

TABLE 7

**STAFF ESTIMATE OF HYDROPOWER-RELATED LOSSES
USING CURRENT RUN SIZE AS A BASIS¹**

Fish Distribution (Percentage)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>		<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
			<u>Hatchery</u>	<u>Natural</u>			
Between 1 & 2 Dams	0.027	0.000	0.260	0.175	0.176	0.047	0.000
Between 2 & 3 Dams	0.128	0.000	0.000	0.234	0.109	0.054	0.000
Between 3 & 4 Dams	0.000	0.000	0.150	0.000	0.031	0.107	0.000
Between 4 & 5 Dams	0.084	0.047	0.510	0.508	0.244	0.095	0.000
Between 5 & 6 Dams	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Between 6 & 7 Dams	0.021	0.000	0.050	0.000	0.000	0.023	0.000
Between 7 & 8 Dams	0.033	0.019	0.000	0.020	0.040	0.022	0.210
Between 8 & 9 Dams	0.654	0.870	0.020	0.063	0.359	0.614	0.296
Between 9 & 10 Dams	0.053	0.064	0.000	0.000	0.046	0.038	0.493
Above Chief Joseph Dam	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Above Hells Canyon Dam	0.000	0.000	0.000	0.000	0.000	0.000	0.000

¹ Estimated hydropower-related losses above Chief Joseph and Hells Canyon dams are computed using predevelopment run sizes. (See Table 6.)

TABLE 7 (cont.)

Calculation Parameters

	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>		<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
			<u>Hatchery</u>	<u>Natural</u>			
Total Adult Production (thousands)	92	77	334	360	179	143	58
Ocean Survival	0.02	0.04	0.04	0.04	0.08	0.10	0.10
Juvenile Down- stream Survival (per dam passed)	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adult Down- stream Survival (per dam passed)	0.95	0.95	0.95	0.95	0.95	0.95	0.95

CALCULATIONS

Number of Adults at River Mouth with Dams (Thousands)

	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>		<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
			<u>Hatchery</u>	<u>Natural</u>			
	92	77	334	360	179	143	58

Number of Smolts at River Mouth with Dams (Thousands)

	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>		<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
			<u>Hatchery</u>	<u>Natural</u>			
	4,600	1,925	8,350	9,000	2,238	1,430	580

TABLE 7 (cont.)

Number of Smolts Produced (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	155	0	4,683	492	84	0
Between 2 & 3 Dams	920	0	3,291	381	121	0
Between 3 & 4 Dams	0	0	2,446	135	299	0
Between 4 & 5 Dams	943	221	21,559	1,333	332	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	368	0	1,593	0	125	0
Between 7 & 8 Dams	724	174	858	427	150	581
Between 8 & 9 Dams	17,931	9,982	4,375	4,788	5,233	1,023
Between 9 & 10 Dams	1,816	918	0	767	405	2,130
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	22,859	11,295	38,804	8,323	6,749	3,734

TABLE 7 (cont.)

Number of Smolts at River Mouth Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	155	0	4,683	492	84	0
Between 2 & 3 Dams	920	0	3,291	381	121	0
Between 3 & 4 Dams	0	0	2,446	135	299	0
Between 4 & 5 Dams	943	221	21,559	1,333	332	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	368	0	1,593	0	125	0
Between 7 & 8 Dams	724	174	858	427	150	581
Between 8 & 9 Dams	17,931	9,982	4,375	4,788	5,233	1,023
Between 9 & 10 Dams	1,816	918	0	767	405	2,130
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	22,859	11,295	38,804	8,323	6,749	3,734

TABLE 7 (cont.)

Number of Adults at River Mouth Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	3	0	187	39	8	0
Between 2 & 3 Dams	18	0	132	30	12	0
Between 3 & 4 Dams	0	0	98	11	30	0
Between 4 & 5 Dams	19	9	862	107	33	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	7	0	64	0	13	0
Between 7 & 8 Dams	14	7	34	34	15	58
Between 8 & 9 Dams	359	399	175	383	523	102
Between 9 & 10 Dams	36	37	0	61	40	213
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	456	452	1,552	665	674	373

TABLE 7 (cont.)

