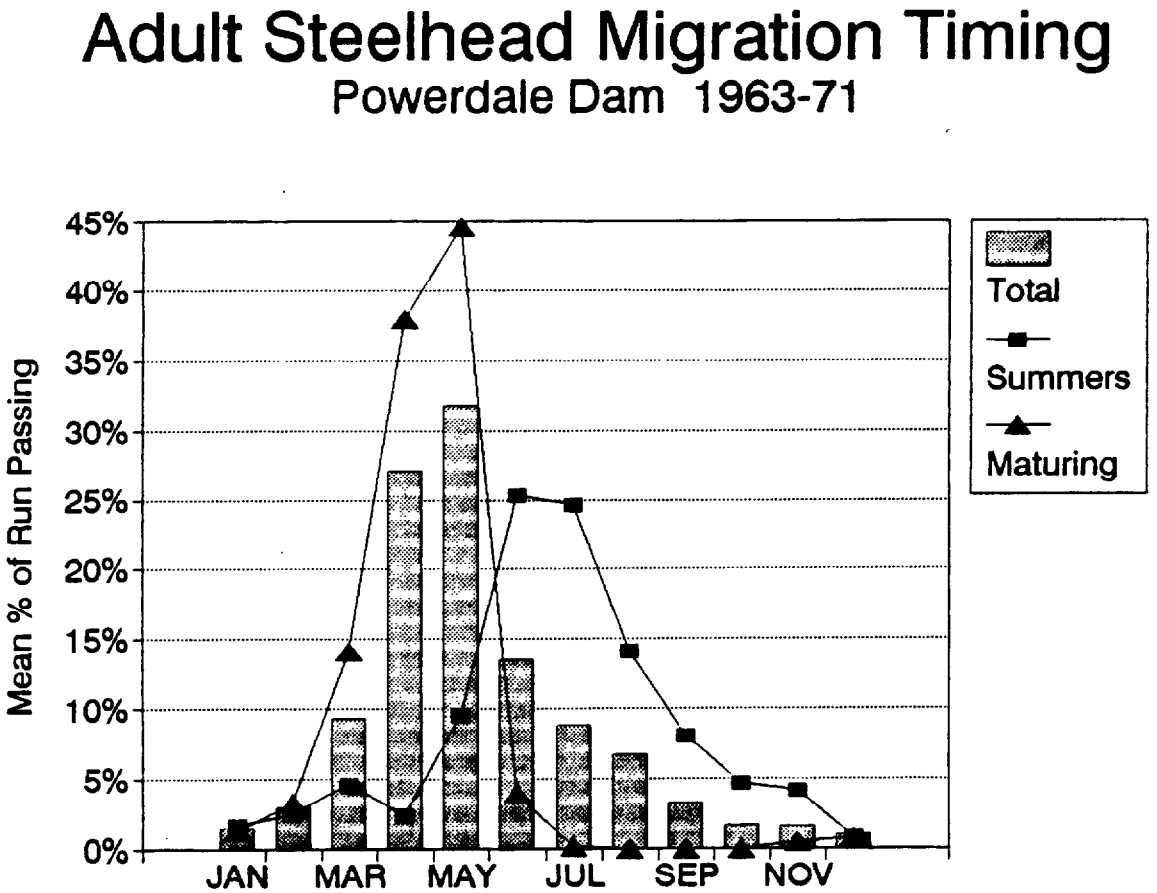


Figure 6. Timing of passage at Powerdale Dam (km 7) for summer steelhead compared to maturing steelhead and all steelhead combined.

Spawning of summer steelhead in the basin has only been spot surveyed, but it is believed they spawn primarily in the West Fork drainage and in the mainstem and its tributaries (excluding the Middle and East forks of the Hood River). Indigenous summer steelhead spawn primarily in April and May, as determined from fish trapped during May-July, 1955-65 at Powerdale Dam (km 7, R 4.5). and used for hatchery brood stock (John Haxton, personal communication, ODFW, McMinnville). Spawning of steelhead was surveyed on the West Fork Hood River on four days during April 21 to May 31, 1966 and spawning peaked on May 18 (monthly reports of John Haxton, ODFW, The Dalles). About 70% of the steelhead counted over Punchbowl Falls (West Fork, near the mouth) during 196264 were summer steelhead (Haxton 1965). Hatchery records of spawning time for Hood River summer steelhead during 1956-1965 could not be found, but monthly reports of Allan Lichens, Oregon Game Commission biologist at the Dalles indicate the first days of spawning during 1963-1966 were:

March 19, 1962
February 18, 1963
March 4, 1964
March 9, 1965
March 7, 1966

Age composition of naturally produced steelhead has been determined from returns of scales collected by volunteer anglers during 1986-90. Scales were analyzed by the Research Section of ODFW. Because scales were obtained through a volunteer program, sampling may not have been representative of fish throughout the run, so results of the scale analysis can only be used to generally characterize steelhead age composition. Since most scales were collected during April-June when both summer and winter runs were present, the two races could not be distinguished. Leider et al. (1986) found the dominant life history categories of Kalama River steelhead, based on freshwater and ocean age, were similar between summer and winter races, and were similar to the results reported here for Hood River steelhead. The frequencies of smolt age and ocean age for 248 Hood River

fish identified by the scale reader as wild were: 14% age 1, 69% age 2, and 17% age 3 at smolting and 4% age 1, 72% age 2 and 24% age 3 ocean age (raw data obtained from Ken Kenaston, ODFW, Corvallis). Thus, the majority of fish spend 2 years in freshwater and 2 years in the ocean before maturing. Repeat spawners composed 6% of the fish sampled.

The time and size of wild steelhead at smolting was determined from a trap fished in the tailrace of Powerdale Dam during April-June of 1965-67. Outmigration of smolts peaked the last two weeks in May in all three years. The mean length of smolts at the peak of migration was 19.2 cm in 1965, 16.5 cm in 1966, and 17.6 cm in 1967.

Genetic Information

Isozyme frequencies of Skamania stock steelhead returning to Willamette Basin hatcheries have been determined for 21 enzyme systems by Schreck et al.(1984). These isozyme frequencies (Table 1) should apply to Skamania steelhead stocked in Hood River annually since 1975, because brood fish were taken from South Santiam Hatchery in the Willamette River Basin. Schreck et al. found from electrophoretic, morphometric and meristic measurements that steelhead at nine different hatcheries seeded with Skamania stock grouped closely together in cluster analysis. They found further that steelhead stocks differed between west and east of the Cascade Mountains and between hatchery and wild stocks. However, much of the difference between hatchery and wild stocks was based on morphometric characteristics that are influenced by environmental factors to an unknown degree. Schreck et al. sampled juvenile steelhead from Neal Creek, tributary to Hood River and were unable to differentiate them from Skamania summer steelhead or Big Creek winter steelhead based on electrophoretic and meristic characters. This does not indicate the stocks are the same; only that they cannot be differentiated by these techniques. However, only winter steelhead are believed to spawn in Neal Creek, so known Hood River summer steelhead were not sampled. Further details of work by Schreck et al. (1986) are

given in the section on Winter Steelhead.

Hatchery Influences on the Indigenous Stock

There is no regular monitoring of steelhead abundance or stock characteristics in the Hood River basin, so influences of the supplementation program on the natal stock must be inferred from peripheral data and known stock differences. I will show that gene flow has probably been minimal between introduced and indigenous stocks due to temporal isolation of spawning. Scale samples from adult steelhead indicate that natural production continues and I provide evidence from other basins that these naturally produced steelhead are indigenous stock.

Wild and hatchery fish were distinguishable as they passed Powerdale Dam (all upstream migrants were sampled there during 1965- 1971) because all hatchery fish were fin marked through the 1975 brood. Hatchery produced fish were first stocked in Hood River in April 1958. Stocking has continued annually since 1958 (Figure 7;Appendix 2). Steelhead brood used for stocking during 1958-66 were taken from the traps at Powerdale Dam and Punchbowl Falls. Only immature fish that were obviously summer steelhead were taken, so the time of passage at Powerdale Dam for brood fish peaked in July rather than April and May (Figure 8). Beginning in 1967 and continuing to present, all plants of summer steelhead were with Washougal or Skamania stock Thus, beginning in 1969, hatchery steelhead returning to Hood River were nonindigenous stock. The Skamania stock originated from a combination of Washougal and Klickitat summer steelhead (Howell et al. 1984). Since 1974, all Skamania stock steelhead planted in the Hood River have been obtained from adults returning to South Santiam Hatchery, so there has been no opportunity for genetic adaptation of the stock to the Hood River environment.

Table 1. Isozyme gene frequencies and sample sizes (#) as determined by electrophoresis from Skamania (Willamette) hatchery summer steelhead stocks. Numbers at top of each column are relative mobilities for each allele present in the enzyme system. Minus signs indicate cathodal migration (Schreck et al. 1984).

Location/ hatchery	ADH			ACO				ACPD-1			CK			GOT 1,2			GOT 3		
	-100	-76	#	100	83	66	#	100	140	#	100	70	#	100	112	#	100	77	#
Eagle Creek Hatchery	1.00		100	0.99	0.01		80	0.97	0.03	51	1.00		100	1.00		80			
McKenzie (Leaburg Hatchery)	1.00		100	0.99	0.01		100	0.92	0.08	97	1.00		100	0.99	0.01	100	1.00		100
South Santiam (Leaburg Hatchery)	1.00		97	0.98	0.02		97	0.93	0.07	96	1.00		97	0.97	0.03	97			97

	IDH 3-4					LDH-4			MDH-1, 2				MDH-4						MK		
	100	40	71	120	#	100	76	#	100	70	140	#	100	83	110	90	70	#	100	85	#
Eagle Creek Hatchery	0.70	0.12	0.15	0.03	94	0.78	0.22	80	1.00			70	0.85	0.14			0.01	95			
McKenzie (Leaburg Hatchery)	0.62	0.19	0.14	0.05	95	0.88	0.12	100	1.00			90	0.84	0.13	0.03			100	0.96	0.04	100
South Santiam (Leaburg Hatchery)	0.70	0.18	0.10	0.02	89	0.80	0.20	96	0.99	0.01		94	0.91	0.07	0.02			95	0.96	0.04	92

	PGI-1			PGI-2			PGI-3				PEP-GL-1				PEP-LGG			PGM-1				PGM-2		
	100	130	#	100	120	#	100	92	120	#	100	110	95	#	100	74	#	-100	-85	-115	#	-100	-140	#
Eagle Creek Hatchery	1.00		80	1.00		80	1.00			80	1.00			100	1.00		40	1.00			70	1.00		70
McKenzie (Leaburg Hatchery)	1.00		95	1.00		95	0.96	0.04		95	0.95	0.05		95	1.00		100	1.00			95	1.00		95
South Santiam (Leaburg Hatchery)	1.00		97	1.00		97	0.95	0.05		97	0.94	0.06		97	1.00		97	1.00			47	1.00		47

	PGK-2				PHI				SDH-1, 2			SOD			
	100	120	160	#	100	110	94	#	100	195	#	100	152	48	#
Eagle Creek Hatchery					1.00			90	1.00		100	0.74	0.26		64
McKenzie (Leaburg Hatchery)					1.00			100	1.00		100	0.78	0.22		97
South Santiam (Leaburgh Hatchery)									1.00		97	0.72	0.28		97

Hatchery Summer Steelhead Released

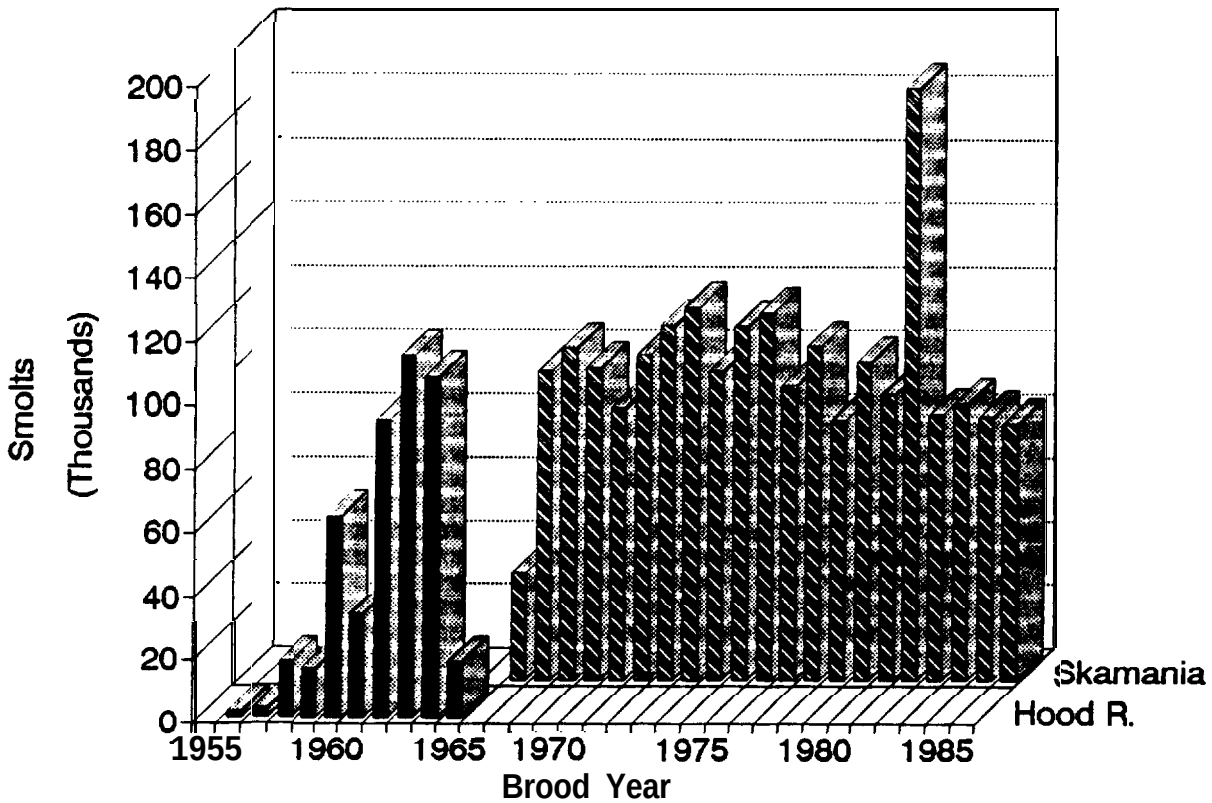


Figure 7. Number of hatchery summer steelhead released annually in the Hood River Basin as smolts (< 15 fish/lb; ODFW data).

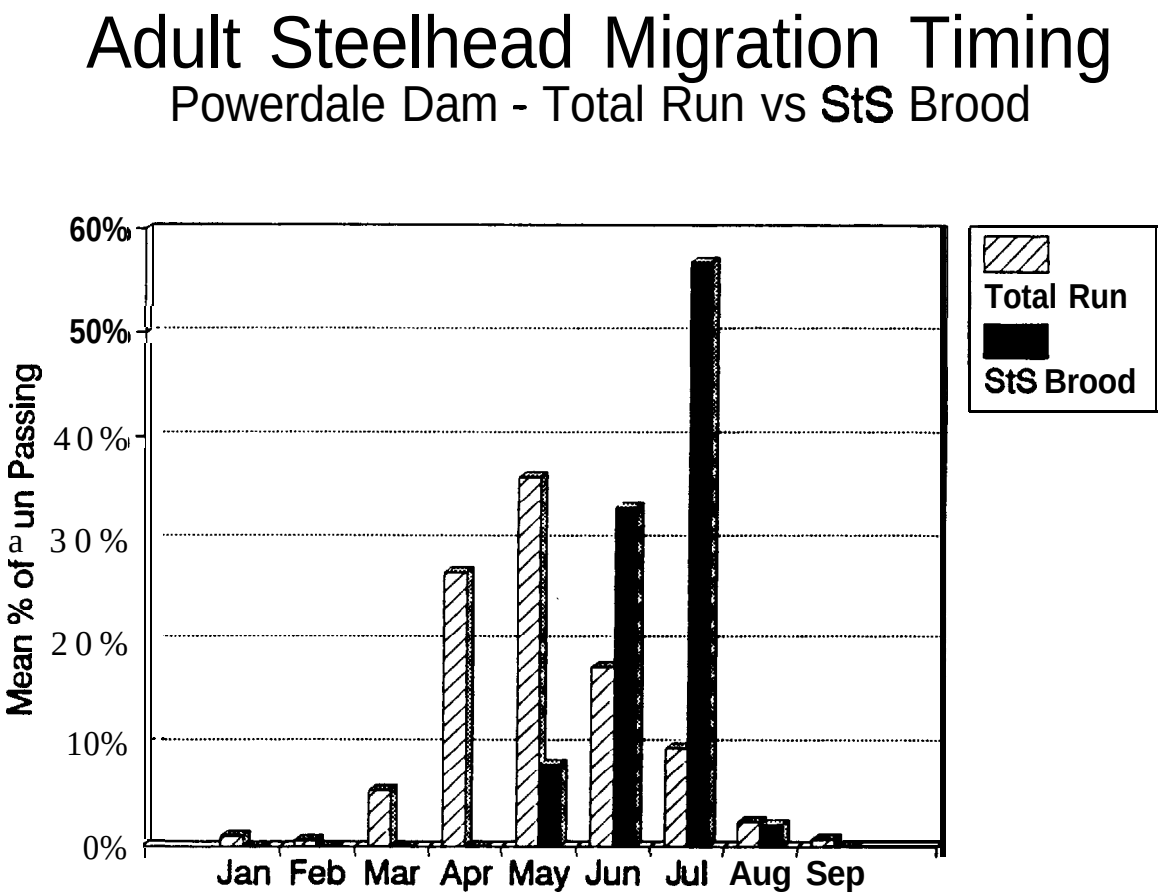


Figure 8. Migration timing at Powerdale Dam of summer steelhead taken for hatchery brood during 1962-1965, compared to all steelhead combined in the same years.

Return timing of Hood River and Washougal stocks of summer steelhead can be compared from recoveries of fin-marked steelhead at Powerdale Dam during 1962-1971. Washougal stock was the predominant founder source of the Skamania stock used to stock Hood River in recent years (Howell et al. 1984). Mean peak time of return to Powerdale Dam during 1962-68 was June for Hood River stock and during 1969-71 was August for Washougal stock (Figure 9). Note that Washougal and Hood River stocks were not released in the same years (Appendix 2), but peak run timing for each stock was consistent between years. Passage at Powerdale Dam of marked Hood River stock peaked in June in every year except one during 1962- 1968, and passage of marked Washougal stock peaked in either July or Augsut during 1969-1971 (see Appendix 1). Some Hood River summer steelhead continued to pass Powerdale Dam even into November, just as Washougal steelhead did, so genetic potential must be available within the indigenous genome for Hood River stock to migrate as late as Washougal stock. Therefore, one must assume the earlier migration time of Hood River stock has an adaptive advantage in the Hood River environment.

The effect of Washougal summer steelhead on the overall run timing of steelhead past Powerdale Dam is apparent by comparing average return timing during 1962-1964 when few hatchery fish returned to that in 1969-71 when typical numbers of Washougal stock summer steelhead returned (see Appendix 1). The number of fish returning in July-September increased substantially in 1969-71 (Figure 10). In contrast to the early return of Hood River stock, wild summer steelhead in the Kalama River return later than Skamania (derivative of Washougal) summer steelhead (Leider et al. 1986).

The timing of steelhead return to Hood River has not been monitored since trapping at Powerdale Dam was discontinued in 1971, so return timing must be inferred through catch estimates based on angler punch cards. The temporal distribution of catch has been consistent between years, with greatest catches during April-June (Figure 11). ‘Compared to catches during 1956-1970 when all returning fish were indigenous, catches are now much greater during May through October (Figure 12) which reflects the presence of Skamania stock summer steelhead in the catch (see Figure 9). The peak catch of Skamania summer steelhead during April-June is atypical of the Skamania stock which consistently returns in

June and July in other subbasins of the Columbia River (Figure 13). Low catches of Skamania summer steelhead in Hood River during July and August are the result of high turbidity in Hood River from glacial runoff (Figure 14).

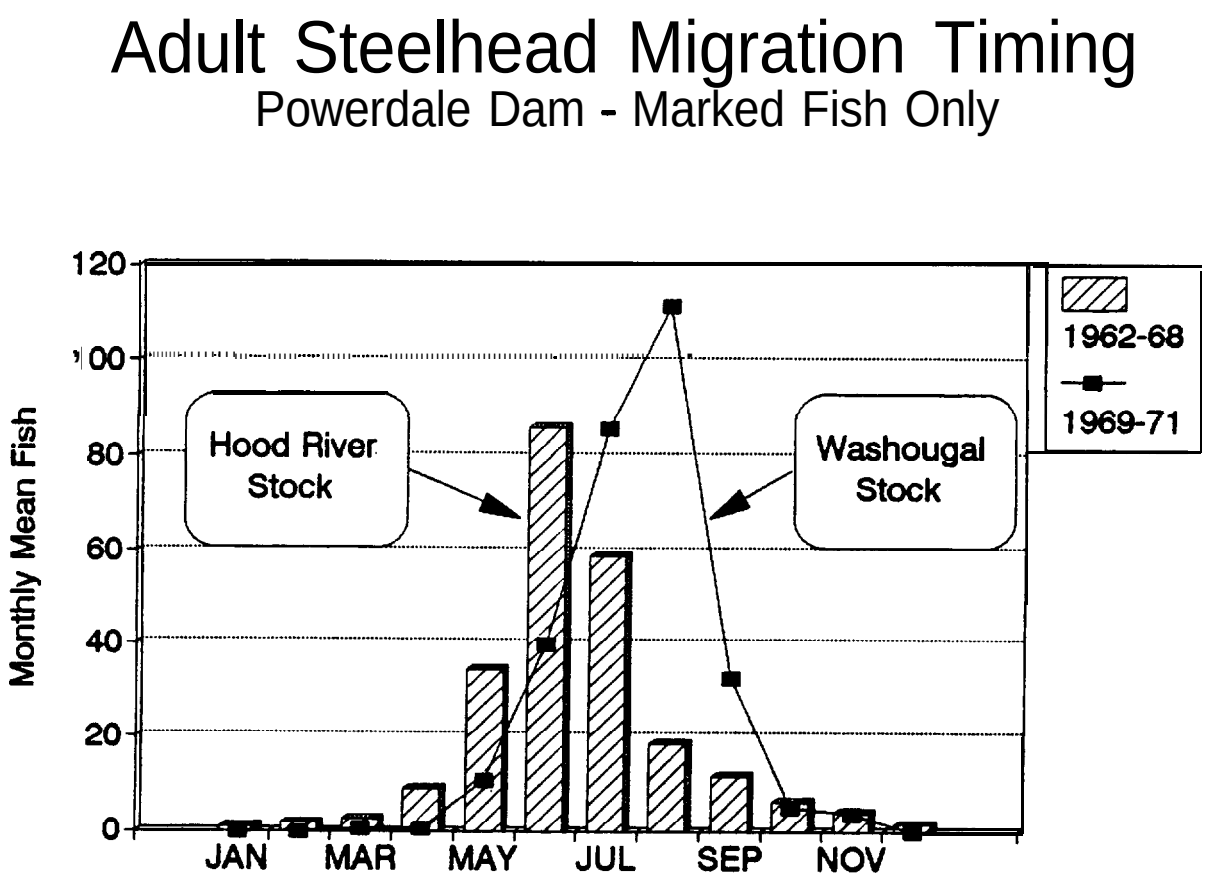


Figure 9. Migration timing at Powerdale Dam of marked summer steelhead from Hood River stock during 1962-1968 and Washougal stock during 1969-71.

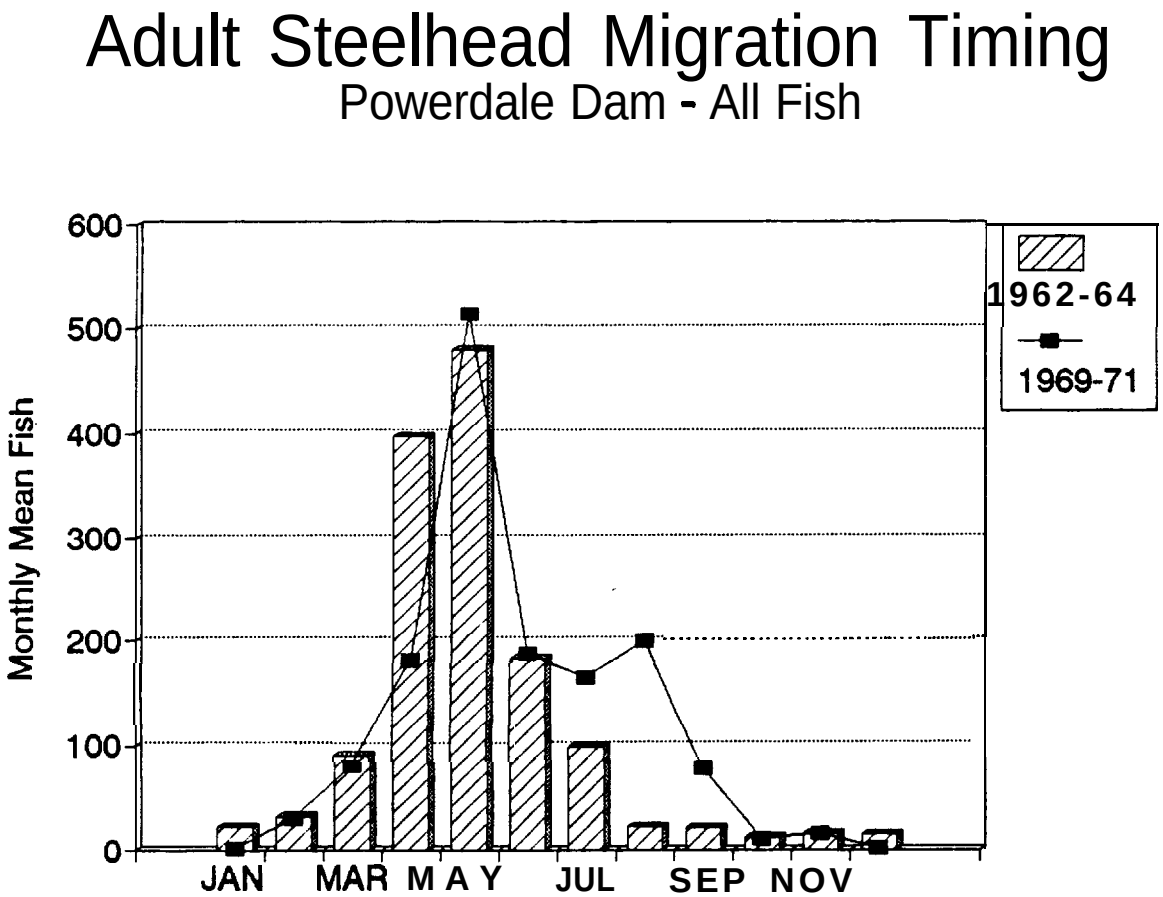


Figure 10. Migration timing at Powerdale Dam for all steelhead during 1962-1964 compared to 1969-197 1.

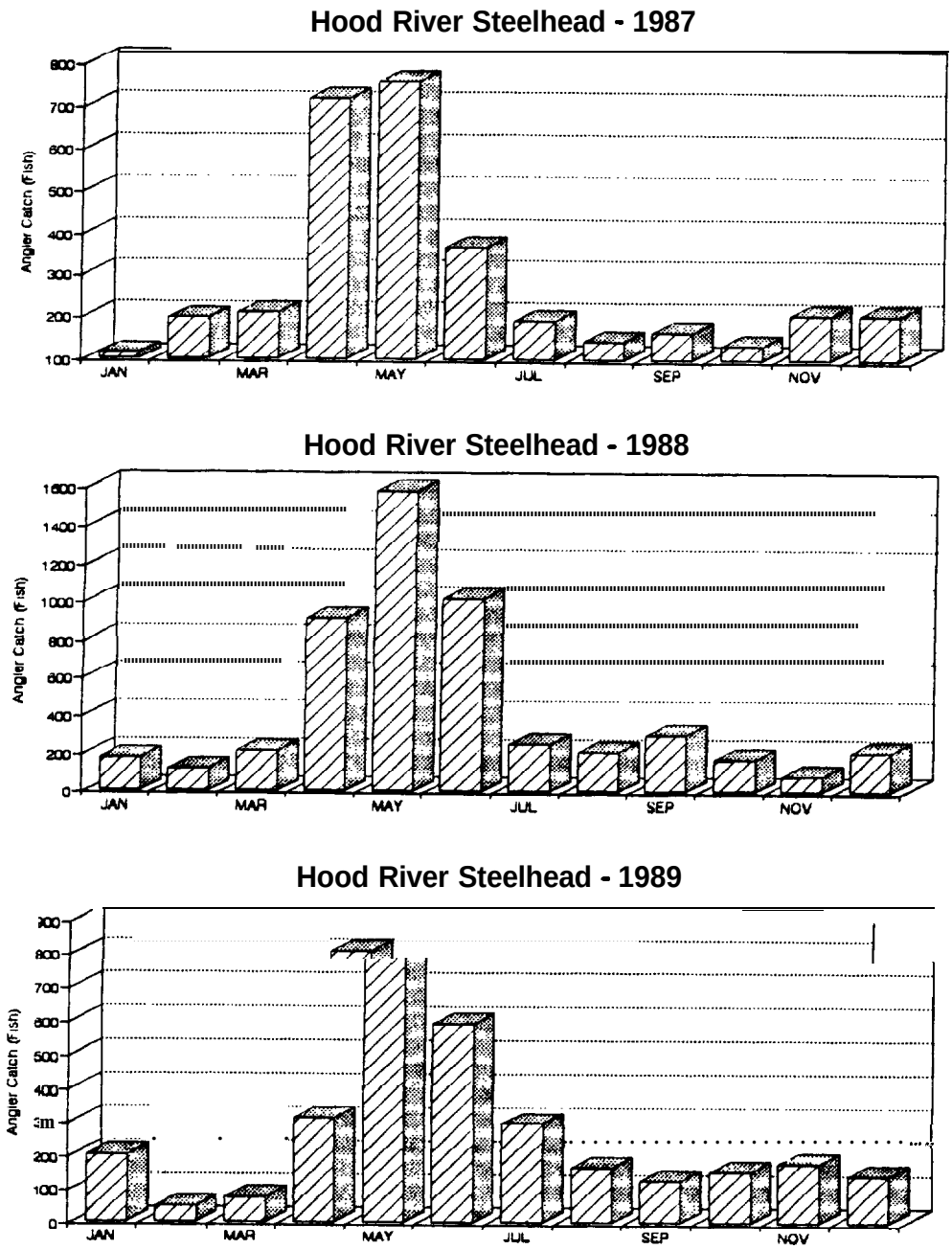


Figure 11. Time of angler catch of steelhead in the mainstem Hood River during 1987-1989, estimated from angler punch cards (ODFW data).

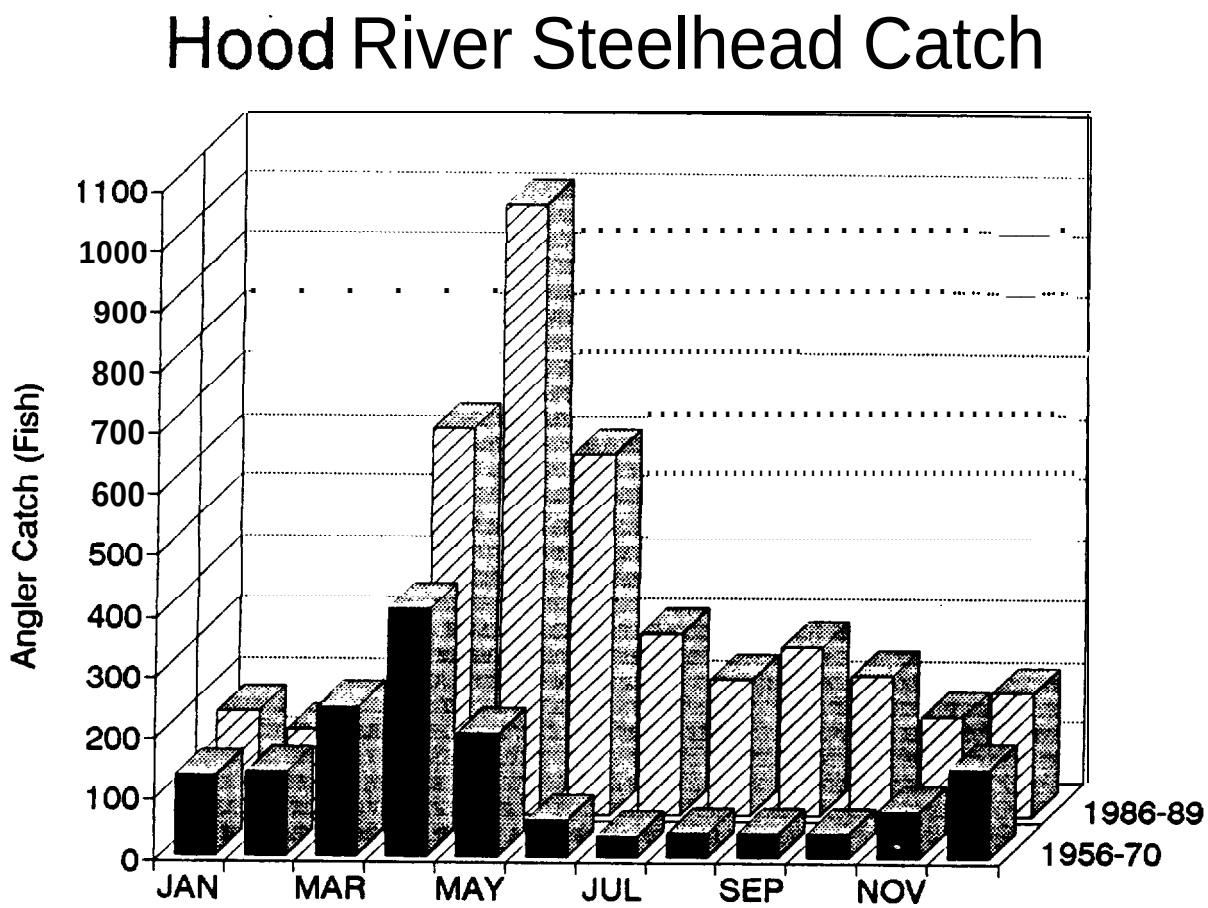


Figure 12. Timing and abundance of steelhead caught by anglers in Hood River during 1956- 1970 compared to 1986- 1989.

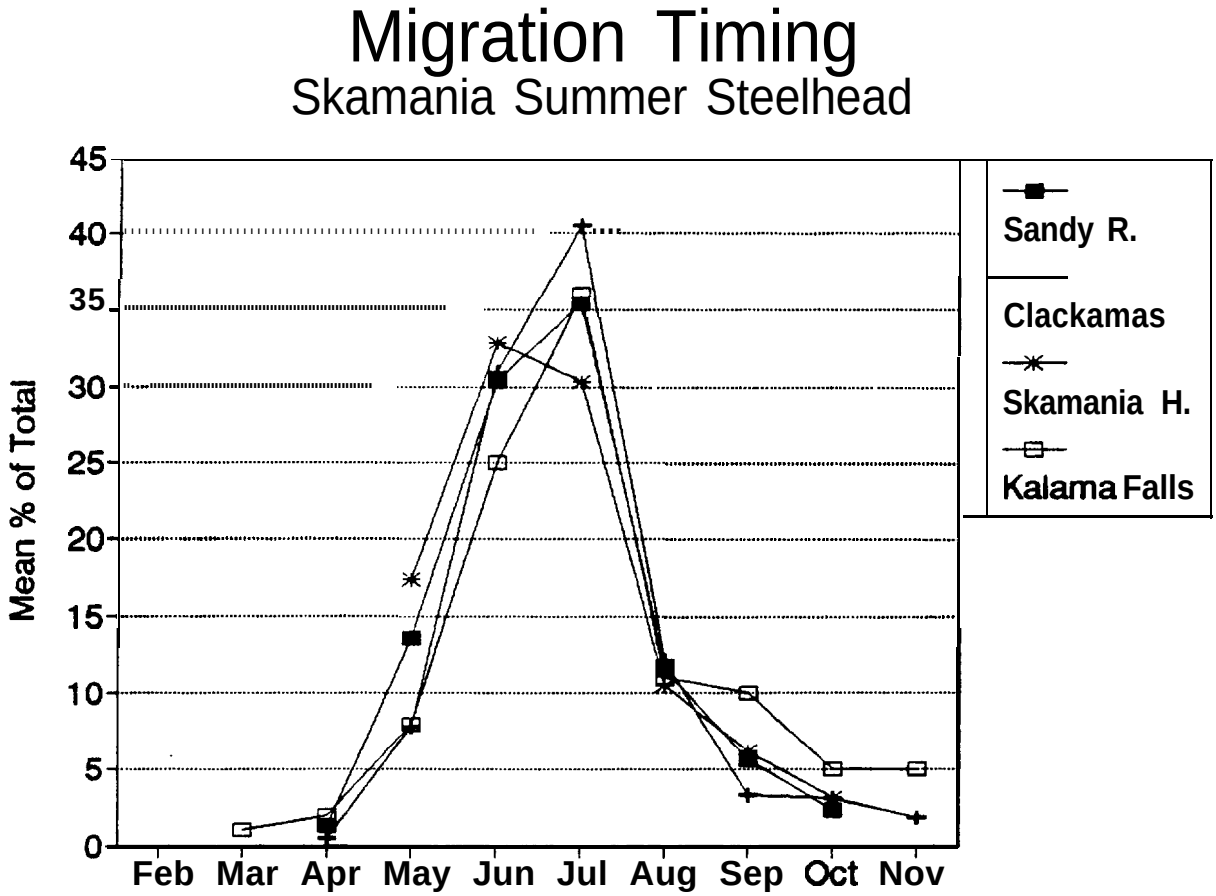


Figure 13. Migration timing of Skamania stock summer steelhead in several Columbia River tributaries. Data sources: Sandy River - counts at Marmot Dam, 1978-1984 from Howell et al.(1984); Clackamas River - counts at North Fork Dam, 1972-1983 from Howell et al. (1984);Skamania Hatchery - counts at entry, 1979-1983 from Howell et al. (1984);Kalama Falls - counts at hatchery for 2-salt fish, 1976-1983 form Leider et al.(1986).

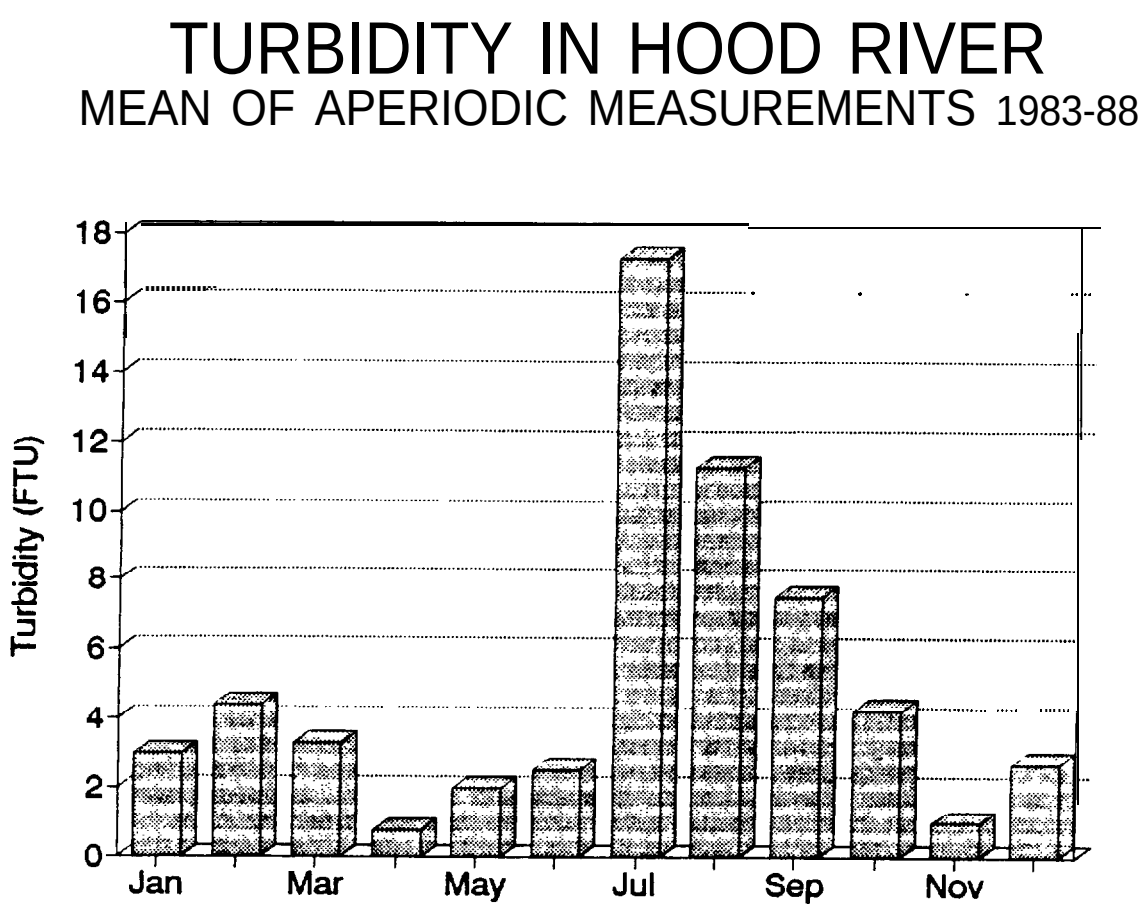


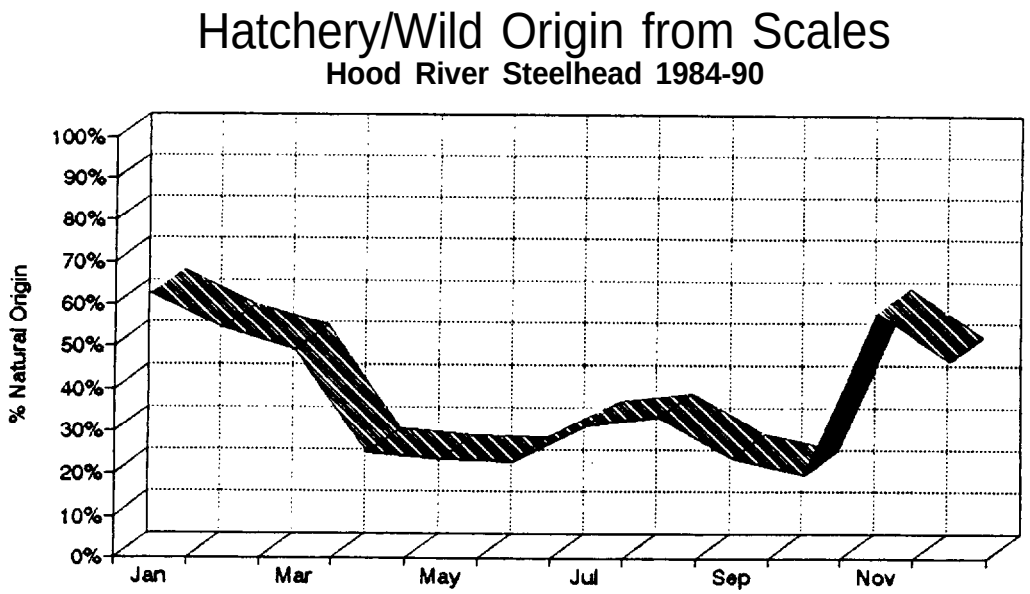
Figure **14.** Mean of aperiodic turbidity measurements in the Hood River near Powerdale Dam during 1983-B (data from **U.S.Environmental** Protection Agency as reported in Hood River **Subbasin** Plan).

At first glance, the disparity in return times between Skamania stock elsewhere and the catch pattern in Hood River seems to indicate catches of steelhead in the Hood River must be dominated by the indigenous stock. However, scale samples from Hood River steelhead captured by volunteer anglers during 1984-1990, indicate that hatchery fish predominate the catch during April-June (Figure 15; data provided by Ken Kenaston, ODFW, Corvallis). The number of scales collected during each month for the 1984-1990 samples combined also substantiate that catches of Skamania summer steelhead peak during April-June (Figure 15). All Skamania stock smolts released in Hood River during 1984-87 were marked with an adipose finclip. The presence or absence of the adipose clip on fish sampled for scales indicated that determinations of hatchery/wild origin from scales was 85% to 90% accurate.

Several factors may account for why the timing of catch for Skamania summer steelhead is so much earlier in the Hood River than other basins. Most obvious is that angling during mid June through August is usually impaired by high turbidities. Additionally, steelhead may be most vulnerable to capture when they first enter Hood River where angling is concentrated near the mouth. Once steelhead moved through the first mile of the river, angler access was poor, so few anglers were present to catch them. This effect can be seen in the one month delay after time of catch before time of passage at Powerdale Dam during 1956-1970 (see Figure 4).

The scale samples obtained by volunteer anglers indicate that at least 25% of the fish caught during April-June were naturally produced. It is unlikely these naturally produced steelhead are a mixture of stocks, because spawning of Skamania steelhead peaks from mid January to mid February (Figure 16) while spawning of 'Hood River summer steelhead peaks in April-May. Thus, spawning of the two stocks is temporally isolated. I conclude the naturally produced fish remaining in the Hood River are predominantly from the indigenous stock, because it is unlikely the Skamania stock, with a spawning time so different from the native stock, could successfully reproduce. This conclusion is supported by the findings of Wade and Buchanan (1983) that Skamania summer steelhead have not

sustained natural reproduction in the South Santiam River where large numbers are released annually.



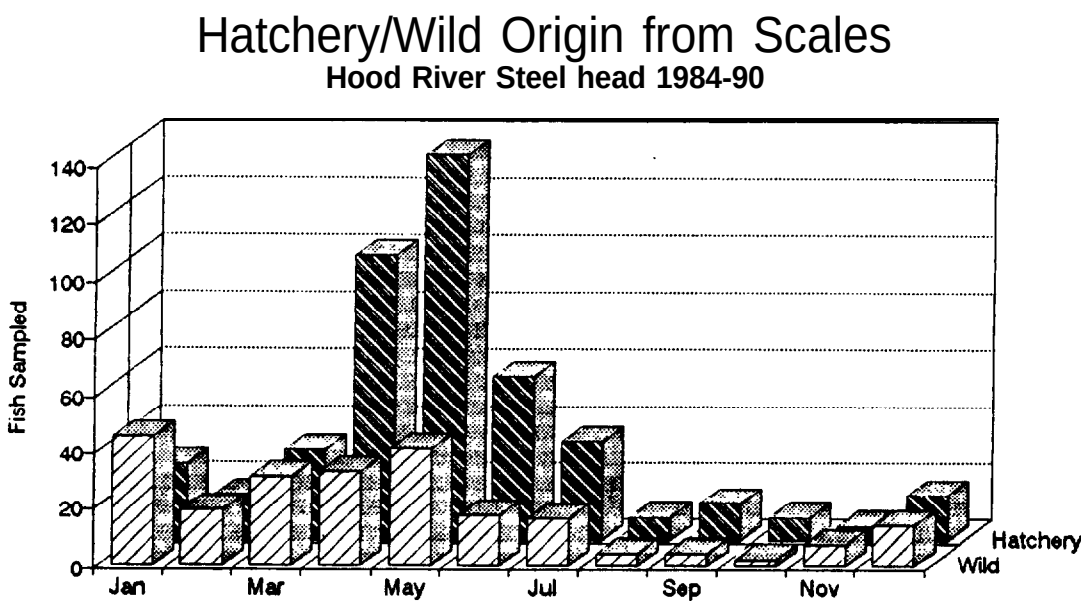


Figure 15. Ratio of hatchery to wild **steelhead** in Hood River and their temporal abundance as determined from scales obtained through an angler volunteer program during **1984-1990** (data through personal communication, Ken Kenaston, ODFW, **Corvallis).**

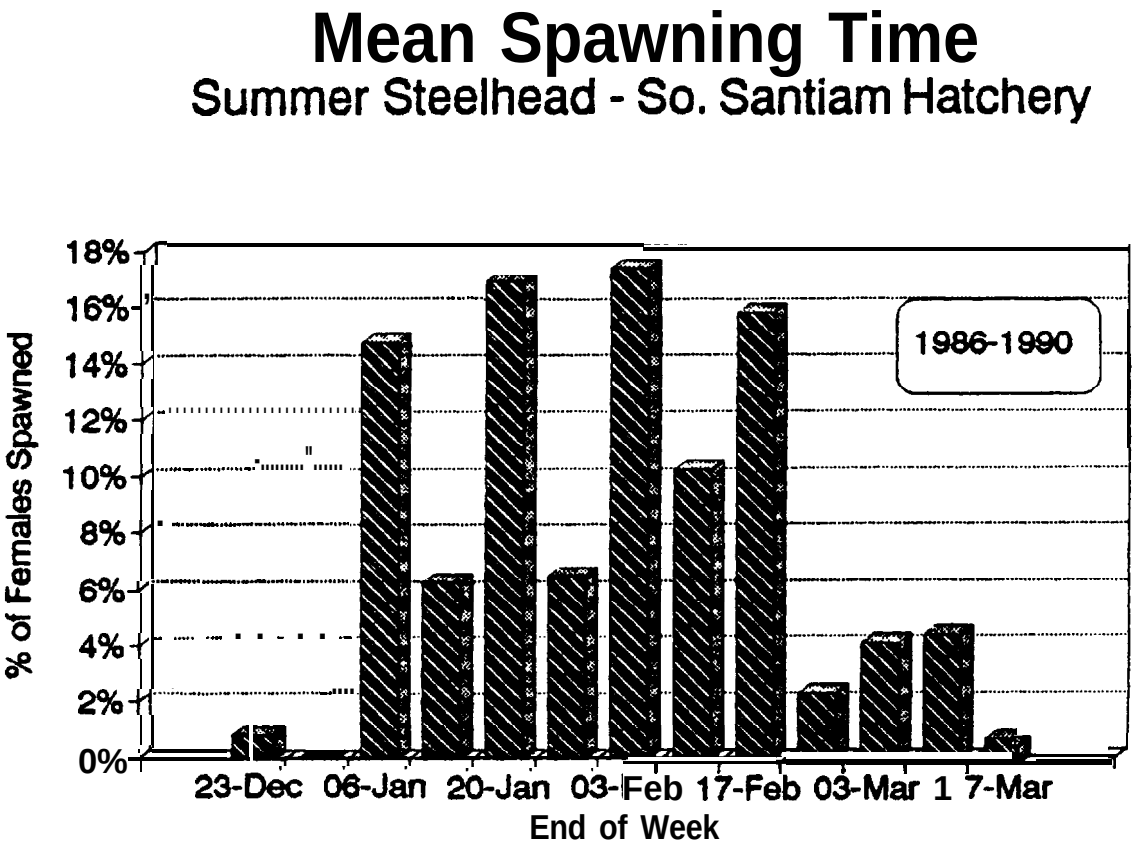


Figure 16. Mean spawning time of Skamania stock summer steelhead at South Santiam Hatchery during 1986-1990 (ODFW data).