Number of Adults at Spawning Grounds Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	3	0	187	39	8	0
Between 2 & 3 Dams	18	0	132	30	12	0
Between 3 & 4 Dams	0	0	98	11	30	0
Between 4 & 5 Dams	19	9	862	107	33	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	7	0	64	0	13	0
Between 7 & 8 Dams	14	7	34	34	15	58
Between 8 & 9 Dams	359	399	175	383	523	102
Between 9 & 10 Dams	36	37	0	61	40	213
Above Chief Joseph Dam	213	592	276	232	101	1,761
Above Hells Canyon Dam	222	1,221	560	0	140	14
Totals:	892	2,265	2,388	898	916	2,148

All Species Total: 9,507,000

TABLE 7 (cont.)

Number of Adults at Spawning Grounds With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	2	0	142	30	6	0
Between 2 & 3 Dams	11	0	76	18	7	0
Between 3 & 4 Dams	0	0	43	5	13	0
Between 4 & 5 Dams	6	3	288	36	11	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	1	0	12	0	2	0
Between 7 & 8 Dams	2	1	5	5	2	9
Between 8 & 9 Dams	40	44	19	43	58	11
Between 9 & 10 Dams	3	3	0	5	3	18
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	66	52	586	141	104	38

All Species Total: 986,000

TABLE 7 (cont.)

Dam Produced Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	1	0	45	9	2	0
Between 2 & 3 Dams	8	0	56	13	5	0
Between 3 & 4 Dams	0	0	55	6	17	0
Between 4 & 5 Dams	13	6	575	71	22	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	6	0	51	0	10	0
Between 7 & 8 Dams	12	6	29	29	13	50
Between 8 & 9 Dams	319	355	156	340	465	91
Between 9 & 10 Dams	33	34	0	56	37	195
Above Chief Joseph Dam	213	592	276	232	101	1,761
Above Hells Canyon Dam	222	1,221	560	0	140	14
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Totals:	826	2,213	1,802	757	812	2,111

All Species Total: 8,522,000

TABLE 7 (cont.)

Hydropower-Related Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	1	0	40	8	2	0
Between 2 & 3 Dams	7	0	49	11	5	0
Between 3 & 4 Dams	0	0	49	5	15	0
Between 4 & 5 Dams	11	5	511	63	20	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	5	0	46	0	9	0
Between 7 & 8 Dams	11	5	26	26	11	44
Between 8 & 9 Dams	284	316	138	303	414	81
Between 9 & 10 Dams	30	30	0	50	33	174
Above Chief Joseph Dam	196	545	254	213	93	1,620
Above Hells Canyon Dam	111	611	280	0	70	7
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Totals:	655	1,511	1,394	681	671	1,926

All Species Total: 6,838,000

TABLE 8

**STAFF ESTIMATE OF HYDROPOWER-RELATED LOSSES
USING CURRENT POTENTIAL RUN SIZE AS A BASIS¹**

(Numbers of Smolts Produced by Area)

<u>Areas of Production</u>	<u>Spring Chinook</u>		<u>Summer Chinook</u>		<u>Fall Chinook</u>		<u>Coho</u>		<u>Steelhead</u>		<u>Sockeye</u>	
	<u>Hatchery</u>	<u>Natural</u>	<u>Hatchery</u>	<u>Natural</u>	<u>Hatchery</u>	<u>Natural</u>	<u>Hatchery</u>	<u>Natural</u>	<u>Hatchery</u>	<u>Natural</u>	<u>Hatchery</u>	<u>Natural</u>
Between 1 & 2 Dams	4,917,000	864,000	---	---	4,431,000	---	1,750,000	269,000	160,000	197,000	---	---
Between 2 & 3 Dams	765,000	1,407,000	---	---	---	2,057,000	---	331,000	130,000	105,000	---	---
Between 3 & 4 Dams	---	4,273,000	---	---	2,580,000	2,025,000	---	---	48,000	458,000	---	---
Between 4 & 5 Dams	514,000	3,112,000	---	---	8,520,000	21,938,000	---	---	359,000	355,000	---	---
Between 5 & 6 Dams	---	---	---	---	---	---	---	---	---	---	---	---
Between 6 & 7 Dams	---	---	---	---	840,000	---	---	---	220,000	1,000	---	---
Between 7 & 8 Dams	1,640,000	887,000	---	556,000	---	---	---	---	---	94,000	---	316,000
Between 8 & 9 Dams	6,251,000	16,905,000	1,364,000	14,159,000	360,000	24,000	320,000	232,000	4,472,000	1,885,000	---	460,000
Above Wells and Below Chief Joseph dams	800,000	1,266,000	1,344,000	1,295,000	---	---	---	---	368,000	78,000	---	748,000

¹ Estimated hydropower-related losses above Chief Joseph and Hells Canyon dams are computed using predevelopment run sizes. (See Table 6.)