Abundance Trends

The number of steelhead entering Hood River have not been monitored since trapping at Powerdale Dam was discontinued in 1971, so the abundance of returning adults can only be inferred through catch estimates based on angler punch cards. Estimates of total catch prior to 1970 were not corrected for nonresponse bias, so we added these factors for estimates back to 1956, as calculated by ODFW (personal communication, Ken Kenaston, ODFW, Corvallis). Total harvest during the 1980's has fluctuated widely and averaged about double that during the 1960's. Most of this increase occurred during April-October (Figure 17) when hatchery fish composed about 75% of the catch (see Figure 15). Catches during November-March, when hatchery fish composed about 50% of the catch, increased only slightly. The total annual catch of naturally produced steelhead remained comparable or slightly higher than that in the 1960's. However, the proportion of the catch that summer run is unknown.

Winter Steelhead

There is little data regarding winter steelhead in the Hood River basin, so the abundance of the natal winter run is uncertain. Passage data at Bonneville Dam during 1938-1950 and at Powerdale Dam (km 7, R 4.5) during the 1960's indicate the winter run entered Hood River during March through May at the same time maturing summer steelhead also pass Powerdale Dam. Hatchery winter steelhead from several stocks with earlier run timing have been released in the basin periodically since 1962.

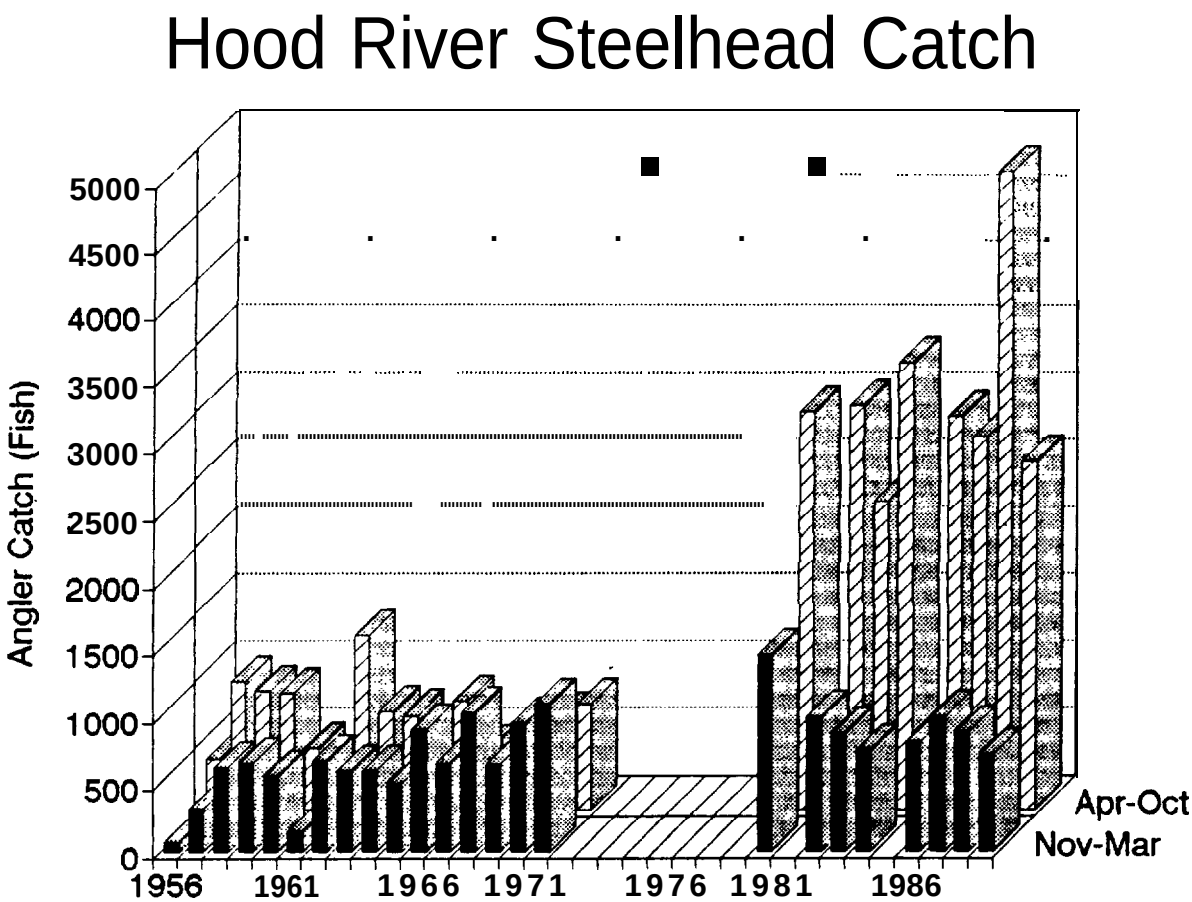


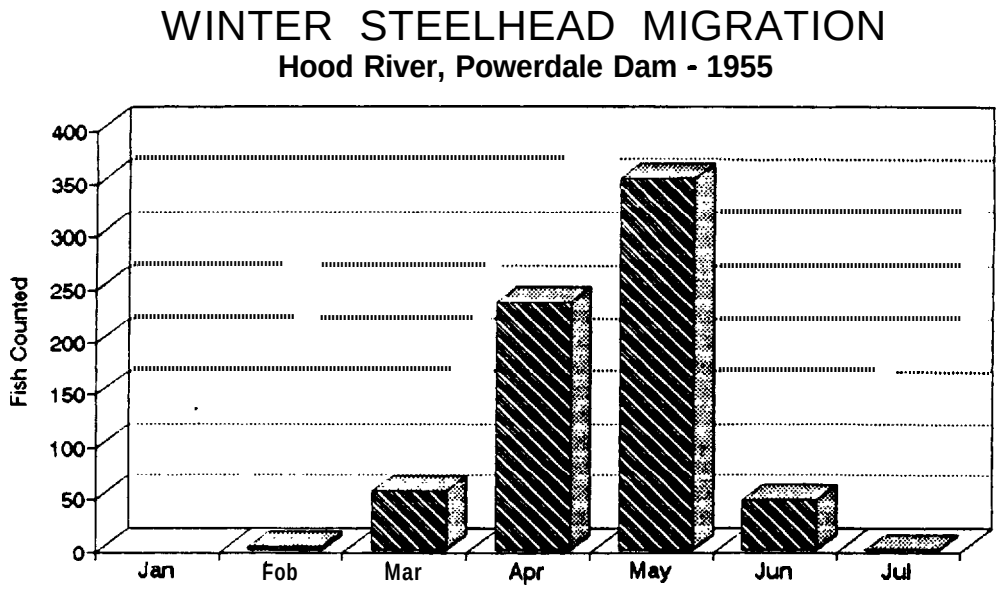
Figure 17. Angler catch of steelhead in the Hood River during April-October compared to November-March during 1956-1989 as estimated from angler punch cards (ODFW data).

Indigenous Life History

The abundance and migration timing of indigenous Hood River winter steelhead was determined from the same data sets used for summer steelhead. Winter and summer steelhead were only differentiated during 1955 and 1962-65 when fish were trapped at Powerdale Dam. Winter steelhead were defined to be fish which entered freshwater during late fall through May and spawned before summer. Once these maturing fish began to show body color, they were' difficult to distinguish from summer steelhead that passed Powerdale Dam after spending a year in freshwater. The problem of differentiating summer and winter runs became especially apparent when marked adults began returning in 1962 from the first substantial hatchery releases of Hood River summer steelhead smolts in 1960. Allan Lichens, Game Commission Biologist at the Dalles states in his 1962 Annual Report,

> ***"One item of major interest concerning the right pectoral marked summer steelhead captured at the Powerdale Dam was that 73 of the fish were considered to be winter fish in coloration and maturity, while 144 (66 percent) were true summer fish...The egg source of the marked fish was from Hood River summer steelhead held one year in a hatchery pond before they matured."***

As a result of this finding, maturing steelhead were generally recorded as race unclassified after March 15. Thus, only in 1955 when the Powerdale trap was operated from February 11 through July 12 was there an attempt to visually discriminate winter steelhead throughout the run. Based on that visual discrimination, the run peaked during April and May, with few fish passing until mid March (Figure 17). Similarly, mean monthly passage of maturing steelhead during 1963- 1971 at Powerdale Dam peaked during April and May (see Figure 6). Few steelhead passed Powerdale Dam each year before March (Appendix 1).



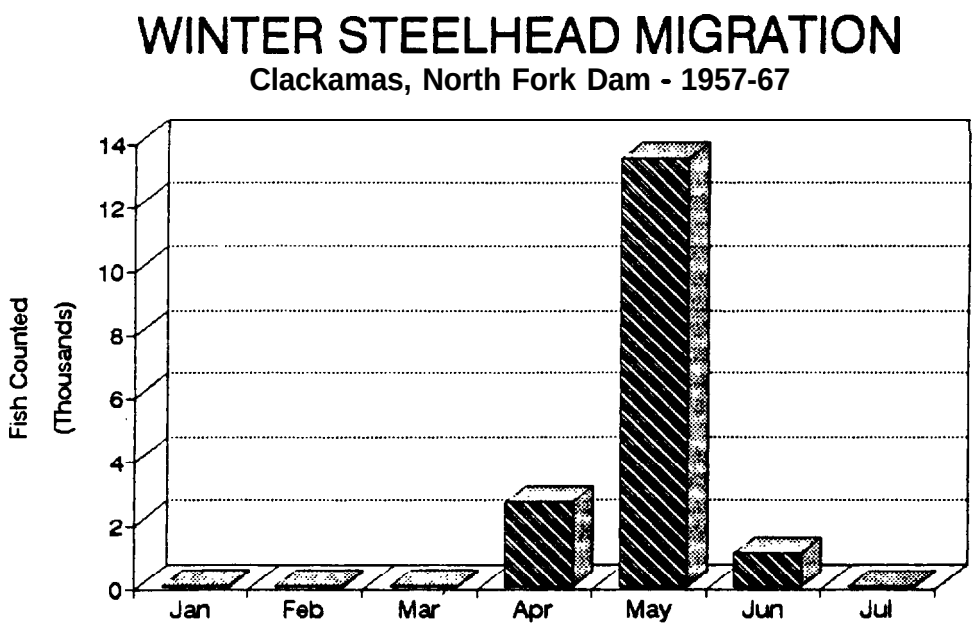


Figure 18. Timing of adult winter steelhead passage at Powerdale Dam in 1955 (Haxton 1965) and at North Fork Dam, Clackamas River, during 1956-1967 (Howell et al. 1984).

The finding from this data review that entry of winter steelhead into Hood River peaked in April and May differs from the assumed river entry time reported for winter steelhead in the Subbasin Plan. The Subbasin Plan states:

> ***"It is assumed that winter steelhead have a life history cycle similar to that of winter steelhead located in lower Columbia River subbasins. Winter steelhead probably return to the Hood River drainage from around November through February, primarily as l-salt and 2-salt fish, with the peak of the run occurring sometime between December and January; spawn from December through March;..."***

Thus, the Subbasin Plan makes it clear that the life history reported was assumed, but not substantiated.

Several sources of evidence support the conclusion that natal winter steelhead enter the river primarily during April-May. The most noteworthy source was the counts of steelhead passing Powerdale Dam. An additional source is counts of steelhead over Bonneville Dam, where fish passage is no longer counted during November l-March 15, but where fish were counted throughout the year during 1938-1950. Counts during 1938-1950 indicate steelhead passage was lowest during November-February, but a minor fresh run passed Bonneville during March through May, followed by the abundant summer run during July-September (Figure 19). The total number of steelhead counted over Bonneville during December through February was generally less than 250 and exceeded 1,000 in only two of the 12 years counted (Figure 20). Experimental counting during winter months of 1989 and 1990 by Washington Department of Fisheries revealed there are still few fish migrating over Bonneville in the winter and the majority of fish that do are maturing summer steelhead, not fresh-run winter steelhead (personal communication with Dan Rawding, WDF, White Salmon). Therefore, I conclude winter steelhead indigenous to Hood River enter the river primarily during April-May. This is an important point because Big Creek winter steelhead have been stocked in the basin annually since 1985 and would return predominantly in December and January (Howell et al. 1984).

Peak return of winter steelhead during March-May appears to be characteristic for tributaries to the Columbia River that drain the Cascade Mountains. Howell et al. (1984)

present data showing this is the typical timing of wild winter steelhead in the Kalama River. Howell et al. (1984) also present data showing passage of indigenous winter steelhead over North Fork Dam in the Clackamas River is limited almost exclusively to April-June (Figure 18).

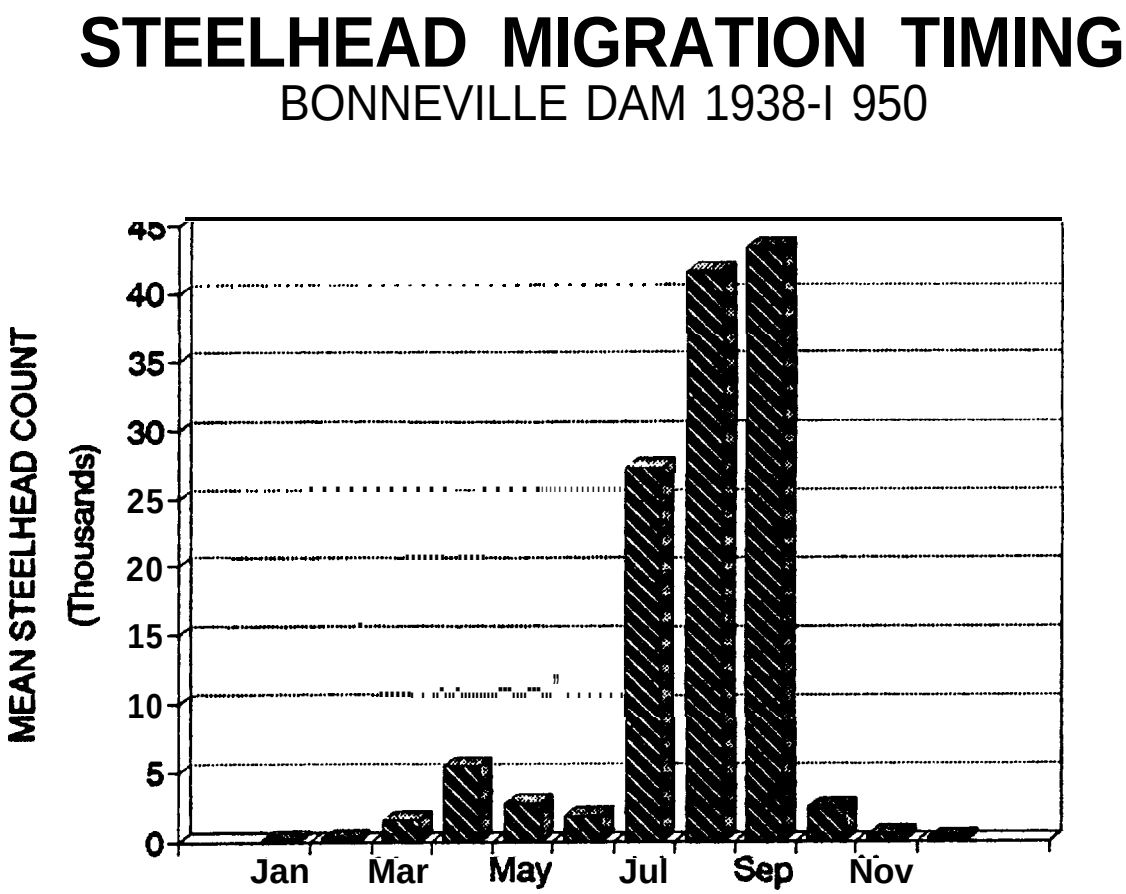


Figure 19. Counts of adult steelhead passing Bonneville Dam during 1938-1950. These were the only years fish were counted during winter (USACE 1989).

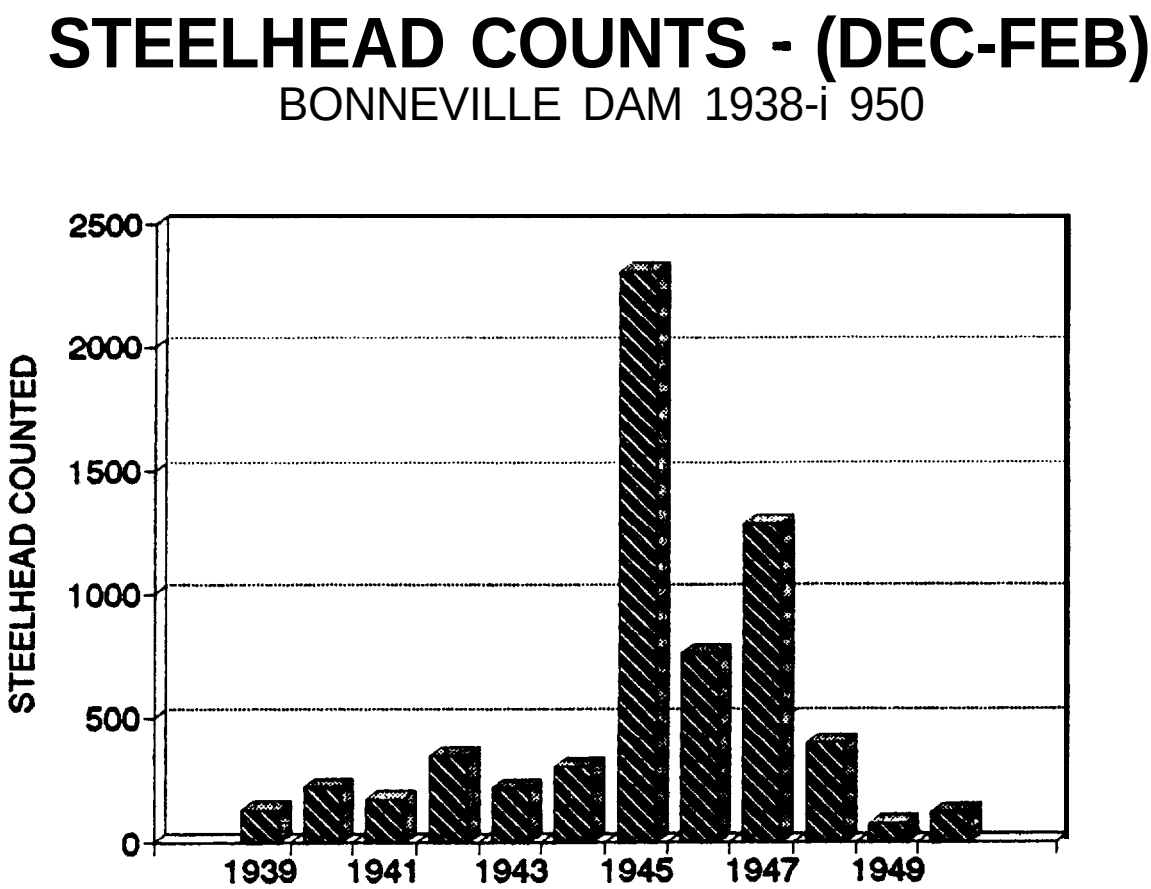


Figure 20. Total adult steelhead counted over Bonneville Dam during December through February each year, 1938-1950 (USACE 1989).

The temporal distribution of steelhead catch by anglers has confused the understanding of the timing for indigenous winter steelhead entry into Hood River. Figure 4 (p. 16) shows that catch of steelhead by anglers during 1956-70 increased in November and December even though passage at Powerdale Dam was lowest in those months. Most angling is below Powerdale Dam (personal communication, Jim Newton, ODFW, the Dalles). The low counts of fresh-run fish at Bonneville Dam during these months indicate the catches during November-February in Hood River during 1956-70 must have been predominantly summer steelhead that had been in freshwater since summer. There is little spawning area in the basin below Powerdale Dam, so the fish caught in November-February must be entering the lower river as a staging area, either for later migration up Hood River or for migration to other portions of the Columbia Basin.

This behavior of summer steelhead to wander during their freshwater holding period is well documented. Sampling of steelhead landings in the Zone 6 (above Bonneville) net fishery during February and March indicated that holdover summer steelhead composed 95% of the 9,530 fish landed in 1989 and 90% of the 3,660 fish landed in 1990 (personal communication with Don Swartz, ODFW, Clackamas). Sampling of the angler catch in the Deschutes River during 1983-1989 revealed that 50% to 75% of the steelhead caught at Sherars Falls (R 40) were stray hatchery fish from other subbasins (Olsen et al, in press). Further, over 150 adult steelhead tagged by ODFW as they passed Sherars Falls, primarily during September and October, 1976-1986, were recaptured in other subbasins as early as November, but mostly in March as they entered hatcheries to spawn (Olsen et al. in press). The Fish Commission of Oregon tagged chinook and coho passing Powerdale Dam in the fail of 1959 and 1960, and the majority of tags recovered from both species were recovered at locations outside the basin (few fish were sampled inside the basin; Sams and Willis 1961).

Steelhead scales obtained through the ODFW angler volunteer program indicate the proportion of the hatchery fish in the catch was lowest (about 50%) during November to March (see Figure 15). Historical data indicate fish migrating past Powerdale at this time are predominantly old-run summer steelhead. It is likely that hatchery summer steelhead,

which were all released as smolts in the West Fork Hood River, would have been more likely to over-winter above Powerdale than wild fish, which may have smolted while rearing downstream of the West Fork. Olsen et al. (in press) found that hatchery summer steelhead released as smolts in the Deschutes River at Pelton Dam had a higher rate of return to the dam and a lower contribution to the lower river fishery than fish that had been released as smolts in the lower Deschutes River (below Sherars Falls).

Straying of hatchery winter steelhead into Hood River may also have provided an occasional bright fish for anglers in November-February and given the impression that a winter run existed during those months. For example, the 1967 monthly reports of John Haxton, Oregon Game Commission biologist in the Dalles indicate that 14 of 67 fresh run steelhead trapped at Powerdale Dam during December 16 to March 15 were fin marked from releases in the Sandy River. The origin and final destination of steelhead captured during November-February remains an uncertainty.