TABLE 8 (cont.)

Number of Smolts Produced (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	5,781	0	4,431	2,019	357	0
Between 2 & 3 Dams	2,172	0	2,057	331	235	0
Between 3 & 4 Dams	4,273	0	4,605	0	506	0
Between 4 & 5 Dams	3,626	0	30,458	0	714	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	840	0	221	0
Between 7 & 8 Dams	2,527	556	0	0	94	316
Between 8 & 9 Dams	23,156	15,523	384	552	6,357	460
Above Wells and Below Chief Joseph	2,066	2,639	0	0	446	748
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	43,601	18,718	42,775	2,902	8,930	1,524

All Species Total: 118,450,000

TABLE 8 (cont.)

Smolts to River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	4,625	0	3,545	1,615	286	0
Between 2 & 3 Dams	1,390	0	1,316	212	150	0
Between 3 & 4 Dams	2,188	0	2,358	0	259	0
Between 4 & 5 Dams	1,485	0	12,476	0	292	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	220	0	58	0
Between 7 & 8 Dams	530	117	0	0	20	66
Between 8 & 9 Dams	3,885	2,604	64	93	1,067	77
Above Wells and Below Chief Joseph	277	354	0	0	60	100
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	14,380	3,075	19,979	1,920	2,192	244

All Species Total: 41,789,000

TABLE 8 (cont.)

Number of Adults at River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	92	0	142	129	29	0
Between 2 & 3 Dams	28	0	53	17	15	0
Between 3 & 4 Dams	44	0	94	0	26	0
Between 4 & 5 Dams	30	0	499	0	29	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	9	0	6	0
Between 7 & 8 Dams	11	5	0	0	2	7
Between 8 & 9 Dams	78	104	3	7	107	8
Above Wells and Below Chief Joseph	6	14	0	0	6	10
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	288	123	799	154	219	24

All Species Total: 1,607,000

TABLE 8 (cont.)

Number of Adults at Spawning Grounds With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	88	0	135	123	27	0
Between 2 & 3 Dams	25	0	48	15	14	0
Between 3 & 4 Dams	38	0	81	0	22	0
Between 4 & 5 Dams	24	0	406	0	24	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	6	0	4	0
Between 7 & 8 Dams	7	3	0	0	1	5
Between 8 & 9 Dams	52	69	2	5	71	5
Above Wells and Below Chief Joseph	3	9	0	0	4	6
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	237	81	678	143	167	16

All Species Total: 1,322,000

TABLE 8 (cont.)

Number of Adults at Spawning Grounds Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	116	0	177	162	36	0
Between 2 & 3 Dams	43	0	82	26	24	0
Between 3 & 4 Dams	85	0	184	0	51	0
Between 4 & 5 Dams	73	0	1,218	0	71	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	34	0	22	0
Between 7 & 8 Dams	51	22	0	0	9	32
Between 8 & 9 Dams	463	621	15	44	636	46
Above Wells and Below Chief Joseph	41	106	0	0	45	75
Above Chief Joseph Dam	213	592	276	232	101	1,761
Above Hells Canyon Dam	222	1,221	560	0	140	14
Totals:	1,307	2,562	2,547	464	1,134	1,927

All Species Total: 9,941,000

TABLE 8 (cont.)

Dam Produced Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	28	0	43	39	9	0
Between 2 & 3 Dams	18	0	35	11	10	0
Between 3 & 4 Dams	48	0	103	0	28	0
Between 4 & 5 Dams	48	0	812	0	48	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	27	0	18	0
Between 7 & 8 Dams	43	19	0	0	8	27
Between 8 & 9 Dams	412	552	14	39	565	41
Above Wells and Below Chief Joseph	38	97	0	0	41	68
Above Chief Joseph Dam	213	592	276	232	101	1,761
Above Hells Canyon Dam	222	1,221	560	0	140	14
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Totals:	1,070	2,480	1,869	321	967	1,911

All Species Total: 8,619,000

TABLE 8 (cont.)