Spawning of winter steelhead has only been spot surveyed and is believed to occur throughout the basin. Primary spawning areas are believed to be the mainstem, Middle Fork and East Fork (Hood River Subbasin Plan). On a spawning survey during an unspecified day in the spring of 1964, Haxton (1965) observed 50 steelhead redds and 19 steelhead from the confluence of the East and West Forks to 6 mi downstream. Spawning apparently peaks shortly after peak passage of mature fish at Powerdale Dam in April and May (see Figure 6, p. 22). This would be similar to peak spawning during April and May of winter steelhead in the Clackamas River, which drains the west side of Mt. Hood (personal communication, Doug Cramer, Portland General Electric Company, Estacada). Spawning in the Hood River must have continued into June, because annual reports during 1959-1962 by Al Lichens, Oregon Game Commission biologist indicate ripe winter steelhead were still being trapped at Powerdale in June each year.

Age composition of Hood River steelhead was determined from scale analysis discussed under **Summer Steelhead.** Summer and winter races could not be distinguished, but the predominant life history was 2 years in freshwater followed by 2 years in the ocean. Leider et al.(1986) found the age composition of Kalama River steelhead was similar

between summer and winter runs.

As presented under summer steelhead, outmigration of smolts past Powerdale Dam in 1965-67 peaked the last two weeks of May. Traps fished on the East Fork and in Neal Creek during 1963 showed the outmigration of juvenile steelhead peaked in April in Neal Creek and in June in the East Fork (Figure 21). These differences in migration time may reflect differences in the temperature and flow regimes of these two tributaries. Neal Creek generally runs warmer than the East Fork (Table 2). However, the East Fork Irrigation District canal empties into the West Fork Neal Creek, runs about 2 miles downstream, and the mixed water is diverted back out into a continuation of the canal (personal communication, Jim Newton, ODFW, the Dalles). Most steelhead spawn in Neal Creek below the intersection with the irrigation canal. Because the canal is unscreened at its head in the East Fork Hood River, smolts emigrating from the East Fork may end up in Neal Creek. Thus, the observed difference in juvenile steelhead migration times during 1965-67 is surprising and may reflect emigration of parr rather than smolts when irrigation flows began or when catchable hatchery rainbows were stocked in April. I conclude these data on juvenile outmigration are inadequate to differentiate substocks.

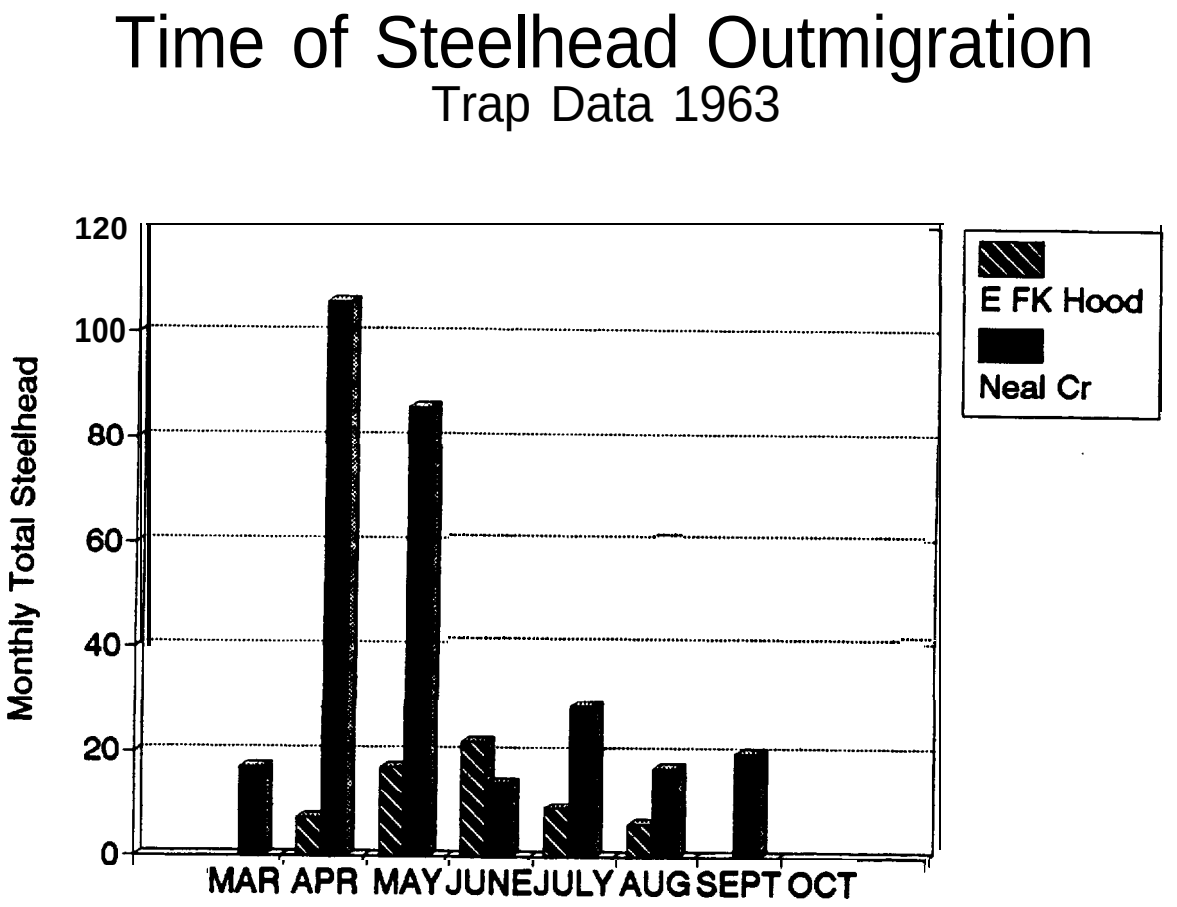


Figure 21. Timing of capture of downstream migrant steelhead in diversion bypass traps on the East Fork Hood River and Neal Creek during 1961-1963 (Oregon State Game Commission 1963).

Table 2. Weekly temperatures (F) obtained with minimum-maximum thermometers from five Hood Basin streams in 1963 (from Oregon State Game Commission 1963).

Week Beginning		Neal Creek 50 yds. below upper Neal Cr. diversion (Fig.1)		E. Fk. Hood River River mile 5.9 50 yds. below "toll bridge"		W. Fk. Hood R. River mile 4.1		Lake Branch River mile 2.1		Fifteenmile Cr. River mile 35.5 above all irrigation diversions	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
May	19	48	57	44	53	43	56	43	53	45	53
	26	46	54	41	51	44	55	44	53	43	53
June	2	48	50	46	52	44	56	44	56	44	56
	9	47	59	44	59	45	60	44	59	46	60
	16	54	60	46	58	50	61	50	58	50	51
	23	46	58	44	57	47	58	44	56	46	64
	30	47	58	44	58	46	58	46	56	50	62
July	7	49	60	46	54	48	56	47	55	50	62
	14	50	60	46	58	46	60	47	61	50	64
	21	49	60	48	59	47	63	46	62	51	64
	28	49	60	48	59	47	60	46	57	50	66
August	4	50	60	47	59	49	61	47	58	50	66
	11	50	60	47	59	50	62	48	58	50	66
	18	50	59	48	59	48	60	47	56	48	65
	25	46	57	45	57	47	58	46	55	50	62
Sept.	1	51	59	48	58	48	59	47	56	50	64
	8	51	59	47	56	47	58	46	56	50	63
	15	50	58	47	54	47	58	46	56	50	63
	22	46	56	44	52	46	58	46	56	50	62
	29	49	53	46	54	46	56	46	56	52	65
Oct.	6	48	50	44	52	44	55	44	53	48	61
	13	47	52	44	46	46	52	45	51	49	58
Averages		48.7	57.2	45.6	55.6	46.6	58.2	45.9	56.3	44.2	61.4

Genetic Information

Schreck et al. (1986) sampled 21 electrophoretic, 16 morphometric, and 11 meristic characters from steelhead throughout the Columbia Basin, and found that stocks differed between west and east of the Cascade Mountains and between hatchery and wild stocks. The morphometric and meristic characters measured by Schreck et al. have a demonstrated genetic basis, but also are influenced by environmental factors. Schreck et al. (1986) obtained samples from Hood River by electrofishing juvenile steelhead in Neal Creek. The parentage of these juveniles is uncertain and may include winter steelhead, summer steelhead, and catchable hatchery rainbow. Whatever the parentage was, Schreck et al. found that steelhead juveniles sampled in Neal Creek could be separated from South Santiam Hatchery summer steelhead and from Big Creek Hatchery winter steelhead based on combined average measurements of body shape characteristics. However, no differences were found in electrophoretic or meristic characters. The differences identified in body shape characteristics were minor and could not be used to distinguish the origin of individual fish.

Hatchery Influences on the Indigenous Stock

Hatchery winter steelhead smolts (non-native stock) have been released into the Hood River drainage periodically since 1962. Hatchery releases from several stocks ranged from 26,250 to 400,365 unmarked fingerlings during 1962 to 1976 and from 23,872 to 99,235 unmarked smolts (Big Creek stock) from 1978 through 1986 (Appendix 3). Hatchbox fry have been released as part of the ODFW STEP program since 1985. Additionally, in 1966, 1967, and 1968 the following number of adult steelhead from Big Creek Hatchery were released in the basin: 43, 384, and 550, respectively.

Returns from these releases of winter steelhead appear to have had the greatest influence on angler harvest in 1980 (Figure 22) when fish would have returned from the release in September, 1978 of 101,658 smolts (Big Creek stock). Catch in 1980 remained

unusually high through the summer and peaked in November. This was an unusual pattern and may be related to the straying of steelhead that had intended to return to streams influenced by the Mount St. Helens eruption. A large portion of the catches in November and December were likely from the Big Creek stock. Steelhead return to Big Creek Hatchery from December through March with the median in January, predominantly after 2 years in the ocean (Howell et al. 1984). Spawning of Big Creek steelhead peaks in January (Howell et al. 1984).

Big Creek winter steelhead appear to survive poorly after release in Hood River. Big Creek smolts released in the Hood River in 1985-87 would have returned primarily in 1987-89. Angler catches during December-February of 1987-89 were low (see Figure 11). November through March is also the period when the wild fish compose the greatest portion (about 50%) of the angler catch (see Figure 15). Many of the hatchery fish from which volunteers collected scales were reported to be maturing summer steelhead and few were reported to be fresh run.

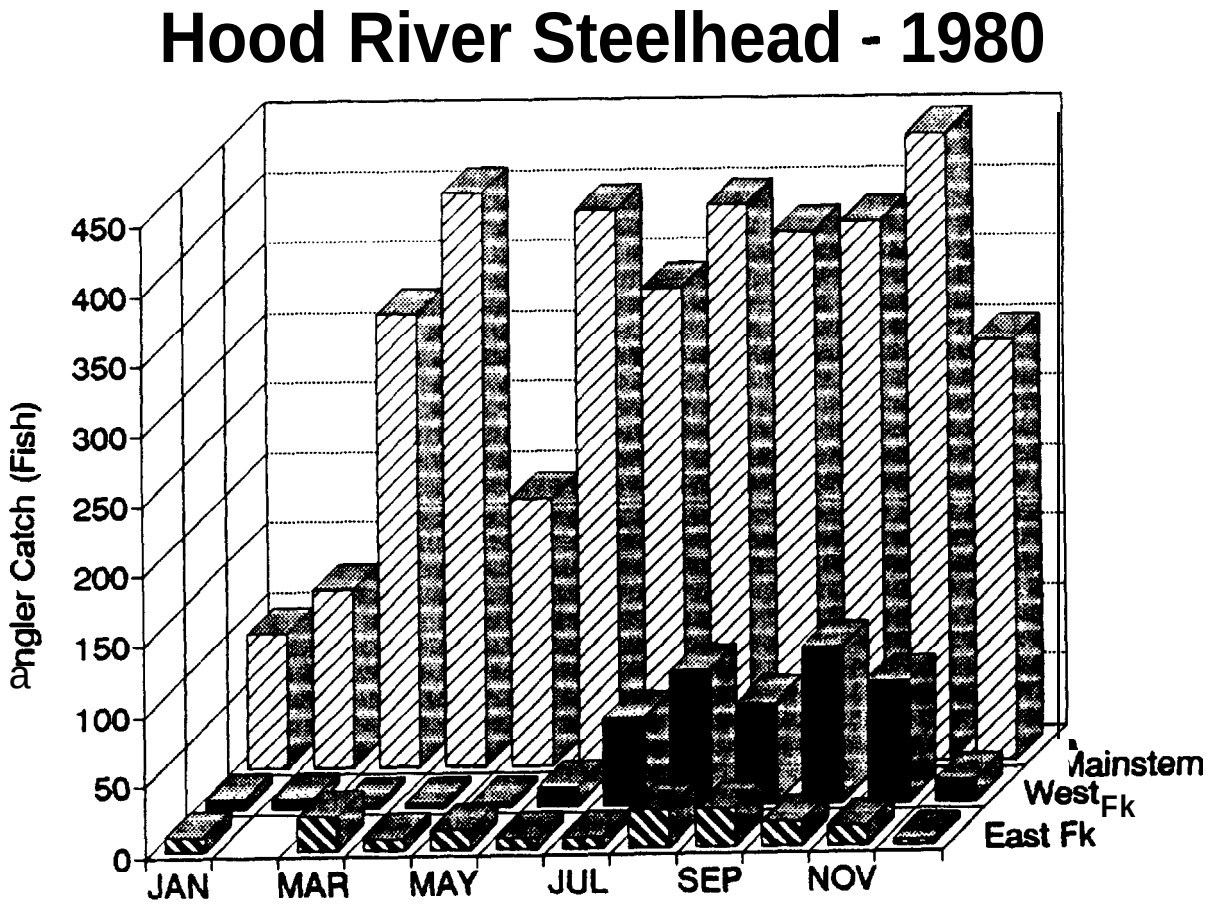


Figure 22. Time of angler catch of steelhead in the Hood River Basin during 1980, estimated from angler punch cards (ODFW data).

If some Big Creek winter steelhead returned and spawned, they should have been temporally isolated from spawning with wild fish by their early spawning time. Spawning of Big Creek steelhead peaks in January, while spawning of Hood River winter steelhead peaks in April or May. Thus, poor returns of Big Creek steelhead coupled with their early peak spawning. has probably precluded introgression of genes to the indigenous stock.

Abundance Trends

During 1963-71, maturing steelhead composed 20% to 60% of the steelhead crossing Powerdale Dam prior to July (Figure 23). The majority of these maturing fish were presumed to be winter steelhead. Earlier drafts of subbasin planning documents suggesting that wild stocks were depressed were based on the assumption that indigenous winter steelhead returned primarily during the winter, not during March into May. Continued good catches of steelhead during March-May during the 1980's appear to indicate that wild winter steelhead are sustaining themselves. For example, total angler catch during April-October, 1956-1971, averaged about 500 fish, many of which were wild. During the 1980's, angler catch has averaged about 2,500 fish during April-October, with about 25% of the fish being wild. Thus, the catch of wild steelhead is greater today than it was in the 1960,s, but the relative proportions that are summer versus winter are unknown. This deduction is an uncertainty that should be tested with future sampling.

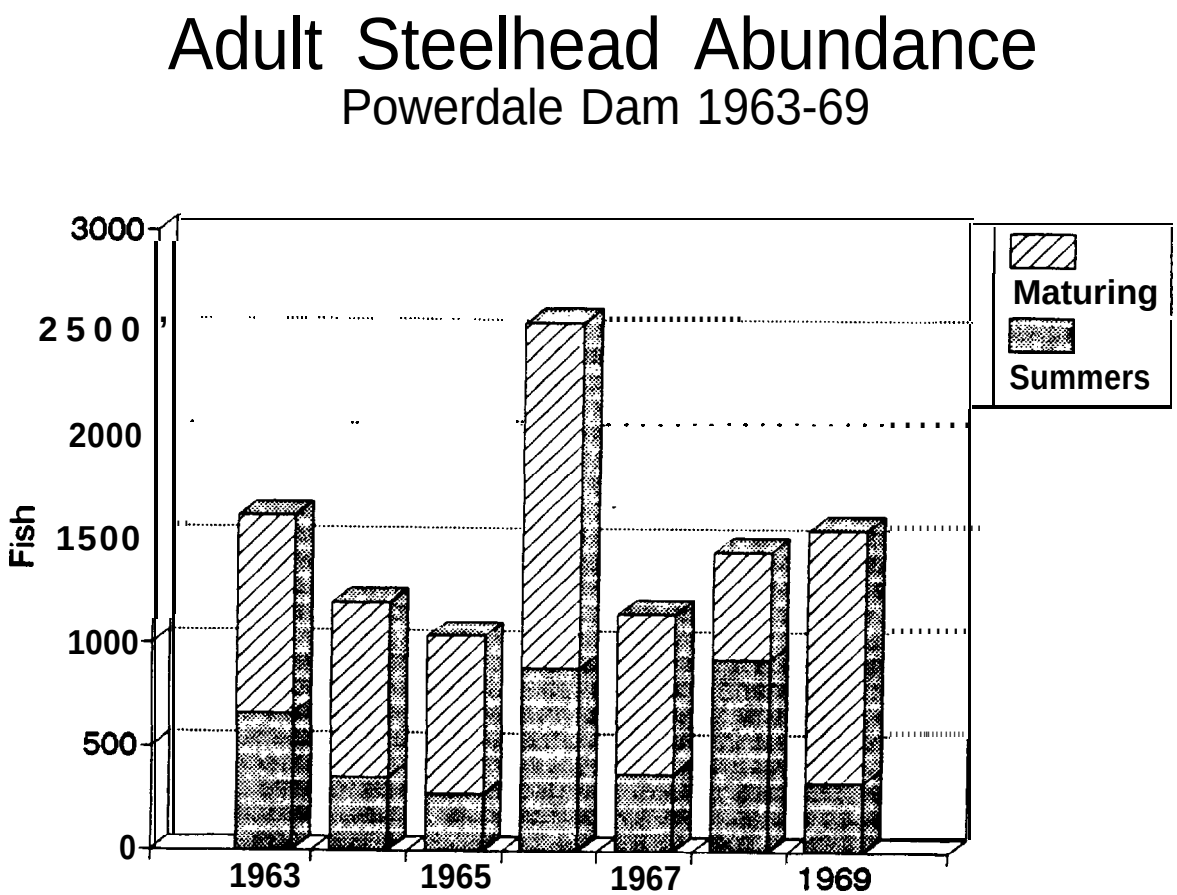


Figure 23. Total counts of summer steelhead and maturing steelhead passing Powerdale Dam during 1963-1969 (ODFW data).

Spring Chinook

Less than two spring chinook were counted over Powerdale Dam for five consecutive years during 1965-1969 (see Subbasin Plan), so the natal run must be considered extinct. A five-year hatchery supplementation program calling for release of 120,000 to 150,000 smolts was implemented in 1988 with Carson stock. The Master Plan calls for the use of Deschutes (Round Butte Hatchery) stock beginning in 1991.

Indigenous Life History

Information on the indigenous stock of spring chinook is lacking. Chinook were occasionally trapped as they passed over Powerdale Dam during May-July of 1962 to 1971. The largest number trapped during May-July was 28 in 1964, with 13 of the fish passing in July (Appendix 1). Only 0 to 2 chinook passed Powerdale Dam during 1965-71, so the run was extinct by 1965. Angler harvest, based on punch card returns, of chinook during April-June has fluctuated from 0 to 15 fish during 1977-86. I conclude these fish must have been strays. Peak time of river entry for spring chinook in other Columbia Basin rivers is April-May (Howell et al. 1984). The remnant run of chinook entering Hood River in the early 1960's may have been summer chinook which migrate through the lower Columbia typically during June and July (Bjomn 1960) and may have been strays. It is believed the chinook entering Hood River in May-July held and spawned in the mainstem of the Hood River, in the West Fork, and in several streams tributary to the West Fork (Hood River Subbasin Plan).

Donor Stock Life History

Donor broodstock will be taken from Deschutes spring chinook returning to Round Butte Hatchery. Round Butte Hatchery has been operated since 1972 and original brood were obtained from fish that returned to the base of Pelton Dam. These were a combination of wild and hatchery fish, hatchery fish having been released prior to 1972 from Fall River, Oak Springs, and Wizard Falls hatcheries in the Deschutes Basin. Additional broodstock were collected for Round Butte Hatchery during 1977-80 from wild spring chinook passing Sherars Falls, because hatchery returns were insufficient (Lindsay et al. 1989). These additional fish must have been Warm Springs River stock, because nearly all of the wild spring chinook are produced in the Warm Springs River.

The Carson stock spring chinook, which was planted in Hood River beginning in 1988, originated from upriver spring chinook trapped at Bonneville Dam (Howell et al. 1984). Thus they represent a mixture of genes from many upriver stocks.

Life history data on Deschutes spring chinook are taken from Lindsay et al. (1989) unless indicated otherwise. Adult spring chinook enter the Deschutes River from early April to early June. They arrive at Pelton trap in early May. Fifty percent of the adults enter the trap by the first week in June and 75% enter by about mid-June. Jacks tend to arrive a week later than adults. Time of entry into Warm Springs National Fish Hatchery is similar. Eggs are taken from late August to early September. This is a narrower range of spawning times then at Warm Springs Hatchery where spawning begins about August 15 and continues weekly until mid September (Subbasin Plan). Spawning of wild spring chinook in the Warm Springs River begins the last week in August, peaks by the second week in September and is complete by the last week in September (Lindsay et al. 1989). Eggs are incubated at Round Butte Hatchery at 42 F and hatch in December and January.

Round Butte stock spring chinook tend to spawn 1-2 weeks later than Carson stock and spawn within a narrower time window than Klickitat stock (Figure 24). These three stocks have been considered for use in Hood River. Data for this comparison were obtained directly from hatchery spawning records during 1986-1990. I conclude that genetic

diversity for spawning time is probably greatest in the Klickitat stock.

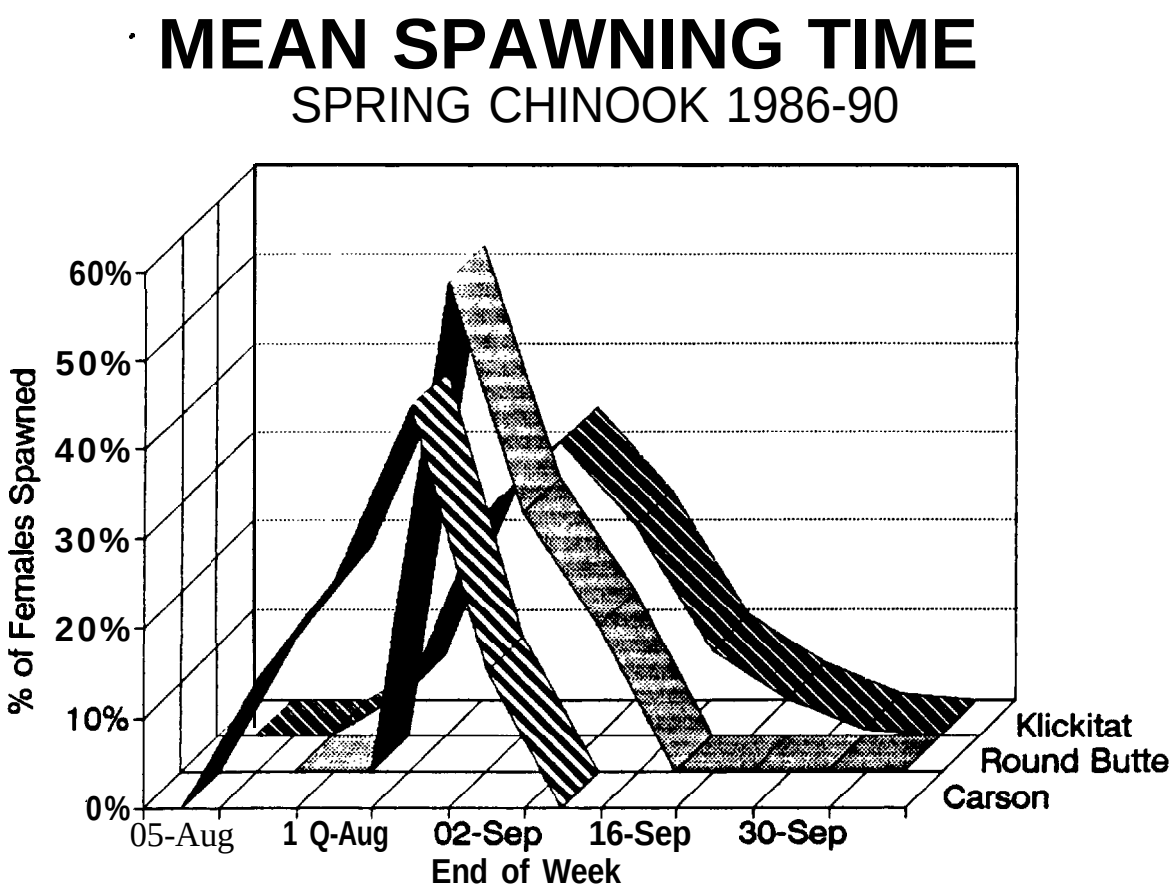


Figure 24. Mean time of spawning for Round Butte, Carson and **Klickitat** spring chinook during 1986-1990 (data from ODFW, WDF, and USFWS files).

Fry from natural spawn in the Warm Springs River emerge in February **and** March. Juveniles migrate from the Warm Springs River in two peaks, a fall migration from September through December, and a spring migration from February through May as yearlings. Natural spring chinook that migrate from the Warm Springs River in fall rear

over winter in the Deschutes or Columbia rivers before entering the ocean the following spring at age-l.

Deschutes River spring chinook enter the ocean at age-l and return at age-3 through age-5. Age at maturity averages slightly younger for fish from Round Butte Hatchery than from Warm Springs Hatchery (Tables 3 and 4), with the predominance of fish rearing 3 years in the ocean (age-4 spawners). Average fecundity at Round Butte Hatchery is 2,300 eggs for age 3 females and 3,500 eggs for age 4 females (Deschutes River Subbasin Plan).

Carson stock spring chinook are older at maturity, on average, than the Deschutes and Klickitat stocks. Carson stock average 54% age 4 and 41% age 5 at maturity (Mullan 1987) compared to 72% age 4 and < 1% age 5 for Round Butte fish and 39% age 4 and < 1% age 5 for Klickitat fish (Klickitat Subbasin Plan).

Ocean distribution differs between Round Butte, Carson, and Klickitat stocks, but catch rate is generally less than 5% for all three stocks. Deschutes fish tend to be caught most off California and Oregon (Wahle et al. 1981; Lindsay et al. 1989), while Carson and Klickitat stocks are caught most off Washington, British Columbia, and Alaska (Wahle et al. 1981; Howell et al. 1984).

Table 3. Percent age composition of hatchery spring chinook salmon that returned to Round Butte Hatchery, 1977-82 broods.

Brood year	Age 3	Age 4	Age 5	n
	21	79		
1977	29	70	0	284
1978			1	358
1979	22	76	2	656
	18		1	
1980	22	81	2	259
1981		76		1,393
1982	19	79 '	2	1,483

Table 4. Percent age composition of hatchery and wild spring chinook salmon in the Warm Springs River, 1978-80 broods.

Brood year	Hatchery fish			Wild fish		
	Age 3	Age 4	Age 5	Age 3	Age 4	Age 5
		86				
1978	6	88	8	2	82	15
	7		5	5	83	12
1980	2	91	7	4	81	15

***Genetic** Information*

Allozymic variability has been determined at 33 protein loci for spring chinook from Round Butte and Warm Springs Hatcheries, and has been compared to numerous other chinook stocks in the Columbia Basin (Winans 1989) and throughout the Pacific Northwest (Utter et al. 1989). Winans (1989) found the largest heterozygosities at six loci, and found that average heterozygosities were lower for spring chinook than fall chinook and lowest of all for Snake River stocks. Winans concluded that the number of bottlenecks reducing genetic variation in a population increased with the distance upstream a stock had to migrate. Average heterozygosity was significantly greater for Kiickitat spring chinook than Deschutes stocks and was similar between Carson and Deschutes stocks. Utter et al. (1989) found from studying 25 polymorphic loci known to be variable in chinook salmon, there were considerable genetic differences among populations. Typically, adjacent populations tended to have allele frequencies more similar to one another than those from other areas. Utter et al. (1989) combined samples from Round Butte and Warm Springs hatcheries, and found they differed from Carson stock at the PGK and SOD1 loci, and they differed from the Klickitat stock at the GR, PGK, and SOD1 loci.

Stock Specific Risk Analysis

This section of the report presents an analysis of the likely magnitude and uncertainty of genetic risks, by species and race, associated with the specific operating plans presented in the Hood River Master Plan. These risks are categorized according to the four genetic yardsticks discussed in Section II, "Classification of Types of Genetic Risk," and are assessed based on information presented in Section IV, "Characterization of Target Populations." Types of risk are presented under each species and race in their order of highest to lowest risk.

The magnitude of genetic risk must be assessed by comparison to the genetic goals for the program and the policies of the resource management agencies. Genetically related goals stated in the Master Plan are:

- ***Re-build naturally sustaining spring chinook, summer and winter steelhead runs in the Hood River drainage.***

- ***Maintain the genetic character of naturally producing populations of salmonids native to and reestablished in the Hood River drainage.***

Summer Steelhead

Rank I Risk - Type 3: Loss of Population identity

An early draft of the Master Plan stated, "Hatchery brood stock for the NEOH Hood River propagational facility will be collected from both hatchery and natural segments of the summer steelhead run returning to the Hood River." Further, it stated, "If necessary, brood stock may be supplemented from Skamania stock." Data presented in this report

demonstrate that run timing and spawning timing of the Skamania stock differ substantially from that of the Hood River stock. If both stocks were used for brood (random matings are stipulated in the Plan), some of the latest spawning Skamania stock would be spawned with earliest spawning Hood River stock. This overlap would amount to roughly 10% of the matings with natal stock. This overlap of Skamania stock into the matings of natal stock would increase as the proportion of hatchery fish in the run increased. Returns of these hybrid fish would result in further introgression of Skamania genes into the Hood River stock in future generations. The expected result would be a gradual loss of Hood River stock identity and a reduction in fitness for natural reproduction. This risk is unacceptable, given the genetic goal for steelhead supplementation. Accordingly, the Master Plan has been modified to exclude the use of Skamania steelhead or their progeny from broodstock. Thus, operational plans have been adjusted to minimize this risk.

A risk remains that naturally reproducing Skamania stock, if present, might be mistaken for native Hood River steelhead. Hatchery and wild fish are likely to substantially overlap in their time of river entry (see Figure 9, p. 30), but appear to have little overlap in their spawning time. Extra fish should be held for brood and those ripening in January and February should be discarded as probable Skamania origin. Some variability of indigenous fish may be sacrificed here (Risk Type 2), i.e. genes for early spawning, in order to avoid Risk Type 3. This risk should affect less than 10% of the population and I believe is a lesser risk than cross breeding Hood River and Skamania stocks.

As an additional means of reducing mistaken identity of naturally produced Skamania stock at time of spawning, the spawning should be compared to time of entry for each fish. Time of passage at Powerdale can still be identified at the time of spawning for each fish if they are tagged with a uniquely numbered tag as they enter the trap. Skamania steelhead tend to pass Powerdale earlier than Hood River steelhead (see Figure 9, p. 30). The majority of any naturally produced steelhead passing Powerdale Dam in April-June should be Hood River stock, and of those passing in August-September should be Skamania stock. Thus, fish that mature in early March, the time of spawning overlap between the two stocks, can be checked for the time they passed Powerdale Dam to determine the

probability that they are one stock or the other. The discriminating power of these measures is uncertain and should be evaluated through the first brood cycle (4 years) that steelhead are trapped at Powerdale. The discriminating power will be high if the correlation between entry time and spawning time is high, but low if the correlation is low. Further, it is uncertain if the Skamania stock steelhead planted in Hood River in recent years have the same run timing as Washougal stock that were monitored at Powerdale Dam in 1969-71. Thus, initial spawning practices should exclude all fish ripening before March 7, but this practice can be modified later if it is demonstrated that time-of-entry data will help differentiate the two stocks.

There is a further risk of combining substocks that may be differentiated within the Hood River Basin. The known spawning area in West Fork is fairly homogeneous, so substocks are unlikely. However, summer steelhead may spawn in other portions of the basin. Spawning should be surveyed throughout the basin during March through May to determine the spatial distribution and potential for substocks, based on spawning time, location and environmental conditions. Winter steelhead will be spawning during this time also, so winter and summer steelhead should be distinctively tagged as they pass Powerdale Dam to enable visual identification of race by surveyors.

An additional risk in this category is the risk to stocks outside the basin if hatchery fish from Hood River stray to spawn. The Master Plan calls for rearing of Hood River summer steelhead at Oak Springs Hatchery on the Deschutes River. This off-site rearing may result in some straying, particularly into the Deschutes River. It is believed this straying will be minimal, but it is an uncertainty that warrants monitoring. Hood River steelhead should be fin marked differently than Deschutes steelhead so strays into the Deschutes can be distinguished.

Rank 2 Risk - Type 2: Loss of Within Population Variability

The risk of loosing within population variability is a function of effective population size. The abundance of indigenous spawners is uncertain and may be low. The population size of naturally produced summer steelhead appears to be near historic levels (500-1,000 spawners per year), but the portion of these that are indigenous stock is unknown. The ODFW Wild Fish Management Policy calls for a minimum of 300 spawners, which would equate to 75 spawners/yr over the 4 yr average brood cycle of indigenous steelhead. The Hood River Master Plan establishes the brood stock collection goal at 150 fish when spawning escapement is 250 to 2,000 fish and 165 fish when spawning escapement reaches 3,000 fish or more. If we assume natural reproduction of Skamania stock is low (this assumption is reasonable based on poor natural reproduction of Skamania stock throughout the Willamette River Basin [personal communication, D. Swartz, ODFW, Clackamas]), then the escapement of indigenous stock will exceed several hundred fish per year and the risk of decreasing indigenous escapement to less than 75 spawners/yr is very small.

It is possible the effective population size could be reduced as a secondary effect of hatchery practices. The effective population size of naturally reproducing fish would be reduced if hatchery fish were released in such a way that caused intraspecific competition for food and space. Additionally, hatchery programs attract anglers, and this is likely to increase harvest rate. The Master Plan sets harvest guidelines and smolt release procedures that should prevent adverse impacts. Still, these are uncertainties which should be monitored and addressed through adaptive management. The Master Plan states, "It is the goal of the Monitoring and evaluation program to identify and develop rearing and release strategies which avoid the creation of adverse interactions between hatchery and naturally produced stocks." This goal is to be achieved through monitoring of harvest, escapement, spawning distribution, smolt production, and genetically controlled traits.

Rank 3 Risk - Type 3: Domestication Selection

The Master Plan incorporates special measures to minimize this risk. The most important measure is that all hatchery fish will be marked before release and only unmarked returns will be used for brood. Spawners of all ages will be taken from throughout the run in proportion to their abundance. A 1:1 sex ratio at spawning will be maintained.

The Master Plan does not address hatchery practices during rearing, and these practices can be genetically selective. For example, size grading is commonly practiced in hatcheries. If size grading is necessary, rearing of the "gade outs" should continue separately and they should be released along with the other fish. Even though eggs will only be taken from unmarked fish, marked fish will be allowed to spawn naturally with wild fish, so care should be taken to avoid any type of selection in the hatchery. If the appropriate care is taken, the genetic risk here should be small.

A type of artificial selection may occur in the hatchery by the way in which matings are assigned. The Master Plan calls for random mating. There is a substantial body of evidence to suggest that matings in the wild are not random, but are assortative according to external appearance. In a study of mate selection among sockeye salmon (*Oncorhynchus nerka*), Foote and Larkin (1988) found that matings were highly assortative and that, "individuals of both sexes find members of the opposite. sex of their own form highly attractive." Hanson and Smith (1967) and Foote (1988) concluded that gene flow is restricted among size classes within sockeye salmon and kokanee through assortative mating by size. Similarly, for rainbow trout, *Oncorhynchus mykiss*, Neave (1944) found that resident trout and migratory steelhead mate assortatively according to size. Van Den Berghe and Gross (1989) found for coho, *Oncorhynchus kisutch*, that body size and kype size, "together resulted in as much as a 23-fold fitness advantage to the largest females in the population." The genetic relevance of assortative mating according to size is established by the findings that age at maturity and growth rate are heritable characteristics in steelhead (Kincaid et al. 1977; Gall et al. 1988; Tipping 1991). Thus, artificial disruption

of assortative mating would alter natural selective pressures and would cause. a reduction in fitness. Instead of mating fish randomly, fish should be mated according to similarity in size and appearance. The degree to which matings occur between partners of different size and appearance is unknown and should be recorded from characteristics of spawning pairs surveyed within Hood River Basin.

Rank 4 Risk - Type I: Extinction

Steelhead populations appear healthy, although the relative abundance of summer and winter races is uncertain. Extinction could become be a threat without the project if heavy stocking continued with the poorly adapted Skamania stock. Hatchery fish could reduce survival of wild fish by competing for spawning sites and by interbreeding and reducing fitness below the viable level. The threat of extinction is small but real and will be reduced by implementation of the Master Plan.

Extinction is also a minor threat to nontarget species as a result of increased harvest, competition, predation or disease. Much of this risk will be eliminated by release of smolts (rather than fingerlings) at their optimum readiness to migrate. Overharvest can be prevented by limiting the take of unmarked fish (all hatchery fish will be marked). Creation of excessive competition or predation between species seems improbable, because these species coexisted in the basin before man began to heavily exploit them and their environment. Still, this risk remains an uncertainty that should be evaluated as the program progresses. This has been adequately addressed in the Monitoring and Evaluation Plan of the Master Plan, which calls for monitoring of smolt production, rearing distribution, and rearing densities.

Winter Steelhead

Rank I Risk - Type 3: Loss of Population identity

An early draft of the Master Plan stated, "Annual winter steelhead smolt outplants are acquired from the Big Creek stock of winter steelhead. Hatchery brood stock will eventually be collected from both hatchery and natural segments of the winter steelhead run returning ton the Hood River." Further, it stated, "If necessary, brood stock may be supplemented with Big Creek stock." Data presented in this report demonstrate that run timing and spawning timing of the Big Creek stock differ substantially from that of the Hood River stock. If both stocks were used for brood (random matings are stipulated in the Plan), some of the latest spawning Big Creek stock would be spawned with earliest spawning Hood River stock. As explained for summer steelhead, the result of this interbreeding of stocks would be a gradual reduction in fitness for natural reproduction. This risk is unacceptable, given the genetic goals of the Master Plan. Accordingly, the Master Plan has been modified to exclude the use of Big Creek steelhead or their progeny from broodstock. Thus, operational plans have been adjusted to minimize this risk.

A risk remains that naturally reproducing Big Creek stock, if present, might be mistaken for native Hood River steelhead. Big Creek and Hood River stock winter steelhead are likely to overlap more in their time of river entry than in their spawning time. Thus, most Big Creek stock can be eliminated from brood stock by only taking fish that reach' Powerdale Dam after February 15. Extra fish should be held for brood and those ripening before March 15 should be discarded as probable Big Creek origin. As with summer steelhead, winter steelhead held for brood should be tagged at the time of entering the trap so the combined data on time of entry and time of spawning for each fish can be evaluated as a means of improving differentiation of Big Creek and Hood River winter steelhead. Some variability of indigenous fish may be sacrificed here (Risk Type 2), i.e. genes for early spawning, in order to avoid Risk Type 3. This risk should affect less than 10% of the population and I believe is a lesser risk than cross breeding Hood River and Big

Creek stocks.

As an additional check on separation of hatchery and wild fish, brood fish should be tagged and scale sampled at capture, the scales then analyzed, and finally the hatchery fish omitted from spawning. This is a necessary step, because hatchery winter steelhead released in Hood River have not been marked. Hatchery and wild fish can be distinguished by their age at smolting: hatchery fish smolt at age 1 and wild fish smolt predominantly at age 2.

There is further risk of combining substocks that may be differentiated within the Hood River Basin. Winter steelhead are believed to spawn throughout the basin, so substocks may be present. There is suggestive, but inconclusive evidence that a substock may exist in Neal Creek. Spawning should be surveyed throughout the basin during March through June to determine if substocks exist with distinct times and locations of spawning. The existence of unique substocks can also be identified by differences in migration time as they pass Powerdale Dam. In order to relate migration timing to time and location of spawning, fish should be tagged as they pass Powerdale Dam and then spawning areas should be surveyed to identify tagged fish. Tags should be chosen to enable surveyors to easily distinguish summer and winter races.

As with summer steelhead, there is a risk to stocks outside the basin if hatchery fish from Hood River stray to spawn. The Master Plan calls for rearing of Hood River winter steelhead at Oak Springs Hatchery on the Deschutes River. This off-site rearing may result in some straying, particularly into the Deschutes River. It is believed this straying will be minimal, but is an uncertainty that warrants monitoring. Hood river steelhead should be fin marked differently than Deschutes steelhead so strays into the Deschutes can be distinguished.

Rank 2 Risk - LASS of Within Population Variability

The risk of loosing within population variability is a function of effective population size. The abundance of indigenous spawners is uncertain and may be low. The population size of naturally produced winter steelhead appears to be near historic levels (500-1,000 spawners per year), but the portion of these that are indigenous stock is unknown. The ODFW Wild Fish Management Policy calls for a minimum of 300 spawners, which would equate to 75 spawners/yr over the 4 yr average brood cycle of indigenous steelhead. The Hood River Master Plan establishes the brood stock collection goal at 100 fish when the additional natural spawning escapement is 150 to 1,300 fish and 110 fish when natural spawning escapement reaches 1,500 fish or more. If we assume natural reproduction of Big Creek stock is low (this assumption is reasonable based on low angler catches during December-February [see Figure 11, p. 32]), then the escapement of indigenous stock will exceed several hundred fish per year and the risk of decreasing indigenous escapement to less than 75 spawners/yr is very small.

It is possible the effective population size could be reduced as a secondary effect of hatchery practices such as competition for food and space and increased harvest rate. As described for summer steelhead, this risk is minimal and adequately addressed in the Monitoring and Evaluation Plan of the Master.

Rank 3 Risk - Type 4: Domestication Selection

The Master Plan incorporates special measures minimize this risk. The most important measure is that all hatchery fish will be marked before release and only unmarked returns will be used for brood. Spawners of all ages will be taken from throughout the run in proportion to their abundance. A 1:1 sex ratio at spawning will be maintained.

Issues of rearing practices and breeding practices are the same as described for this risk under Summer Steelhead. I recommend that winter steelhead not be mated randomly,

but that they be mated with fish of similar size and appearance. This practice should be evaluated during spawning surveys, as described for summer steelhead.

Rank 4 Risk - Type 1: Extinction

As for summer steelhead, the Master Plan will reduce the risk of winter steelhead extinction. The discussion for this risk type under Summer Steelhead fully applies to winter steelhead.

Spring Chinook

Rank 1 Risk - Type 2: Loss of Within Population Variability

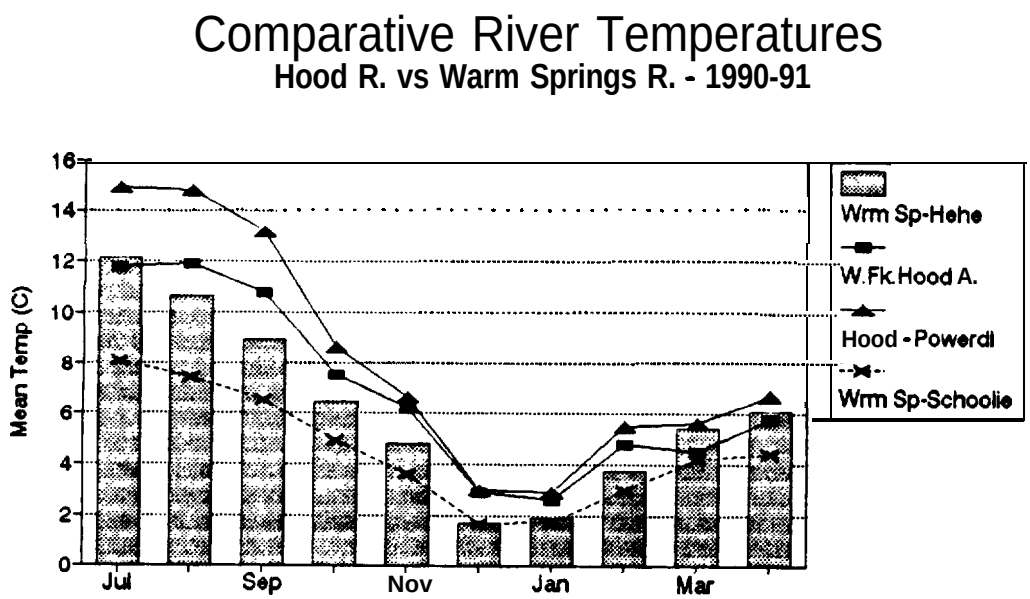
Because spring chinook are extinct in the Hood River Basin and are being reintroduced, the greatest genetic risk is the Founder Effect: the genetic variability will be limited to that which is available from the founding population. Although the variability of the founding population might be great, it is likely that some and perhaps much of that variability will be quickly eliminated because of its poor fitness value for the Hood River environment. If such natural selection occurs, then the effective population size of the donor population will be less than the number of fish used for spawning. This is important to plan for, because effective population size is a measure of a population's genetic variability (Kapuscinski and Lankan 1986).

Differences in the temperature and flow regimes between the Hood River and Deschutes Basins indicates the introduced stock is likely to face new selective pressures. Water temperatures during the egg incubation period (October-February) of 1990-1991 were 1°-3° C higher in Hood River (West Fork and Powerdale Dam) than at Schoolie Ranger Station and Hehe on the Warm Springs River (Figure 25). Limited temperature data collected in 1987 in Beaver Creek and Mill Creek, spring chinook spawning streams tributary to the Warm Springs River, indicated temperatures during November through

April were several degrees (C) lower than at Schoolie Ranger Station (Figure 25). Thus, temperatures during the time of egg incubation are the highest at Hehe of any location in the Warm Springs Basin, yet these are 1°-2° C lower than the warmest temperatures in Hood River. Spot temperatures taken by the U.S. Environmental Protection Agency (see Hood River Subbasin Plan) tend to confirm that temperatures in Hood River during winter are higher than in the Warm Springs River in all years.

Cramer et al.(1985) found that several fold differences in survival of spring chinook eggs to fry in the Rogue River were linked to differences in incubation temperature - survival decreased as incubation temperature increased. Cramer et al. (1985) concluded that higher temperatures caused fry to emerge while winter conditions still existed, so survival was poor. Deschutes spring chinook are likely to spawn too early and the fry emerge too early for high survival in Hood River. Thus, the initial generations are likely to undergo intense selection until gene frequencies code for the optimum spawning time and incubation rate.

The pattern of winter flows is also different in the Warm Springs River compared to Hood River (Figure 26). Hood River is characterized by variable and high flows during the winter, while high flows in the Warm Springs River come almost exclusively from spring runoff in March through May. These differences in flow are likely to place different selective pressures on spring chinook, especially if they emerge earlier in Hood River than they are adapted for in the Warm Springs River.