Hydropower-Related Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Between 1 & 2 Dams	25	0	38	35	8	0
Between 2 & 3 Dams	16	0	31	10	9	0
Between 3 & 4 Dams	43	0	92	0	25	0
Between 4 & 5 Dams	43	0	723	0	42	0
Between 5 & 6 Dams	0	0	0	0	0	0
Between 6 & 7 Dams	0	0	24	0	16	0
Between 7 & 8 Dams	38	17	0	0	7	24
Between 8 & 9 Dams	366	491	12	35	503	36
Above Wells and Below Chief Joseph	34	86	0	0	36	61
Above Chief Joseph Dam	196	545	254	213	93	1,620
Above Hells Canyon Dam	111	611	280	0	70	7
Totals:	872	1,749	1,454	293	809	1,748

All Species Total: 6,925,000

TABLE 9

**STAFF ESTIMATE OF HYDROPOWER RESPONSIBILITY
USING ALTERNATIVE 2**

Total Loss	7-14 million
	X
Percent Hydropower Purpose of Dams	77%
	=
Hydropower Responsibility	5-11 million

TABLE 10

VARIATION 1:
 STAFF ESTIMATE OF HYDROPOWER-RELATED LOSSES
 USING PRE-1850 RUN SIZE AS A BASIN¹

Fish Distribution (Percentage)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0.151	0.000	0.248	0.437	0.171	0.000
Between 1 & 2 Dams	0.009	0.000	0.010	0.049	0.022	0.000
Between 2 & 3 Dams	0.033	0.000	0.004	0.000	0.041	0.001
Between 3 & 4 Dams	0.045	0.000	0.004	0.000	0.052	0.000
Between 4 & 5 Dams	0.061	0.018	0.029	0.135	0.061	0.021
Between 5 & 6 Dams	0.000	0.000	0.022	0.000	0.000	0.000
Between 6 & 7 Dams	0.007	0.000	0.064	0.021	0.011	0.000
Between 7 & 8 Dams	0.026	0.012	0.022	0.027	0.011	0.008
Between 8 & 9 Dams	0.325	0.420	0.174	0.139	0.359	0.016
Between 9 & 10 Dams	0.042	0.041	0.000	0.020	0.020	0.303
Above Chief Joseph Dam	0.147	0.166	0.140	0.173	0.105	0.647
Above Hells Canyon Dam	0.153	0.342	0.284	0.000	0.146	0.005

¹ Uses the pre-development run size based on a 67 percent catch efficiency. (See Table 6.)

TABLE 10 (cont.)

Calculation Parameters

	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Total Adult Production (thousands)	597	2,537	1,642	903	570	2,843
Ocean Survival	0.02	0.04	0.04	0.08	0.10	0.10
Juvenile Down- stream Survival (per dam passed)	0.80	0.80	0.80	0.80	0.80	0.80
Adult Down- stream Survival (per dam passed)	0.95	0.95	0.95	0.95	0.95	0.95

CALCULATIONS

Number of Adults Without Dams (Thousands)

<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
597	2,537	1,642	903	570	2,843

Number of Smolts Without Dams (Thousands)

<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
29,850	63,425	41,050	11,288	5,700	28,430

TABLE 10 (cont.)

Numerical Distribution of Smolts Produced Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	4,507	0	10,180	4,933	975	0
Between 1 & 2 Dams	269	0	411	553	125	0
Between 2 & 3 Dams	985	0	164	0	234	28
Between 3 & 4 Dams	1,343	0	164	0	296	0
Between 4 & 5 Dams	1,821	1,142	1,190	1,524	348	597
Between 5 & 6 Dams	0	0	903	0	0	0
Between 6 & 7 Dams	209	0	2,627	237	63	0
Between 7 & 8 Dams	776	761	903	305	63	227
Between 8 & 9 Dams	9,701	26,639	7,143	1,569	2,046	455
Between 9 & 10 Dams	1,254	2,600	0	226	114	8,614
Above Chief Joseph Dam	4,388	10,529	5,747	1,953	599	18,394
Above Hells Canyon Dam	4,567	21,691	11,658	0	832	142
Totals:	29,820	63,362	41,091	11,299	5,694	28,458

TABLE 10 (cont.)

Number of Smolts at River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	4,507	0	10,180	4,933	975	0
Between 1 & 2 Dams	215	0	328	442	100	0
Between 2 & 3 Dams	630	0	105	0	150	18
Between 3 & 4 Dams	688	0	84	0	152	0
Between 4 & 5 Dams	746	468	488	624	142	245
Between 5 & 6 Dams	0	0	296	0	0	0
Between 6 & 7 Dams	55	0	689	62	16	0
Between 7 & 8 Dams	163	160	189	64	13	48
Between 8 & 9 Dams	1,628	4,469	1,198	263	343	76
Between 9 & 10 Dams	168	349	0	30	15	1,156
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	8,800	5,445	13,558	6,419	1,907	1,543

TABLE 10 (cont.)