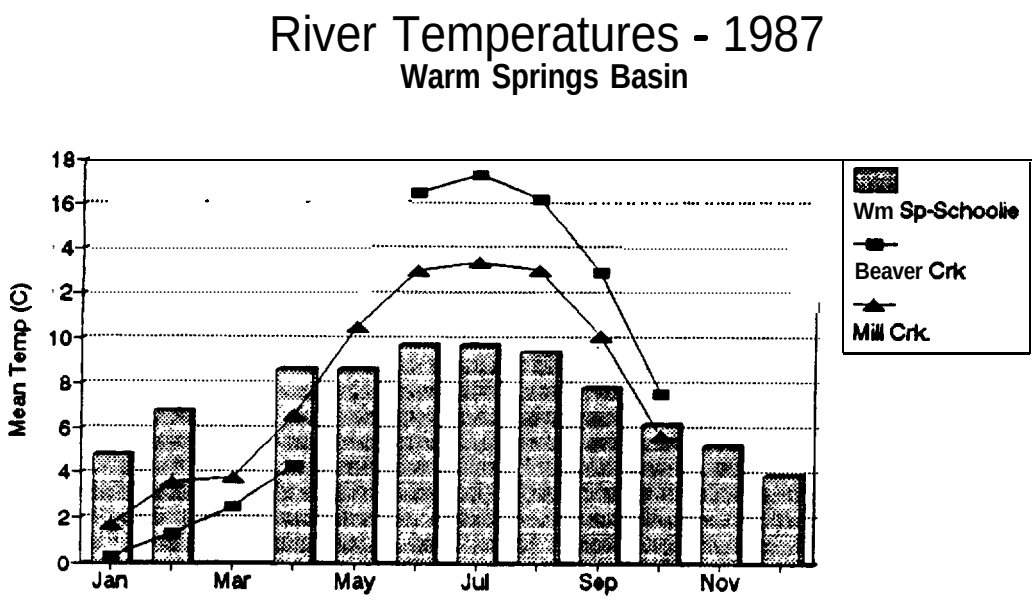


Figure 25. Monthly mean temperatures of streams where spring chinook spawn in the Warm Springs River drainage and in Hood River. Data sources: Warm Springs River locations hatchery form Oregon Water Resources Department; Hood River locations from **CTWIR.**

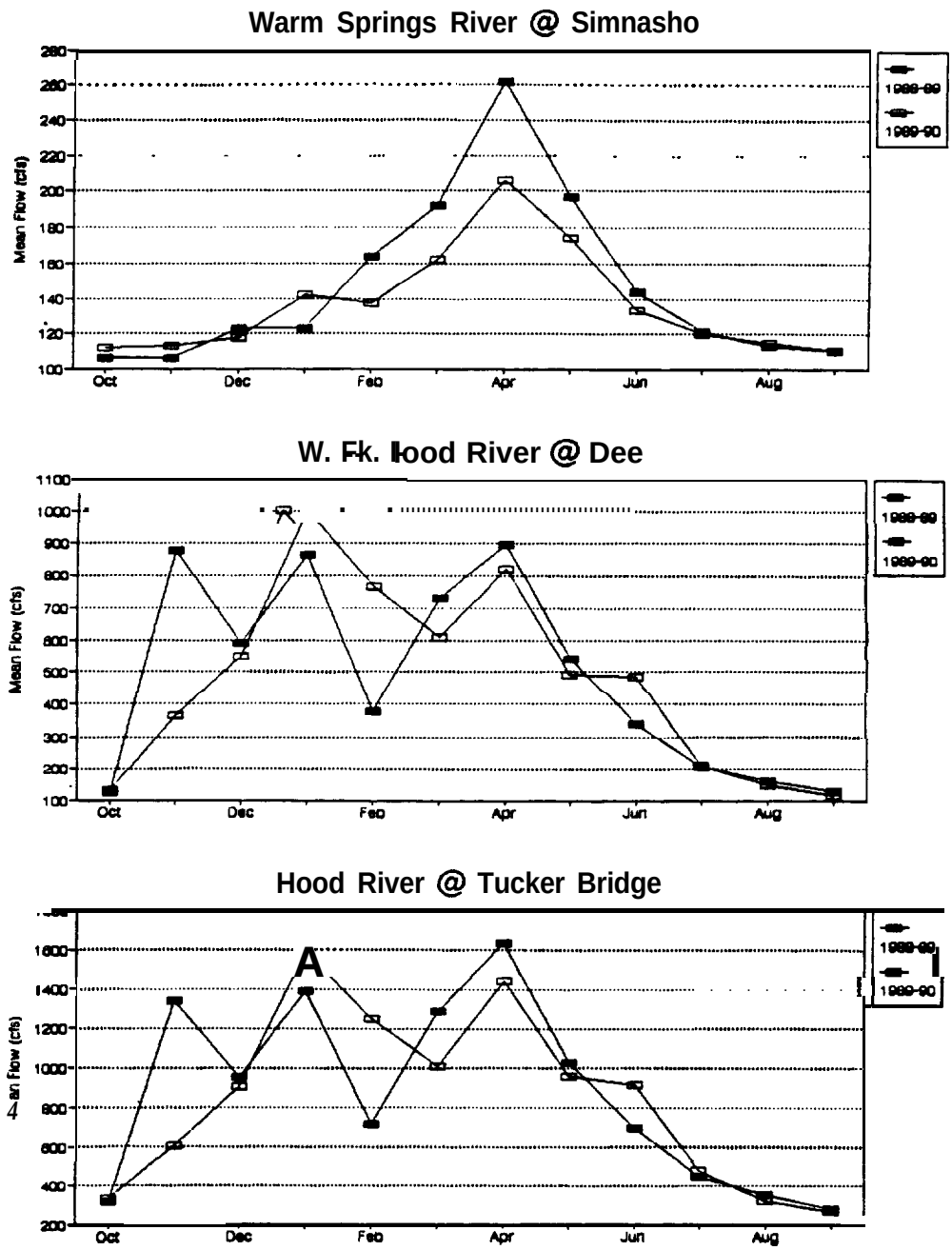


Figure 26. Monthly mean flows in Hood River and Warm Springs River during 1988-1990 (USGS data).

The advantages in using Deschutes spring chinook as a seed stock are its close proximity to Hood River (advantage shown in Figure 1, p.9) and its fish share the same migration pathway (the Columbia River) as Hood River fish. These same advantages would be true of the Klickitat spring chinook The Klickitat River, like the Hood River, drains off the Cascade Mountains and is highly influenced by glacial silt. I was unable to compare temperature regimes because temperatures have only been record in the lower Klickitat River, about 65-95 km (40-60 mi) downstream from the spring chinook spawning areas. Because the data on incubation temperatures indicate a substantial portion of Deschutes spring chinook will have low fitness for natural reproduction in Hood River, I recommend that several stocks and selectively bred groups be tested for fitness in Hood River. In order to evaluate fitness for natural reproduction, it will be necessary to use genetic marking (Allendorf and Utter 1979; Schweigert et al. 1977). It would be desirable to test both Klickitat and Round Butte stocks, each with two groups: one representing all spawning times and one selected for spawning after September 10. In order to maintain an effective population size of 75-100 fish/yr within the groups selected for late spawning, it may be necessary to use split-cross or factorial breeding procedures.

An additional genetic risk from reintroducing spring chinook will be to other indigenous species that must compete with juvenile chinook for rearing areas and forage. Juvenile spring chinook have been essentially absent from the basin for at least 25 years. Greatest competition is likely to be with juvenile fall chinook, which are limited to the lower basin and are at very low levels. Spatial separation of spawning areas should limit this competition between spring and fall races. Spring chinook are expected to spawn and rear in the West Fork while fall chinook spawn primarily in the main stem below Powerdale Dam.

Competition of chinook with other species indigenous to the basin should not pose a threat to their persistence, because they historically coexisted in the Hood River Basin. However, this remains an uncertainty that will be addressed in the Monitoring and Evaluation Plan.

Rank 2 Risk - Type 3: Loss of Population Identity

If the recommendations of this report are followed and both Deschutes and Klickitat stocks are evaluated in Hood River, there will be a risk that interbreeding of these stocks, as well as the Carson stock being released now, may disrupt co-adapted gene complexes specific to each stock. Such disruption could reduce fitness. However, co-adapted gene complexes for survival in the Deschutes River, the Klickitat River, or the upper Columbia River (Carson stock) may not be of special value in the Hood River. Also many co-adapted gene complexes may be the same for these stocks, because all three stocks would have experienced similar selective pressures during their outmigration through the Columbia River and its estuary. Because none of these stocks have developed specific adaptation to Hood River, I conclude the risk of disrupting co-adapted gene complexes is far less than the risk of loosing population variability because of inappropriate adaptation to start with.

Rank 3 Risk -Type 4: Domestication Selection

The Master Plan incorporates special measures to minimize this risk. All hatchery-reared fish will be marked before release. Once returns from natural production begin, only unmarked returns will be used for brood. Spawners of all ages will be taken from throughout the run in proportion to their abundance (unless designated for experimental groups selected for spawning time). A 1:1 sex ratio at spawning will be maintained.

Issues of rearing practices and breeding practices are the same as described for this risk under Summer Steelhead. I recommend that spring chinook not be mated randomly, but that they be mated with fish of similar size and appearance. This practice should be evaluated during spawning surveys, as described for summer steelhead.

Rank 4 Risk - Type 1: Extinction

This risk is zero because the population is already extinct.

Fall Chinook (Non Target)

There are risks of reduced population variability and identity through interactions with spring chinook. The risk of reduced genetic variability was described under spring chinook. A loss of population identity would result from interbreeding of fall and spring chinook. However, it is likely these races are temporally isolated, because Hood River fall chinook spawn primarily in October, while spawning of spring chinook concludes in mid September.

These risks are believed to be small, but should be evaluated through the Monitoring and Evaluation Plan. Changes in the fall chinook population will be evaluated from data on growth, rearing density, harvest, spawning density and spawning time. Because fall chinook spawn primarily below Powerdale Dam, sampling locations for all life stages must be established below the dam, in addition to upstream and downstream traps at the dam.

Coho Salmon (Non Target)

There are risks of reducing the population size and thus reducing genetic variability. Juvenile chinook and steelhead may compete with coho for rearing space and forage. The problem should be small, because these species historically coexisted in the Hood River. Increased angling pressure could increase the harvest rate on coho; however, this is not perceived as a serious threat because the catchability of coho is low in freshwater.

These risks are believed to be small, but should be evaluated through the Monitoring and Evaluation Plan. Changes in the coho salmon population will be evaluated from data on growth, rearing density, harvest, and escapement.

Cutthroat Trout (Non Target)

There is a small risk that competition and interbreeding with steelhead may reduce genetic variability (lower effective population size) and decrease population identity of cutthroat trout. However, these risks should be small because cutthroat and steelhead historically coexisted in Hood River. Also, harvest of cutthroat may increase if anglers are attracted to the increased abundance of steelhead.

These risks are believed to be small, but should be evaluated through the Monitoring and Evaluation Plan. Changes in the cutthroat trout population will be evaluated from data on growth, rearing density, and harvest.

Bull Trout (Non Target)

The greatest risk to bull trout comes from increased angling pressure. This challenge can be overcome by restricting the take of bull trout. Bull trout are likely to benefit from an added forage base of juvenile steelhead and chinook.

These risks are believed to be small, but should be evaluated through the Monitoring and Evaluation Plan. Changes in the bull trout population will be evaluated from data on growth, rearing density, and harvest.

Mountain Whitefish (Non Target)

The greatest risk to whitefish would be a loss of variability as a result of competition with juvenile steelhead and chinook. These populations have coexisted in Hood River in the past, so I conclude this risk is small. These risks should be evaluated through the Monitoring and Evaluation Plan Changes in the whitefish population will be evaluated from data on growth, rearing density, and harvest.

Recommendations

1. The genetic risks are small compared to the potential benefits of the Hood River Master Plan, if recommendations listed here are implemented. I recommend the Master Plan be approved, given that the following recommendations are included.

2. Although the genetic risks of the Master Plan appear to be low, this assessment was based on available data, not ideal data. Many uncertainties remain as to the accuracy of assumptions and deductions. Therefore, I recommend the monitoring and evaluation procedures described in the following section be implemented to enable future adjustment of the Master Plan as necessary to meet its goals.

3. Skamania stock summer steelhead and their progeny should be excluded as brood stock for **Hood** River. Naturally produced summer steelhead that ripen prior to March 7 should be excluded from brood stock as probable Skamania origin. Because time of maturity will be unknown at the time brood fish are captured, the number of brood fish taken should exceed the Master Plan goals (Table 20) by 20%. This proportion of excess brood fish held should be reevaluated based on findings during the first year of operation. Priority should be given to achieving natural spawner goals before these extra brood fish are retained.

4. Big Creek stock winter steelhead and their progeny should be excluded as brood stock for Hood River. Naturally produced winter steelhead that arrive at Powerdale **Dam** before February 15 or ripen prior to March 15 should be excluded from brood stock as probable Big Creek origin. Additionally, scales of brood fish should be analyzed and any fish appearing to be **of** hatchery origin should be excluded. Because time of maturity will be unknown at the time brood fish are captured, guidelines stipulated in Recommendation 3 should be followed for the taking of extra brood fish.

5. Deschutes and Klickitat stocks of spring chinook should each be evaluated for their fitness for natural reproduction in the Hood River. Additionally, groups from each stock selected for spawning after September 10 should be tested at the same time. In order to maintain an effective population size of 75-100 fish/yr within the groups selected for late spawning, it may be necessary to use split-cross or factorial breeding procedures. This evaluation will require that fish be genetically marked, i.e., each group has a unique genotype that can be detected. The design for this genetic marking should be worked out in consultation with experts in enzyme electrophoresis for salmonids.

6. Brood fish should be mated to fish that are similar in size and appearance, rather than randomly. This practice should be evaluated by observations of mate selection among naturally spawning fish in the Hood River.

7. If size grading is necessary, rearing the "grade outs" should continue separately and they should be released along with the other fish.

Monitoring and Evaluation

The Master Plan includes a monitoring and evaluation plan that generally encompasses the uncertainties associated with genetic risks. Therefore, this section lists only those activities that require more specific definition than provided in the Master Plan. See the Master Plan for a description of experimental approach and specific objectives. This section begins with a listing of uncertainties related to genetic risk, by stock, that dictate the need for monitoring and evaluation activities.

Uncertainties

Summer Steeihead

1. Can the race (winter or summer) of maturing steelhead trapped at Powerdale during February through May be determined?
2. Is the indigenous run abundant enough to meet brood stock, escapement and harvest goals?
3. Are there distinct substocks?
4. Are river entry time and spawning time related in such a way that would aid in discriminating Skamania and Hood River stocks?
5. What proportion of the naturally produced fish will be composed by Skamania stock?
6. What proportion of hatchery fish will stray to spawn in the Deschutes Basin where the rearing facilities are located?
7. How much will harvest rate increase on naturally produced fish?
8. Will the increased abundance of spawning and rearing summer steelhead cause competition detrimental to other fish populations protected by ODFW's Wild Fish Management Policy?
9. What are the proper criteria for assortative mating?

Winter Steelhead

1. Can the race (winter or summer) of maturing steelhead trapped at Powerdale during February through May be determined?
2. Is the indigenous run abundant enough to meet brood stock, escapement, and harvest goals?
3. Are there distinct substocks?
4. Are river entry time and spawning time related in such a way that would aid in discriminating Big Creek and Hood River stocks?

5. What proportion of the naturally produced fish will be composed by Big Creek stock?

6. What is the origin of fresh-run winter steelhead that reach Powerdale during November through February?

7. What proportion of hatchery fish will stray to spawn in the Deschutes Basin where the rearing facilities are located?

8. How much will harvest rate increase on naturally produced fish?

9. Will the increased abundance of spawning and rearing summer steelhead cause competition detrimental to other fish populations protected by ODFW's Wild Fish Management Policy?

10. What are the proper criteria for assortative mating?

Spring Chinook

1. Which donor stock is most fit for natural reproduction in the Hood River?

2. Will late spawning in the donor stock be an advantage for reproductive fitness in Hood River?

3. What proportion of hatchery fish will stray to spawn in the Deschutes Basin where the rearing facilities are located?

4. Will the increased abundance of spawning and rearing spring chinook cause competition detrimental to other fish populations protected by ODFW's Wild Fish Management Policy?

Monitoring Activities

Summer and Winter Steelhead

1. Tag adults retained for brood with uniquely numbered tags that enable later identification of the date individuals entered the Powerdale trap. This date can later be

compared with spawning date and scale information to help discriminate Skamania, Big Creek and Hood River stock.

2. All fish released above Powerdale should be tagged such that race and approximate date of passage at Powerdale can be identified at a distance by spawning survey personnel. The color or type of tags should be changed every two weeks to identify the approximate date of entry. Data from this sampling will help discriminate substocks, if they exist.

3. Survey spawning weekly throughout the basin during March through February to determine first the spatial distribution of spawning, and second the potential for substocks based on spawning time, location, and environmental conditions.

4. Record size and external characteristics of natural spawning pairs to evaluate assortative mating.

5. Fin mark all hatchery fish differently than other steelhead released from Deschutes Basin hatcheries, so that strays into the Deschutes can be identified before spawning.

Spring Chinook

1. Trap juveniles at Powerdale Dam to estimate the timing, abundance and genotype of outrnigrants. Retain a representative subsample for electrophoretic analysis.

2. Trap adults at Powerdale Dam to estimate the timing and abundance of returning adults. Retain sufficient numbers of CWT adults to evaluate the relative return rates of different stocks and select groups.

3. Monitor river temperature in the spawning area so temperature data can be used in combination with the temporal distribution of spawning to estimate the temporal distribution of fry emergence. A knowledge of fry emergence times may aid interpretation of differences in survival between groups of different parentage.

4. Record size and external characteristics of natural spawning pairs to evaluate assortative mating.

5. Fin mark all hatchery fish differently than other spring chinook released from Deschutes Basin hatcheries, so that strays into the Deschutes can be identified before

spawning.

Non- Target Species

Monitor distribution, abundance, and growth as outlined in the Master Plan.

REFERENCES

Allendorf, F.W., D.M. Espeland, D.T. Scow, and S. Phelps. 1980. Coexistence of native and introduced rainbow trout in the Kootenai River drainage. Proc. Montana Acad. Sci. 39:28-36.

Allendorf, R.W., J.E. Lankan, and L.W. Riggs. 1990. Clarification of wild/natural production issues in the production principles. Submitted to the Northwest Power Planning Council, Portland, Oregon.

Allendorf, F.W., and S.R. Phelps. 1980. Loss of genetic variation in a hatchery stock of cutthroat trout. Trans. Am. Fish. Soc. 109:537-543.

Allendorf, F.W. and F.M. Utter. 1979. Population genetics, P. 407454. In W.S. Hoar, and D.J. Randall [ed.] Fish physiology, Vol. VIII. Academic Press, New York, NY.

Altukhov, Y. P. and E.A. Salmenkova. 1986. Stock transfer relative to natural organization, management, and conservation of fish populations. *In* N. Ryman and F. Utter [ed] Population genetics and fishery management. Univ. Wash. Press, Seattle.

Ayala, F.J. 1965. Evolution of fitness in experimental populations of *Drosophila serrata.* Science 150: 903-905.

Ayerst, J.D. 1977. The role of hatcheries in rebuilding steelhead runs of the Columbia River system. p. 84-88 *In* E. Schweibert [ed] Columbia River salmon and steelhead. Am. Fish. Soc. Spec. Publ. No. 10.

Bams, R.A. 1976. Survival and propensity for homing as affected by presence or absence of locally adapted paternal genes in two transplanted populations of pink salmon *(Oncorhynchus gorbushka).* J. Fish. Res. Bd. Can. 33:2716-2725.

Bjornn, T.C. 1960. The salmon and steelhead stocks of Idaho. Idaho Department of Fish and Game, Boise.

Busack, C. 1990. Yakima/Klickitat production project genetic risk assessment. Unpublished report, Washington Department of Fisheries, Olympia.

Campton, E.E. and J. M. Johnston. 1985. Electrophoretic evidence for a genetic admixture of native and non-native trout in the Yakima Rive, Washington. Trans. Am. Fish. Soc. 114:782-793.

Chilcote, M.W., B.A. Crawford, and S.A. Leider. 1980. A genetic comparison of sympatric populations of summer and winter steelheads. Trans. Am. Fish. Soc. 109:203-206.

Chilcote, M.W., S.A.Leider, and J.J. Loch. 1986. Differential reproductive success of hatchery and wild summer-run steelhead under natural conditions Trans. Am. Fish. Soc. 115:726-735.

Columbia Basin Fish and Wildlife Authority. 1990. Integrated system plan for salmon and steelhead production in the Columbia River Basin. Public Review Draft, Northwest Power Planning Council, Portland.

Cramer, S.P. 1985. Lost Creek Dam fisheries evaluation, anticipated changes in production and harvest of spring chinook under different water release and fish management strategies. Oregon Department of Fish and Wildlife, Fish Research Project DACW57-77-C-0027, Phase 1 Completion Report, Volume 2, Portland.

Cramer, S.P. 1990. The feasibility for reintroducing sockeye and coho salmon in the Grande Ronde River and coho and chum salmon in the Walla Walla River. Progress report, submitted to Nez Perce Tribe, Umatilla, Lapwai, Idaho, 132 p.

Cramer, S.P., A. Maule, and D. Chapman. 1990. Status of wild coho salmon in the lower Columbia River. Contract report submitted to Pacific Northwest Utilities Conference Committee, Portland, Oregon.

Cross,T.F. and J.King. 1983. Genetic effects of hatchery rearing in atlantic salmon. Aquaculture 33: 33-40.

Donaldson, L.R. 1970. Selective breeding salmonid fishes, pages 65-74. In: WJ. McNeil (ed.). Marine Aquaculture. Oregon State University Press, Corvallis.

Doyle, R.W. and AJ. Talbot. 1986. Effective population size and selection in variable aquaculture stocks. Aquaculture 57: 27-35.

Falconer, D.S. 1981. Introduction to quantitative genetics. Longman, Inc., New York, N.Y. *340* p.

Fisher, R.A. 1930. The genetical theory of natural selection. Clarendon Press, Oxford.

Foote, CJ. 1988. Male mate choice dependent on male size in salmon. Behavior 106:63-80.

Foote, C.J. and P.A. Larkin. 1988. The role of male choice in the assortative mating of anadromous and non-anadromous sockeye salmon (*Oncorhynchus nerka*). Behavior 106:43-62.

Gall, G.A., J. Baltodano, and N. Huang. 1988. Heritability of age at spawning for rainbow trout. Aquaculture 68:93- 102.

Gharrett, A.J., and S.M. Shirley. 1985. A genetic examination of spawning methodology in a salmon hatchery. Aquaculture 47:245-256.

Garrison, R.C., and M.M. Rosentreter. 1981. Stock assessment and genetic studies of anadromous salmonids. Federal Aid Progress Rpts. Fisheries, 1980. Portland: Oregon Dept. Fish and Wildlife, Fish Div. 66p.

Hager, R. C., and C.W. Hopley. 1981. A comparison of the effect of adult return timing of Cowlitz and Toutle hatchery coho on catch and escapement. Washington Department of Fisheries, Technical Report No. 58. Olympia.

Hankin, D.G. 1982. Estimating escapement of pacific salmon: marking practices to discriminate wild and hatchery fish. Trans. Am. Fish. Soc. 43:1746-1759.

Hanson, A.J. and H.D. Smith. 1967. Mate selection in a population of sockeye salmon (*Oncorhynchus nerka*) of mixed age groups. J. Fish. Res. Board Can. 24: 1955-1977.

Haxton, J. 1965. Summary report of the Hood River steelhead project. Unpublished report, Oregon Department of Fish and Wildlife, The Dalles.

Hershberger, WK., and R.N. Iwanmoto. 1983. Genetics manual and guidelines for the Pacific salmon hatcheries of Washington. University of Washington, Seattle. 83p.

Holtby, L.B. and M.C. Healey. 1986. Selection for adult size in female coho salmon *(Oncorhynchus kisutch).* Can. J. Fish. Aquat. Sci. 43: 1946-1959.

Hopley, C., P.R. Seidel, H.G. Senn, and R. C. Hager. 1978. Results of 1970 and 1972 brood Columbia River coho studies. Washington Department of Fisheries, Progress Report No. 46, Olympia.

Howell, P., K.Jones, D.Scarnecchia, L.LaVoy, W.Kendra, and D. Ortman. 1984. Stock assessment of Columbia River Anadromous Salmonids, Volumes 1 and 2. Final Report, Contract No. DE-AI79-84BP12737, submitted to Bonneville Power Administration, Portland, Oregon.

Kapuscinski, A.R. 1991. Genetic analysis of policies and guidelines for salmon and steelhead hatchery production in the Columbia River Basin. Contract Report (Agreement 09-037) submitted to Northwest Power Planning Council, Portland, Oregon.

Kapuscinski, A. R., and L.D.Jacobsen. 1987. Genetic guidelines for fisheries management. Minnesota Sea 'Grant Research Report 17, University of Minnesota, St. Paul 66p.

Kapuscinski, A.R.D., and J.E. Lankan. 1986. A conceptual genetic fitness model for fisheries management. Can. J. Fish. Aquat. Sci. 43: 1606-1616.

Kincaid, H.L. 1976. Inbreeding in rainbow trout (*Salmo gairdneri*). J.Fish. Res. Board Can. *33: 2420-2426.*

Krueger, C.C., A.J.Gharrett, T.R. Dehring, and R.W. Allendorf. 1981. Genetic aspects of fisheries rehabilitation programs. Can. J. Fish. Aquat. Sci. 38: 1877-1881.

Lande, R. and G.F. Barrowclough. 1987. Effective population size, genetic variation, and their use in population management. Pages 87-123 in M.E. Soule, [ed] Viable populations for conservation. Cambridge Univ. Press, Cambridge, U.K.

Leary, R. F., F.W. Allendorf, and K.L. Knudsen. 1985. Developmental instability as an indicator of reduced genetic variation in hatchery trout. 114: 230-235.

Leary, R. F., F.W. Allendorf, and K.L. Knudsen. 1989. Genetic differences among rainbow trout spawned on different days within a single season. The Progressive Fish-Cultulist 5 1: 10- 19.

Leider, S.A., M.W. Chilcote, and J.J. Lock. 1984. Spawning characteristics of sympatric populations of steelhead trout (*Salmo gairdneri*): Evidence for partial reproductive isolation. Can. J. Fish. Aquat. Sci. 41: 1454-1462.

Leider, S.A., M.W. Chilcote, and J.J. Loch. 1986. Comparative life history characteristics of hatchery and wild steelhead trout (*Salmo gairdneri*) of summer and winter races in the Kalama river, Washington. Can. J. Fish. Aquat. Sci. 43:1398-1409.

Lichatowich, J.A., and J.D. McIntyre. 1987. Use of hatcheries in the management of Pacific anadromous salmonids. American Fisheries Society Symposium 1: 13 1-136.

Lindsay, R.B., B.C. Jonasson, R.K. Schroeder, and B.C. Cates. 1989. Spring chinook salmon in the Deschutes River, Oregon. Oregon Department of Fish and Wildlife, Information Reports (Fish) 89-4, Portland.

Moller, et al. 1979.

Mullan, J.M. 1987. Status and propagation of chinook salmon in the mid-Columbia River through 1985. U.S.Fish and Wildlife Service, Biological Report 87(3), Leavenworth, Washington.

Neave,F. 1944. Racial characteristics and migratory habits in *Salmo gairdneri.* J. Fish. Res. Board Can. 6:245-251.

Nicholas, J.W. and D.G. Hankin. 1988. Chinook salmon populations in Oregon coastal river basins: description of life histories and assessment of recent trends in run strengths. Oregon Department of Fish and Wildlife, Information Reports (Fish) 88- 1, Portland.

Nickelson, T.E., M.F. Solazzi, and S.L. Johnson. 1986. Use of hatchery coho salmon *(Oncorhynchus kisutch)* presmolts to rebuild wild populations in Oregon coastal streams. Can. J. Fish. Aquat. Sci. 43:2443-2449.

Olsen, E.A., R.B. Lindsay, and W.A. Burck. 1991. Summer steelhead in the Deschutes River, Oregon. Oregon Department of Fish and Wildlife, Information Report (Fish), Portland.

Oregon State Game Commission. 1963. The fish and wildlife resources of the Hood Basin, Oregon, and their water use requirements. Report to the State Water Resources Board, Project F-69-R-1, Job 1, ODFW, Portland, 21p.

Reisenbichler, R.R. 1981. Columbia River salmonid broodstock management: Annual progress report. Unpublished, National Fishery Research Center, Seattle, Wash.
Reisenbichler, R.R. 1988. Relation between distance transferred from natal stream and recovery rate for hatchery coho salmon. N. Am. J. Fish .Mangmnt. 8:172-174.

Reisenbichler, R.R., and J.D. McIntyre. 1977. Genetic differences in growth and survival of juvenile hatchery and wild steelhead trout (*Salmo gairdneri*). J. Fish. Res. Bd. Can. 34: 123-128.

Reisenbichler, R.R. and S.R. Phelps. 1987. Genetic variation in chinook, *Oncorhynchus tshawytscha,* and coho, 0. *kisutch*, salmon from the north coast of Washington. Fishery Bull. 85(4):681-695.

Reisenbichler, R.R. 1988. Relation between distance transferred from natal stream and recovery rate for hatchery coho salmon. N. Am. J. Fish. Mangmt. 8:172-174.

Ricker, W.E. 1972. Hereditary and environmental factors affecting certain salmonid populations, p. 19460. In: R.D.Simon and P. A. Larkin (eds.). The stock concept of Pacific salmon. H.R. MacMillan lectures in fisheries. Univ. British Columbia, Vancouver, BC.

Riggs, L.A. 1986. Genetic considerations in salmon and steelhead planning: Final report. Technical paper prepared for the Northwest Power Planning Council, Portland, Oregon.

Riggs, L.A. 1986b. Genetic considerations in salmon and steelhead planning: Area below Bonneville. Prepared for the Northwest Power Planning Council, Portland, Oregon.

Riggs, LA. 1986c. Genetic considerations in salmon and steelhead planning: II. Bonneville Dam to the Snake River. Prepared for the Northwest Power Planning Council, Portland, Oregon.

Riggs, L.A. 1986d. Genetic considerations in salmon and steelhead planning: III. The mid-Columbia [upper Columbia]. Prepared for the Northwest Power Planning Council, Portland, Oregon.

Riggs, L.A. 1986e. Genetic considerations in salmon and steelhead planning: IV. The lower Snake River. Prepared for the Northwest Power Planning Council, Portland, Oregon.

Riggs, L.A. 1990. Principles for genetic conservation and production quality: results of a scientific and technical clarification and revision. Report on a workshop held December 15, 1989, Portland, Oregon. Prepared for the Northwest Power Planning Council, Portland, Oregon.

Royal, L.A. 1972. An examination of the anadromous trout program of the Washington State Game Department. Washington Game Department, Olympia.

Ryman, N. 1970. A genetic analysis of recapture frequencies of released young of salmon (*Salmo salar L.*). Hereditas 65: 159-160.

Ryman, N., and G. Stahl. 1980. Genetic changes in hatchery stocks of brown trout (*Salmo trutta*). Can J. Fish. Aquat. Sci. 37: 82-87.

Ryman, N., and G. Stahl. 1981. Genetic perspectives of the identification and conservation of Scandinavian stocks of fish. Can. J. Fish. Aquat. Sci. 38: 1562-1575.

Sams, R.W. and R.A. Willis. 1961. Summary report of Hood River studies, 1959 and 1960. Mimeographed report, Fish Commission of Oregon (ODFW), Clackamas, 40p.

Schreck, C.B., H.W. Li, R. C. Hjort, and S.B. Yamada. 1984. Stock identification of Columbia River chinook salmon and steelhead trout. Annual progress report submitted to the Bonneville Power Administration, Division of Fish and Wildlife, Portland, Oregon.

Schreck, C.B., H.W. Li, R.C. Hjort, and C.S. Sharpe. 1986. Stock identification of Columbia River chinook salmon and steelhead trout. Oregon Cooperative Fisheries Research Unit, Agreement DE-A179-83BP13499, Project 83-451, Final Report. Corvallis.

Schweigert, J.F., F.J. Ward, and J.W. Clayton. 1977. Effects of fry and fingerling introductions of walleye *(Stizostedion vitreum vitreum)* production in West Blue Lake, Manitoba. J. Fish. Res. Bd. Can. 34: 2142-2150.

Simon, R.C., J.D. McIntyre, and A.R. Hemmingsen. 1986. Family size and effective population size in a hatchery stock of coho salmon (*Oncorhynchus kisutch*). Can. J. Fish. Aquat. Sci. 43: 2434-2442.

Tipping, J.M. 1991. Heritability of age at maturity in steelhead. N. Am. J. Fish. Mangmt. 11: 105-108.

United States Army Corps of Engineers (USACE). 1989. 1989 annual fish passage report: Columbia and Snake Rivers for salmon, steelhead and shad. North Pacific Division, Portland, Oregon.

Utter, F.M. 1981. Biological criteria for definition of species and distinct intraspecific populations of anadromous salmonids under the U.S.Endangered Species Act of 1973. Can. J. Fish. Aquat. Sci. 38:1626-1635.

Utter, F., G. Milner, G. Stahl, and D. Teel. 1989. Genetic population structure of chinook salmon, *Oncorhynchus tshawytscha,* in the Pacific Northwest. Fish. Bull. 87: 239-264.

Utter, F., D.Teel, G Milner, and D. McIsaac. 1987. Genetic estimates of stock compositions of 1983 chinook salmon, *Oncorhynchus tshawytscha,* harvests off the Washington coast and the Columbia River. Fish. Bull. 85: 13-23.

Van Den Berghe, E.P. and M.R. Gross. 1989. Natural selection resulting from female breeding competition in a pacific salmon (coho: *Oncorhynchus kisutch*). Evolution 43(1): 125-140.

Wade, M.G., and D.V. Buchanan. 1983. Development and assessment of steelhead in the Willamette River Basin. Annual progress report, Oregon Department of Fish and Wildlife, Research Section, Corvallis.

Wahle, R.J., E. Chaney and R.E. Pearson. 1981. Areal distribution of marked Columbia River Basin spring chinook salmon recovered in fisheries and at parent hatcheries. Mar. Fish Review 43(12): 1-9.

Waples, R.S. 1990a. Conservation genetics of Pacific salmon. I. Temporal changes in allele frequency. Conserv. Bio. 4(2): 144-156.

Waples, R. S. 199Ob. Conservation genetics of Pacific salmon. II. Effective population size and the rate of loss of genetic variability. J. Heredity 81(4):267-276.

Waples, R.S. 1990c. Conservation genetics of Pacific salmon. III. Estimating effective population size. J. Heredity 81 (4):277-289.

Wapels, R.S. and D.J. Teel. 1990. Conservation genetics of Pacific salmon: I. Temporal changes in allele frequency. Conservation Biology 4(2): 144- 156.

Wehrhahn, D.F., and R. Powell. 1987. Electrophoretic variation, regional differences, and gene flow in the coho salmon (*Oncorhynchus kisutch)* of southern British Columbia. Can. J. Fish. Aquat. Sci. 44: 822-831.

Winans, G.A. 1989. Genetic variability in chinook salmon stocks from the Columbia River Basin. N. Am. J. Fish. Mangmnt. 9: 47-52.

Wishard, L.N., J.E. Seeb, F.M. Utter, and D. Stefan. 1984. A genetic investigation of suspected redband trout populations. Copeia 1984: 120-132.

Withler, R.E. 1988. Genetic consequences of fertilizing chinook salmon *(Oncorhynchus tshawytscha*) eggs with pooled milt. Aquaculture 68: 15-25.

APPENDICES

Appendix 1. Data gathered from trapping at Powerdale Dam (KM 7, R 4.5) on the Hood River (data from ODFW files, The Dalles).

Appendix 1. Data gathered from trapping at Powerdale Dam (km 7, RM 4.5) on lbod River (data from ODFW files, The Dalles).

1955

MONTH	SUMMER STOCK WILD	SUMMER STOCK MARKED	WINTER STOCK	UNCLASS. STOCK	TOTAL STOCK	TAGGED STOCK	BROOD STOCK	ADDITIONAL SPECIES COHO	CHIN	CUTT	MISC
JANUARY											
FEBRUARY			3		3						
MARCH			55		55					9	
APRIL	4		236		240					39	
MY	81		352		433					12	
JUNE	99		47		146		8			2	
JULY	5				5		12				2
AUGUST											
SEPTEMBE											
OCTOBER											
NOVEMBER											
DECEMBER											
Total	189	0	693	0	882	0	20	0	0	62	2

NOTES:

MONTH COVER CALENDAR MONTH.

TRAP OPERATED FROM FEBRUARY 11 THROUGH JULY 12.

	1962								1963							
	SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES				SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES			
MONTH	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	NISC
JANUARY									20	3	6	29			4	
FEBRUARY									34	4	30	68			8	
MARCH									11	7		73			17	1
APRIL	11	17	188	216					19	33	5::	577			4	1
MY	107	85	371	563		1			93	19	320	432		10	1	2
JUNE	128	90	22	240		2			142	51	11	204		12		4
JULY	40	20		60		12			87	26		[illegible]		1		8
AUGUST	1	3		4	1				22	13		[illegible]			1	2
SEPTEMBE	3			3	105	15			33	4		[illegible]	74	27	1	2
OCTOBER	15	2		17	121	3			14	1		15	43	2		4
NOVEMBER	13		1	14	20				20		5	25	26	1	1	5
DECEMBER	12	3	5	20	8		8		4		5	9				
0	330	220	587	1137	255	33	8	0	499	161	957	1617	143	53	37	29

NOTES:
TRAP INSTALLED ON APRIL 1.
TRAP DID NOT OPERATE THROUGHOUT THE ENTIRE MONTH, AUG.-NOV.
FISH ASCENDED THE LADDER BUT WERE nor COUNTED.

NOTES:
INCLUDES SEVEN RAINBOW TROUT, 11 SOCKEYE SALMON, SIX DOLLY VARDEN TOUT, FOUR BROWN TROUT, AND THREE WHITE FISH.

Appendix

	1964								1965							
	SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES				SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES			
MONTH	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC
JANUARY	16		19	35			4								1	
FEBRUARY	11		16	27			3	2	15		25	40			9	
MARCH	26	1	175	202			6	1	50		111	161			5	
APRIL	1	2	1%	399			1		17	5	508	530				3
MY	30	8	408	446		4		2	11	12	96	119				1
JUNE	51	27	25	103		11		1	42	21	17	80				1
JULY	82	37	3	122		13		4	34	10	1	45		1		
AUGUST	19	7		26	5	2	1	1								
SEPTEMBE	16	1		23	233	9										
OCTOBER	4			4	79	15		1	22	2		24	66	1	9	
NOVEMBER	2		4	6	27				28	1	7	36	59		1	3
DECEMBER	2	2	11	15	2		2	5	4		7	11	5		2	
Total	260	91	857	1408	346	54	17	23	223	51	772	1046	130	2	27	8

NOTES: NOTES:

MONTH COVROLLER GATES OPENED 9/23 TO 9/25. UPSTREAM ESCAPEMENT NOT RECORDED.

TRAP OPERTRAP WASHED our 12/22.

INCLUDES EIGHT RAINBOW TROUT, NINE DOLLY VARDEN TROUT, TWO BROWN TROUT, TWO SOCKEYE SALMON, AND TWO WHITEFISH.

NOTES:

TEMPORARY LADDER PROVIDED ON EAST SIDE 2/16.

LADDER SHUT DOWN 7/19 FOR CONSTRUCTION OPERATIONS.

LADDER REOPENED 10/28.

COHO COUNT INCLUDES 20 JACKS.

BOTH CHINOOK WERE JACKS.

INCLUDES FOUR RAINBOW TROUT, THREE DOLLY VARDEN TROUT, AND ONE BROWN TROUT.

Appendix

	1966								1967							
	SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES				SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES			
MONTH	WILD	MARKED	STOCK	STOCK	am	CHIN	CUTT	MISC	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC
			13													
JANUARY	4	1	24	18	1		I		15		35	50			7	
FEBRUAR1	9			33			6		10		25	35			15	
MARCH	8	2	2%	2%			7		2	3	76	81			22	
APRIL	1	4	731	736			4	1	2	2	273	277			21	
MY	50	65	579	694			2	1	17	26	344	387		1	5	9'
JUNE	105	183	30	318					41	61	11	113			2	22
JULY	68	158		226		3		1	22	41		63				11:
AUGUST	22	58		80		5			11	13		24		2		
SEPTEMBE	45	39		84	112	24	1:		17	13		30	89	29	7	5
OCTOBER	19	12		31	162	6	5		36	14		50	149	22	13	11
NOVEMBER	21	8	2	31	55		5		15	3	3	21	19		9	3
DECEMBER	4	3	3	10			8	1	8	1	15	24				1
Total	3%	533	1668	2551	330	38	57	4	1%	177	782	1155	251	54	101	62

NOTES: NOTES:

MONTH COVCOHO COUNT INCLUDES 145 JACKS.

TRAP OPERCHINOOK COUNT INCLUDES ONE JACK.

INCLUDES TWO RAINBOW TROUT, ONE DOLLY VARDEN TROUT, AND ONE BROWN TROUT.

NOTES:

COHO COUNT INCLUDES 162 JACKS.

CHINOOK COUNT INCLUDES 48 RAINBOW TROUT, 12 DOLLY VARDEN TROUT, AND TWO BROWN TROUT.

Appendix

	1968								1969							
	SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES				SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES			
MONTH	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC
JANUARY	3		7	10			8				1	1				1
FEBRUARY	4		29	33			11	2	4		11	15			7	
MARCH	19		141	160			68	1	11	1	199	211			77	1
APRIL		1	181	182			7				355	355			66	1
MAY	27	40	160	221				2	10	6	595	611			9	1
JUNE	112	249		361				6	45	33	57	135		1		5
JULY	80	210		290		4	2	2	54	38	2	94	1	1	2	4
AUGUST	35	70		105	1	3	12	2	35	28		63		1	8	4
SEPTEMBE	31	12		43	98	25	13	2	30	19		49	128	5	2	5
OCTOBER	19	5		24	144	1	4	3	5	3		8	30		1	3
NOVEMBER	13	3	5	21	38		8		16	2		18	14		3	1
DECEMBER	I	1	3	5	4		1	1			4	4	1		2	
Total	344	591	526	1461	205	33	134	21	210	130	1224	1564	174	8	177	26

NOTES: NOTES:
MONTH COWCOHO COUNT INCLUDES 100 JACKS.
TRAP OPERCHINOOK COUNT INCLUDES THREE JACKS.
INCLUDES NIB RAINBOW TROUT, NINE DOLLY VARDEN TROUT,
AND THREE BROWN TROUT.

NOTES:
TRAP WAS INOPERATIVE FROM OCTOBER 13 THROUGH OCTOBER 23,
AND FISH PASSAGE WAS NOT RECORDED.
COHO COUNT INCLUDES 107 JACKS.
ALL CHINOOK WERE ADULTS.
INCLUDES 19 RAINBOW TROUT, SIX DOLLY VARDEN TROUT,

Appendix

	1970								1971							
	SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES				SUMMER STOCK		UNCLASS.	TOTAL	ADDITIONAL SPECIES			
MONTH	WILD	MARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC	WILD	HARKED	STOCK	STOCK	COHO	CHIN	CUTT	MISC
JANUARY											4	4				
FEBRUARY											76	76			21	
MARCH											31	31			a	1
APRIL										1	188	189			9	5
MY	26	13	284	323		1			52	13	546	611			7	a
JUNE	40	60	10	110		1			121	26	111	318				2
JULY	41	154		195				2	139	66	2	207				
AUGUST	48	155		203	4		8	1	la2	152		334				
SEPTEMBE	27	33		60	137	1	5		78	45		123	299			7
OCTOBER	10	12		22	111		4	7								
NOVEMBER	18	9		27	30		1	1								
DECEMBER				0												
Total	210	436	294	940	282	3	18	11	572	303	1018	1893	299	0	45	23

NOTES: n o m :
MONTH COV COHO COUNT INCLUDES 161 JACKS.
TRAP OPERALL CHINOOK WERE ADULTS.
INCLUDES EIGHT RAINBOW TROUT AND THREE BROWN TROUT.

NOTES:
CAKE COUNT INCLUDES 60 JACKS.
INCLUDES 21 RAINBOW TROUT, 4 BROWN TROUT AND 1 DOLLY VARDEN TROUT.

Appendix

1962 PUNCH BOWL

MONTH	SUMMER STOCK WILD	SUMMER STOCK MARKED	WINTER STOCK	UNCLASS. STOCK	TOTAL STOCK	TAGGED STOCK	BROOD STOCK	ADDITIONAL SPECIES COHO	CHIN	CUTT	MISC
JANUARY											
FEBRUARY											
MARCH											
APRIL	2	1	4		7						
MY	3	2	34		39	4					
JUNE	37	4	42		83	24	28				
JULY'	57	2	5		64	42	23				
AUGUST	40	2			42	21,	4				
SEPTEMBE	10				10	4		1	2		
OCTOBER	4				4	1		9			
NOVEMBER											
DECEMBER											
Total	153	11	85	0	249	96	55	10	2	0	0

NOTES: NOTES:

MONTH COVMONTH COVERS PERIOD FROM THE 16TH OF TEE PREVIOUS MONTH TO THE TRAP OPER15TH OF THE LISTED MONTH.

TRAPPING TERMINATED JULY 19 FOR CONSTRUCTION AT POWERDALE.

MONTH, EXCEPT FOR APRIL, COVERS PERIOD FROM THE 16TH OF THE PREVIOUS MONTH TO THE 15TH OF THE LISTED MONTH.

(THE MONTH OF APRIL COVERS THE PERIOD FROM APRIL 1 TO 15.)

ALL MARKS ARE I@. SEVER OF THESE FISH WERE PREVIOUSLY CLASSIFIED As "WINTER STEELHEAD."

IN 1962, BOTH WINTER AND SUMMER STEELHEAD WERE TAGGED AT POWERDALE.

NINETEEN OF THESE FISH WERE TAGGED AS "WINTER STEELHEAD."

Appendix

1963 Pun BOWL

MONTH	SUMMER STOCK WILD	SUMMER STOCK MARKED	WINTER STOCK	UNCLASS. STOCK	TAGGED AT POWERDALE	TAKEN TO HATCHERY	ADDITIONAL SPECIES COHO	CHIN	CUTT	MISC
JANUARY										
FEBRUARI										
MARCH		2			1					
APRIL	1	1	2	1	6					
MY		2	1	1	6					
JUNE	15	4		23	22	7				
JULY	37	22		3	43			2		
AUGUST	29	12			20			1	6	1
SEPTEMBI	9	10			12		1	3	8	
OCTOBER	7	2			5			4	4	
NOVEMBEI		1			1		1			
DECEMBEI										
Total	98	56	3	40	116	7	2	10	18	1

NOTES: NOTES:

MONTH COWSOME STEELHEAD, AND POSSIBLY AN OCCASIONAL SALMON, ASCEND THE TRAP OPERFALLS WITHOUT USING THE LADDER AND THEREFORE ARE NOT COUNTED.

A MONTH COVERS THE PERIOD FROM THE 16TH OF THE PREVIOUS MONTH THROUGH THE 15TH OF THE LISTED MONTH.

GRAND TOTAL OF STEELHEAD CAUGHT - 197.

Appendix 2. Hatchery releases of juvenile summer steelhead into the Hood River drainage, 1956-86 broods (ODFW files, The Dalles).

Brood releases of juvenile hatchery S-1 steelhead into the Hood River drainage, 1956-66 broods.

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1956	Hood River	Hood River	ADRM	4/16/58	9.0	1,800	Hood River
1957	Hood River	Hood River	RPRM	4/ 1/59	8.1	2,454	Hood River, E. Fk.
1958	Hood River	Hood River	RP	4/13/60	11.0	7,920	Hood River
	Hood River	Hood River	RP	4/14/60	11.0	9,460	Hood River
1959	Oak Springs	Hood River	RP	4/13/60	12.0	7.680	Hood River
	Oak Springs	Hood River	RP	4/14/60	12.4	7.746	Hood River
1960	Gnat Creek	Hood River	LP	5/25/61	0.7	18,242	Hood River, V. Fk.
	Gnat Creek	Hood River	LP	6/ 2/61	10.0	12,000	Hood River, V. Fk.
	Gnat Creek	Hood River	LP	6/ 5/61	10.0	9.730	Hood River, W. Fk.
	Hood River	Hood River	LPRM	11/12/61	9.0	2,727	Hood River, V. Fk.
	Hood River	Hood River	LPRM	11/13/61	9.0	20,349	Hood River, W. Fk.
1961	Gnat Creek	Hood River	RPRM	5/ 8/62	11.0	11.460	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	6/ 8/62	22.0	13,200	Lake Branch Creek
	Hood River	Hood River	LVRPRM	II 7/63	9.b	3,225	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	II 4/62	12.0	0.972	Hood River, V. Fk.
	Gnat Creek	Hood River	RPRM	6/11/62	22.0	lb.018	Hood River, V. Fk.
1962	Gnat Creek	Hood River	LPLM	6/ 4/63	10.1	10,500	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	6/ 5/63	10.5	9,355	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 5/63	11.0	3,355	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 7/63	11.0	2,640	Lake Branch Creek
	Hood River	Hood River	RVLPLM	9/ 9/63	11.0	3,432	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	64 3/63	9.5	10,500	Hood River, W. Fk.
	Hood River	Hood River	RVLPLM	8/28/63	11.0	4,103	Hood River, V. Fk.
	Hood River	Hood River	RVLPLM	8/30/63	11.0	7,051	Hood River, W. Fk.
	Hood River	Hood River	RVLPLM	9/ 5/63	11.0	3,740	Hood River, V. Fk.
	Hood River	Hood River	RVLPLM	9/ 6/63	11.0	3,861	Hood River, V. Fk.
	Hood River	Hood River	RVLPLM	9/10/63	11.0	6,578	Hood River, V. Fk.
	Hood River	Hood River	LVRP	6/ 8/64	9.0	28,377	Hood River, V. Fk.
1963	Gnat Creek	Hood River	RPRM	5/25/64	10.0	10.000	Lake Branch Crook
	Gnat Creek	Hood River	RPRM	5/25/64	10.2	10,934	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	6/ 1/64	11.4	12,574	Lake Branch Creek
	mod River	Hood River	RPLM	4/12/65	7.0	2,100	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	5/22/64	10.0	10,000	Hood River, V. Fk.
	Gnat Creek	Hood River	RPRM	5/26/64	10.2	10,240	Hood River, V. Fk.
	Gnat Creek	Hood River	RPRM	5/28/64	11.2	11,346	Hood River, V. Fk.
	Gnat Creek	Hood River	RPRM	5/29/64	11.4	12.004	Hood River, V. Fk.
	Gnat Creek	Hood River	RPRM	6/ 2/64	11.8	12,000	Hood River, W. Fk.
	Hood River	Hood River	RPLM	4/12/65	7.0	9.450	Hood River, V. Fk.
	Hood River	Hood River	RPLM	4/13/65	7.0	2,100	Hood River, V. Fk.
1964	Gnat Creek	Hood River	LPLM	7/16/65	10.3	10,815	Lake Branch Creek
	Gnat Creek	Hood River	ADRPRM	5/ 4/66	b.8	9,044	Lake Branch Creek
	Gnat Creek	Hood River	LPLM	7/14/65	10.8	10,260	Hood River, W. Fk.
	Gnat Creek	Hood River	LPLM	7/15/65	10.6	10,600	Hood River, V. Fk.
	Gnat Creek	Hood River	LPLM	7/20/65	10.3	11,025	Hood River, W. Fk.
	Gnat Creek	Hood River	LPLM	7/21/65	10.5	11.235	Hood River, W. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 2/66	7.0	17,941	Hood River, V. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 3/66	6.8	8.701	Hood River, V. Fk.
	Gnat Crook	Hood River	ADRPRM	5/ 3/66	7.0	8,981	Hood River, W. Fk.
	Gnat Creek	Hood River	ADRPRM	5/ 5/66	1.8	8,228	Hood River, V. Fk.
1965	Gnat Creek	Hood River	RPRM	6/ 1/66	7.4	8,140	Lake Branch Creek
	Gnat Creek	Hood River	RPRM	6/ 1/66	7.b	9,620	Hood River, W. Fk.
1966	Gnat Creek	Washougal	LVLM	61 6/67	12.3	11.070	Lake Branch Creek
	Gnat Creek	Washougal	LVLM	6/ 6/67	12.3	11.070	Hood River, W. Fk.
	Gnat Creek	Washougal	LVLM	6/ 7/67	10.3	11,433	Hood River, W. Fk.