Number of Adults at River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	90	0	407	395	97	0
Between 1 & 2 Dams	4	0	13	35	10	0
Between 2 & 3 Dams	13	0	4	0	15	2
Between 3 & 4 Dams	14	0	3	0	15	0
Between 4 & 5 Dams	15	19	20	50	14	24
Between 5 & 6 Dams	0	0	12	0	0	0
Between 6 & 7 Dams	1	0	28	5	2	0
Between 7 & 8 Dams	3	6	8	5	1	5
Between 8 & 9 Dams	33	179	48	21	34	8
Between 9 & 10 Dams	3	14	0	2	2	116
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	176	218	542	514	191	154

TABLE 10 (cont.)

Number of Adults at Spawning Grounds With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	90	0	407	395	97	0
Between 1 & 2 Dams	4	0	12	34	10	0
Between 2 & 3 Dams	11	0	4	0	13	2
Between 3 & 4 Dams	12	0	3	0	13	0
Between 4 & 5 Dams	12	15	16	41	12	20
Between 5 & 6 Dams	0	0	9	0	0	0
Between 6 & 7 Dams	1	0	20	4	1	0
Between 7 & 8 Dams	2	4	5	4	1	3
Between 8 & 9 Dams	22	119	32	14	23	5
Between 9 & 10 Dams	2	9	0	2	1	73
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	156	147	509	492	171	103

All Species Total: 1,578,000

TABLE 10 (cont.)

Number of Adults at Spawning Grounds Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	90	0	407	395	97	0
Between 1 & 2 Dams	5	0	16	44	13	0
Between 2 & 3 Dams	20	0	7	0	23	3
Between 3 & 4 Dams	27	0	7	0	30	0
Between 4 & 5 Dams	36	46	48	122	35	60
Between 5 & 6 Dams	0	0	36	0	0	0
Between 6 & 7 Dams	4	0	105	19	6	0
Between 7 & 8 Dams	16	30	36	24	6	23
Between 8 & 9 Dams	194	1,066	286	126	205	45
Between 9 & 10 Dams	25	104	0	18	11	861
Above Chief Joseph Dam	88	421	230	156	60	1,839
Above Hells Canyon Dam	91	868	466	0	83	14
Totals:	596	2,534	1,644	904	569	2,846

All Species Total: 9,094,000

TABLE 10 (cont.)

Dam Produced Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0	0	0	0	0	0
Between 1 & 2 Dams	1	0	4	11	3	0
Between 2 & 3 Dams	8	0	3	0	10	1
Between 3 & 4 Dams	15	0	4	0	17	0
Between 4 & 5 Dams	24	30	32	81	23	40
Between 5 & 6 Dams	0	0	27	0	0	0
Between 6 & 7 Dams	3	0	85	15	5	0
Between 7 & 8 Dams	13	26	31	21	5	19
Between 8 & 9 Dams	172	947	254	112	182	40
Between 9 & 10 Dams	23	95	0	17	10	789
Above Chief Joseph Dam	88	421	230	156	60	1,839
Above Hells Canyon Dam	91	868	466	0	83	14
Totals:	440	2,387	1,135	412	398	2,743

All Species Total: 7,516,000

TABLE 10 (cont.)

Hydropower-Related Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0	0	0	0	0	0
Between 1 & 2 Dams	1	0	4	9	3	0
Between 2 & 3 Dams	7	0	2	0	9	1
Between 3 & 4 Dams	13	0	3	0	15	0
Between 4 & 5 Dams	22	27	28	72	21	35
Between 5 & 6 Dams	0	0	24	0	0	0
Between 6 & 7 Dams	3	0	76	14	5	0
Between 7 & 8 Dams	12	23	27	19	5	17
Between 8 & 9 Dams	153	843	226	99	162	36
Between 9 & 10 Dams	20	85	0	15	9	702
Above Chief Joseph Dam	81	387	211	144	55	1,692
Above Hells Canyon Dam	46	434	233	0	42	7
Totals:	359	1,799	835	372	324	2,491