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Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1967	Gnat Creek	Washougal	RV	5/13/68	9.b	20,553	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/14/68	7.8	9,625	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/14/68	9.6	11,520	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/15/68	7.7	20,867	Hood River, W. Fk.
	Gnat Creek	Washougal	RV	5/16/68	8.1	11.117	Hood River, v. Fk.
	Gnat Creek	Washougal	RV	5/16/68	8.6	11.288	Hood River, v. Fk.
	Gnat Creek	Washougal	RV	5/17/68	8.b	Lt.610	Hood River, v. Fk.
1968	Gnat Creek	Washougal	LVRV	at 2/69	8.5	14,321	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 3/69	9.0	25.908	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 4/69	9.0	26,990	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 5/69	8.0	9,440	Hood River, W. Fk.
	Gnat Creek	Washougal	LVRV	6/ 5/69	8.5	14,448	Hood River, v. Fk.
	Gnat Creek	Washougal	LVRV	6/ 6/69	8.5	12,871	Hood River, W. Fk.
1969	Gnat Creek	Washougal	LFLM	6/ 1/70	b.9	11,730	Hood River, v. Fk.
	Gnat Creek	Washougal	LFLM	6/ 1/70	7.b	12,570	Hood River, v. Fk.
	Gnat Creek	Washougal	LFLM	6/ 2/70	7.1	12,448	Hood River, W. Fk.
	Gnat Creek	Washougal	LFLM	6/ 2/70	7.3	8,760	Hood River, v. Fk.
	Gnat Creek	Washougal	LFLM	6/ 2/70	l.b	8,954	Hood River, v. Fk.
	Gnat Creek	Washougal	LFLM	6/ 3/70	7.2	8,640	Hood River, v. Fk.
	Gnat Creek	Washougal	LFLM	6/ 3/70	7.b	34,744	Hood River, v. Fk.
1970	Gnat Creek	Washougal	RFLM	4/26/71	8.8	10,560	Hood River
	Gnat Creek	Washougal	RFLM	4/27/71	8.8	10,560	Hood River
	Gnat Creek	Washougal	RFLM	4/27/71	9.0	10,800	Hood River
	Gnat Creek	Washougal	RFLM	4/30/71	8.8	10.560	Hood River
	Gnat Creek	Washougal	RFLM	5/ 3/71	15.0	14.400	Hood River
	Gnat Creek	Washougal	RFLM	4/28/71	[illegible]	9,680	Hood River, W. Fk.
	Gnat Creek	Washougal	RFLM	4/28/71	[illegible]	10,648	Hood River, W. Fk.
	Gnat Creek	Washougal	RFLM	4/29/71	8.7	10,440	Hood River, v. Fk.
	Gnat Creek	Washougal	RFLM	4/29/71	8.8	10,736	Hood River, v. Fk.
	Gnat Creek	Washougal	RFLM	4/30/71	8.8	12,056	Hood River, v. Fk.
1971	Gnat Creek	Washougal	ARRV	4/20/72	7.1	9,230	Hood River
	Gnat Creek	Washougal	ARRV	4/26/72	7.4	13,762	Hood River
	Gnat Creek	Washougal	ARRV	4/18/72	7.1	9.301	Lake Branch Creek
	Gnat Creek	Washougal	ARRV	4/26/72	l.b	10,064	Lake Branch Creek
	Gnat Creek	Washougal	ARRV	4/19/72	7.1	9.202	Hood River, W. Fk.
	Gnat Creek	Washougal	ARRV	4/21/72	7.1	9.301	Hood River, W. Fk.
	Gnat Creek	Washougal	ARRV	4/24/72	7.1	13,062	Hood River, v. Fk.
	Gnat Creek	Washougal	ARRV	4/25/72	7.4	13,902	Hood River, W. Fk
	Gnat Creek	Washougal	ARRV	4/27/72	7.3	14,079	Hood River, W. Fk
1972	Gnat Creek	Washougal	RFRM	4/17/73	11.2	21,350	Hood Rive
	Gnat Creek	Washougal	RFRM	4/20/73	b.8	21,246	Hood Rive
	Gnat Creek	Washougal	RFRM	4/18/73	6.J	13,228	Lake Branch Cree
	Gnat Creek	Washougal	RFRM	4/17/73	6.5	21,125	Hood River, v. Fk
	Gnat Creek	Washougal	RFRM	4/19/73	6.5	34,548	Hood River, W. Fk
1973	Gnat Creek	Washougal	RFLM	5/ 8/74	7.3	8,758	Hood Riv
	Gnat Creek	Washougal	RFLM	5/ 9/74	7.2	27,740	Hood Riv
	Gnat Creek	Washougal	RFLM	5/13/74	6.5	11,700	Hood Riv
	Gnat Creek	Washougal	RFLM	5/13/74	b.8	12,235	Hood Riv
	Gnat Creek	Washougal	RFLM	5/13/74	7.1	9,372	Hood Xl-
	Gnat Creek	Washougal	RFLM	5/14/74	5.0	5,000	& d Riv
	Gnat Creek	Washougal	RFLM	lt 9/74	7.3	9,490	Lake Branch Cre
	Gnat Creek	Washougal	RFLM	5/13/74	6.5	8,580	Lake Branch Cre
	Gnat Creek	Washougal	RFLM	5/10/74	7.3	9,125	Hood River, W. F
	Gnat Creek	Washougal	RFLM	5/13/74	7.1	9,372	Hood River, W. F
	Gnat Creek	Washougal	RFLM	5/15/74	3.5	5,600	Hood River, W. F
1974	Gnat Creek	Skamania	ADLV	4/16/75	b.7	9,111	Hood Riv
	Gnat Creek	Skamania	ADLV	4/17/75	6.7	18.023	Hood Riv
	Gnat Creek	Skamania	ADLV	4/23/75	4.0	9.228	Hood Riv

(continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1974	Gnat Creek	Skamania	ADLV	4/25/75	6.0	10,500	Hood River
	Gnat Creek	Skamania	ADLV	4/ 4/75	6.5	10,724	Lake Branch Creek
	Gnat Creek	Skamania	ADLV	4/16/75	6.7	9,489	Hood River, W. Fk.
	Gut Creek	Skamania	ADLV	4/21/75	6.5	10,725	Hood River, W. Fk.
	Gnat Creek	Skamania	ADLV	4/22/75	6.5	10,205	Hood River, W. Fk.
	Gnat Creek	Skamania	ADLV	4/22/75	b.7	11,926	Hood River, W. Fk.
	Gnat Creek	Skamania	ADLV	4/24/75	7.b	3.809	Hood River, W. Fk.
1975	Oak Springs	Skamania	--	4/ 5/76	b.8	10,846	Hood River
	Oak Springs	Skamania	--	4/ 6/76	4.8	5,400	Rood River
	Oak Springs	Skamania		4/ 8/76	1.9	10.277	Hood River
	Oak Springs	Skamania		4/ 8/76	4.0	10,940	Hood River
	Oak Springs	Skamania		4/ 9/76	3.9	10.802	Hood River
	Oak Springs	Skamania		4/12/76	9.9	3,276	Hood River
	Oak Springs	Skamania	--	4/12/76	4.4	6,600	Hood River
	Oak Springs	Skamania	--	4/ 7/76	4.0	10.280	Lake Branch Creek
	Oak Springs	Skamania	--	4/ 9/76	3.9	6,123	Lake Branch Creek
	Oak Springs	Skamania	--	4/ 5/76	4.8	5,992	Hood River, W. Fk.
	Oak Springs	Skamania	--	4/ 5/76	4.9	4,981	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 6/76	4.0	10,314	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 7/76	4.0	10,100	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 9/76	1.9	4,871	Hood River, W. Fk.
1976	Oak Springs	Skamania		4/11/77	1.7	6,305	Hood River
	Oak Springs	Skamania		4/11/77	1.0	6,240	Hood River
	Oak Springs	Skamania	--	4/12/77	6.0	16,260	Hood River
	Oak Springs	Skamania	--	4/12/77	6.0	6,660	Lake Branch Creek
	Oak Springs	Skamania		4/11/77	5.5	6,186	Hood River, W. Fk.
	Oak Springs	Skamania		4/13/77	8.0	so.110	Hood River, W. Fk.
	Oak Springs	Skamania		4/14/77	9.2	7,436	Hood River, W. Fk.
	Oak Springs	Skamania		4/14/77	1.1	14,465	Hood River, W. Fk.
	Oak Springs	Skamania		4/14/77	5.6	6,384	Hood River, W. Fk.
	Oak Springs	Skamania		4/15/77	1.4	lb.769	Hood River, W. Fk.
1977	Oak Springs	Washougal		4/11/78	5.2	24,362	Hood River
	Oak Springs	Washougal		4/12/78	5.3	6,678	Hood River
	Oak Springs	Washougal		4/12/78	5.5	6,875	Hood River
	Oak Springs	Washougal		4/13/78	5.3	6,678	Hood River
	Oak Springs	Washougal	--	4/13/78	1.1	12,763	Hood River
	Oak Springs	Washougal		4/14/78	1.1	to.942	Hood River
	Oak Springs	Washougal		4/12/78	5.2	7,059	Hood River, W. IL.
	Oak Springs	Washougal		4/12/78	5.3	6,890	Hood River, W. Fk.
1978	Oak Springs	Skamania		4/ 9/79	6.5	7,178	Hood River
	Oak Springs	Skamania		4/16/79	1.0	13,375	Hood River
	Oak Springs	Skamania		4/17/79	4.3	4,795	Hood River
	Oak Springs	Skamania		4/17/79	b.7	5,875	Hood River
	Oak Springs	Skamania		4/20/79	1.0	13,000	Hood River
	Oak Springs	Skamania		4/10/79	5.4	5,993	Hood River, W. Fk.
	Oak Springs	Skamania		4/11/79	5.4	6,210	Hood River, W. Fk.
	Oak Springs	Skamania		4/12/79	5.0	12,000	Hood River, W. Fk.
	Oak Springs	Skamania		4/13/79	5.2	13.572	Hood River, W. Fk.
	Oak Springs	Skamania		4/20/79	5.0	6,850	Hood River, W. Fk.
	Oak Springs	Skamania		4/24/79	4.4	11,660	Hood River, W. Fk.
	Oak Springs	Skamania		4/26/79	4.4	4,004	Hood River, W. Fk.
1979	Oak Springs	Skamania		4/10/80	4.2	5,628	Hood River
	Oak Springs	Skamania		4/11/80	b.3	6,235	Hood River
	Oak Springs	Skamania		4/14/80	4.0	5,300	Hood River
	Oak Springs	Skamania	--	4/15/80	3.8	5,510	Hood River
	Oak Springs	Skamania		4/16/80	4.0	5,800	Hood River
	Oak Springs	Skamania	--	4/17/80	4.0	6,200	Hood River
	Oak Springs	Skamania		4/17/80	4.3	6.020	Hood River
	Oak Springs	Skamania	--	5/14/80	4.0	2.899	Hood River
	Oak Springs	Skamania		4/15/80	b.2	6,300	Lake Branch Creek

(continued).

Brood Year	Hatchery	trod stock	Mark	Date	Size (fish/lb)	Number	Release ite
1979	Oak Springs	Skamania		4/16/80	2.8	2.320	Lake Branch Creek
	Oak Springs	Skamania		4/ 9/80	b.2	a.040	Hood River, W. Fk.
	Oak Springs	Skamania		4/10/80	4.2	5,460	Hood River, W. Fk.
	Oak Springs	Skamania		4/11/80	4.2	5,565	Hood River, W. Fk.
	Oak Springs	Skamania		4/14/80	4.2	6,090	Hood River, W. Fk.
	Oak Springs	Skamania		4/18/80	2.8	4,648	Hood River, W. Fk.
1980	Oak Springs	Skamania	-- -	4/ 7/81	1.0	6,250	Hood River
	Oak Springs	Skamania		4/ 7/81	2.1	5,308	Hood River
	Oak Springs	Skamania		4/ 7/81	5.7	13,462	Hood River
	Oak Springs	Skamania		5/ 1/81	4.3	10,369	Hood River
	Oak Springs	Skamania		4/ 9/81	1.6	6,440	Lake Branch Creek
	Oak Springs	Skamania		4/ 9/81	6.0	6,000	Lake Branch Creek
	Oak Springs	Skamania		4/ 8/81	5.0	13,248	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 8/81	1.4	14,540	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 9/81	5.0	12,800	Hood River, W. Fk.
	Oak Springs	Skamania		4/10/81	b.7	10,927	Hood River, W. Fk.
1981	Oak Springs	Skamania		4/ 5/82	4.3	13,650	Hood River
	Oak Springs	Skamania		4/ 7/82	4.3	10,019	Hood River
	Oak Springs	Skamania		4/ 9/82	5.6	13,720	Hood River
	Oak Springs	Skamania		4/ 8/82	5.6	13,300	Lake Branch Creek
	Oak Springs	Skamania		4/ 6/82	4.3	14,566	Hood River, W. Fk.
	Oak Springs	Skamania		4/ 7/82	4.3	10,105	Hood River, W. Fk.
	Oak Springs	Skamania		4/12/82	5.6	14,270	Hood River, W. Fk.
1982	Oak Springs	Skamania		4/ 6/83	a.1	11,730	Hood River
	Oak Springs	Skamania		4/ 7/83	5.1	35,589	Hood River
	Oak Springs	Skamania		4/12/83	5.0	19,075	Hood River
	Oak Springs	Skamania		4/13/83	4.9	6,566	Hood River
	Oak Springs	Skamania		4/ 8/83	5.0	11,975	Lake Branch Creek
	Oak Springs	Skamania		4/ 9/83	5.0	12,440	Lake Branch Creek
	Oak Springs	Skamania		4/ 7/83	5.0	12,125	Hood River, W. Fk
	Oak Springs	Skamania		4/10/83	5.0	51,315	Hood River, W. Fk
	Oak Springs	Skamania		4/11/83	4.5	11,475	Hood River, W. Fk
	Oak Springs	Skamania		4/11/83	1.0	0 [illegible]0	Hood River, W. Fk
	Oak Springs	Skamania		4/11/83	5.1	6,120	Hood River, W. Fk
1983	Oak Springs	Skamania	AD	4/ 5/84	4.0	0 [illegible]0	Hood River
	Oak Springs	Skamania	AD	4/ 6/84	4.0	4,600	Hood River
	Oak Springs	Skamania	AD	4/ 9/84	3.9	9,316	Hood River
	Oak Springs	Skamania	AD	4/ 9/84	a.1	6,325	Hood River
	Oak Springs	Skamania	AD	4/10/84	3.9	4,485	Hood River
	Oak Springs	Skamania	AD	4/13/84	b.8	12,985	Hood River
	Oak Springs	Skamania	AD	4/11/84	3.9	9,653	Lake Branch Creek
	Oak Springs	Skamania	AD	4/ 4/84	4.0	4,400	Hood River, W. Fk
	Oak Springs	Skamania	AD	4/ 4/84	4.5	5,400	Hood River, W. Fk
	Oak Springs	Skamania	AD	4/13/84	2.8	5,320	Hood River, W. Fk
	Oak Springs	Skamania	AD	4/13/84	5.0	6,125	Hood River, W. Fk
	Oak Springs	Skamania	AD	4/16/84	4.5	4,725	Hood River, W. Fk
1984	- -	Skamania	AD	4/ 9/85	b.2	10,920	Hood River
	- -	Skamania	AD	4/ 9/85	5.5	7,095	Hood River
	Oak Springs	Skamania	AD	4/10/85	4.3	16,342	Hood River
	- -	Skamania	AD	4/11/85	4.3	4,300	Hood UT
	Oak Springs	Skamania	a	4/16/85	4.0	10,108	Hood UT
	Oak Springs	Skamania	AD	4/16/85	4.1	5,433	Hood UT
	Oak Springs	Skamania	AD	4/ 4/85	4.5	10,710	Lake Branch Cre
	Oak Springs	Skamania		9/10/84	35.0	37,750	Hood River, W. F
	Oak Springs	Skamania		9/11/84	50.0	56,250	Hood River, W. F
	Oak Springs	Skamania	AD	4/ 3/85	4.7	11,506	Hood River, W. F
	Oak Springs	Skamania	AD	4/ 5/85	4.4	4,743	Hood River, W. F
	Oak Springs	Skamania	AD	4/11/85	4.5	5,963	Hood River, W. F
	Oak Springs	Skamania	AD	4/12/85	4.5	5,850	Hood River, W. F

(continued).

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1985	Oak Springs	Skamania	AD	4/ 7/86	4.1	4,920	Hood River
	Oak Springs	Skamania	AD	4/ 8/86	b.l	4,100	Hood River
	Oak Springs	Skamania	AD	4/ 9/86	4.1	9,656	Hood River
	Oak Springs	Skamania	AD	4/10/86	b.5	21.113	Hood River
	Oak Springs	Skamania	AD	4/11/86	4.5	9,900	Hood River
	Oak Springs	Skamania	AD	4/ 7/86	4.1	9.143	Hood River, V. Fk.
	Oak Springs	Skamania	AD	4/ 8/86	b.l	14,416	Hood River, V. Fk.
	Oak Springs	Skamania	AD	4/ 9/86	b.l	9,410	Hood River, v. Fk.
1986	Oak Springs	Skamania	ho	4/ 7/87	4.0	4,700	Hood River
	Oak Springs	Skamania	AD	4/ 8/87	b.5	5.738	Hood River
	Oak Springs	Skamania	AD	4/ 9/87	b.8	11.424	Hood River
	Oak Springs	Skamania	AD	4/10/87	b.7	5,358	Hood River
	Oak Springs	Skamania	AD	4/10/87	b.8	5.760	Hood River
	Oak Springs	Skamania	AD	4/ 6/87	4.0	4,900	Hood River, V. Fk.
	Oak Springs	Skamania	AD	4/ 7/87	4.0	9,900	Hood River, V. Fk.
	Oak Springs	Skamania	ho	4/ 8/87	4.6	5,635	Hood River, W. Fk.
	Oak Springs	Skamania	AD	4/ 9/87	4.2	10,206	Hood River, W. Fk.
	Oak Springs	Skanamia	AD	4/10/87	4.4	5.170	Hood River, v. It.
	Oak Springs	Skamania	ho	4/10/87	5.2	6,422	Hood River, v. Fk.
	Oak Springs	Skamania	AD	4/13/87	4.4	4,840	Hood River, V. Fk.

Appendix 3. Hatchery releases of juvenile winter steelhead into the Hood River drainage, 1962-86 broods (ODFW files, The Dalles).

Brood releases of juvenile hatchery winter steelhead into the Hood River drainage 1962-63, 1966, 1969-70, 1972-74, 1976-77, and 1981-H broods.

Brood Year	Hatchery	Brood stock	Mark	Date	Size (fish/lb)	Number	Release site
1962	Carson	Unknown	--	2/14/62	45.0	56,340	Tony Creek
	Carson	Unknown	--	2/13/62	45.0	50,040	Lake Branch Creek
	Carson	Unknown	--	2/26/62	45.0	120.150	Hood River, E. Fk.
	Carson	Unknown	--	2/19/62	45.0	117,450	Hood River, M. Fk.
	Carson	Unknown	--	2/14/62	b5.0	56,385	Hood River, v . Fk.
1963	Eagle Creek (USFWS)	Unknown	--	6/ 7/63	42.6	34,165	Clear Branch Creek
	Eagle Creek (USFWS)	Unknown	--	6/ 6/63	J5.b	36,850	Hood River, E. Fk.
	Eagle Creek (USFWS)	Unknown	--	6/ 4/63	32.0	29,024	Hood River, M. Fk.
1966	Little White Salmon	Unknown	--	2/14/66	1050.0	26.250	Bear Creek
1969	Gnat Creek	Unknown	--	9/14/69	55.0	17.100	Laurance Lake
1970	Oak Springs	Alsea River	--	10/ 6/70	15.0	34,965	Laurance Lake
	Gnat Creek	Unknown	--	10/ 6/70	68.0	47,580	Laurance Lake
	Oak Springs	Alsea River		10/ 8/70	36.0	21,364	Laurance Lake
1972	Oak Springs	Foster Res.		9/12/72	b7.8	49,983	Laurance Lake
1974	Oak Springs	Foster Res.	--	8/21/74	114.0	52.435	Laurance Lake
	Oak Springs	Foster Res.		8/22/74	101.0	48,150	Laurance Lake
1976	Gnat Creek	Big Creek	--	11/18/76	27.0	101,658	Laurance Lake
1917	Gnat Creek	218 Creek	--	9/18/78	4.0	33,896	Hood River, E. Fk.
	Gnat Creek	Big Creek	--	9'19118	4.0	33,450	Hood River, E. Fk.
	Gnat Creek	Big Creek	--	9/20/78	4.0	31,889	Hood River, E. Fk.
1984	Trojan Ponds	Big Creek		4/30/85	4.3	13,379	Hood River, M. Fk.
	Trojan Ponds	Big Creek		5/ 1/85	b.8	15.197	Hood River, n. Fk.
	Trojan Ponds	Big Creek	--	5/ 2/85	4.4	13,125	Hood River, n . Fk.
1985	Trojan Ponds	Big Creek		3/17/86	5.5	4,710	E d River
	Trojan Ponds	818 Creek		3/18/86	b.7	4,269	Hood River
	Trojan Ponds	Big Creek	--	3/19/86	5.8	4,628	Hood River
	Trojan Ponds	Big Creek	--	3/20/86	5.1	4,448	Hood River
	Trojan Ponds	Big Creek		3/21/86	5.b	4,138	Hood River
	Trojan Ponds	Big Creek		3/19/86	5.8	4,398	Neal Creek
	Trojan Ponds	Big Creek	--	3/17/86	5.2	4,577	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	3/18/86	b.7	4,368	Hood River, M. Fk.
	Trojan Ponds	Big Creek	--	3/20/86	5.2	4,370	Hood River, M. Fk.
1986	Trojan Ponds	218 Creek	--	5/14/87	4.5	7,419	Hood River, E. Fk.
	Trojan Ponds	818 Creek	--	5/29/87	4.0	5.518	Hood River, 1 . Fk.
	Trojan Ponds	Big Creek		5/14/87	b.5	13,135	Hood River, n . Fk.