All Species Total: 6,179,000

TABLE 11

VARIATION 1:
 STAFF ESTIMATE OF HYDROPOWER-RELATED LOSSES
 USING PRE-1850 RUN SIZE AS A BASIS¹

Fish Distribution (Percentage)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0.151	0.000	0.248	0.437	0.171	0.000
Between 1 & 2 Dams	0.009	0.000	0.010	0.049	0.022	0.000
Between 2 & 3 Dams	0.033	0.000	0.004	0.000	0.041	0.001
Between 3 & 4 Dams	0.045	0.000	0.004	0.000	0.052	0.000
Between 4 & 5 Dams	0.061	0.018	0.029	0.135	0.061	0.021
Between 5 & 6 Dams	0.000	0.000	0.022	0.000	0.000	0.000
Between 6 & 7 Dams	0.007	0.000	0.064	0.021	0.011	0.000
Between 7 & 8 Dams	0.026	0.012	0.022	0.027	0.011	0.008
Between 8 & 9 Dams	0.325	0.420	0.174	0.139	0.359	0.016
Between 9 & 10 Dams	0.042	0.041	0.000	0.020	0.020	0.303
Above Chief Joseph Dam	0.147	0.166	0.140	0.173	0.105	0.647
Above Hells Canyon Dam	0.153	0.342	0.284	0.000	0.146	0.005

¹ Uses the pre-development run size based on a 50 percent catch efficiency. (See Table 6.)

TABLE 11 (cont.)

Calculation Parameters

	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Total Adult Production (thousands)	2.300	4.600	2.300	1.780	1,348	2.600
Ocean Survival	0.02	0.04	0.04	0.08	0.10	0.10
Juvenile Down- stream Survival (per dam passed)	0.80	0.80	0.80	0.80	0.80	0.80
Adult Down- stream Survival (per dam passed)	0.95	0.95	0.95	0.95	0.95	0.95

CALCULATIONS

Number of Adults Without Dams (Thousands)

<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
2.300	4.600	2.300	1.780	1,348	2.600

Number of Smolts Without Dams (Thousands)

<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
115.000	115.000	57.500	22.250	13.480	26.000

TABLE 11 (cont.)

Numerical Distribution of Smolts Produced Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	17,365	0	14,260	9,723	2,305	0
Between 1 & 2 Dams	1,035	0	575	1,090	297	0
Between 2 & 3 Dams	3,795	0	230	0	553	26
Between 3 & 4 Dams	5,175	0	230	0	701	0
Between 4 & 5 Dams	7,015	2,070	1,668	3,004	822	546
Between 5 & 6 Dams	0	0	1,265	0	0	0
Between 6 & 7 Dams	805	0	3,680	467	148	0
Between 7 & 8 Dams	2,990	1,380	1,265	601	148	208
Between 8 & 9 Dams	37,375	48,300	10,005	3,093	4,839	416
Between 9 & 10 Dams	4,830	4,175	0	445	270	7,878
Above Chief Joseph Dam	16,905	19,090	8,050	3,849	1,415	16,822
Above Hells Canyon Dam	17,595	39,330	16,330	0	1,968	130
Totals:	114,885	114,885	57,558	22,272	13,467	26,026

TABLE 11 (cont.)

Number of Smolts at River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	17.365	0	14.260	9.723	2.305	0
Between 1 & 2 Dams	828	0	460	872	237	0
Between 2 & 3 Dams	2.429	0	147	0	354	17
Between 3 & 4 Dams	2.650	0	118	0	359	0
Between 4 & 5 Dams	2.873	848	683	1,230	337	224
Between 5 & 6 Dams	0	0	415	0	0	0
Between 6 & 7 Dams	211	0	965	122	39	0
Between 7 & 8 Dams	627	289	265	126	31	44
Between 8 & 9 Dams	6.270	8.103	1,679	519	812	70
Between 9 & 10 Dams	648	633	0	60	36	1,057
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	33.902	9.874	18.991	12.653	4.510	1.411

TABLE 11 (cont.)

Number of Adults at Spawning Grounds With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	347	0	570	778	231	0
Between 1 & 2 Dams	16	0	17	66	23	0
Between 2 & 3 Dams	44	0	5	0	32	2
Between 3 & 4 Dams	45	0	4	0	31	0
Between 4 & 5 Dams	47	28	22	80	27	18
Between 5 & 6 Dams	0	0	13	0	0	0
Between 6 & 7 Dams	3	0	28	7	3	0
Between 7 & 8 Dams	9	8	7	7	2	3
Between 8 & 9 Dams	83	215	45	28	54	5
Between 9 & 10 Dams	8	16	0	3	2	67
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	602	267	713	969	404	94

All Species Total: 3,049,000

TABLE 11 (cont.)

Number of Adults at River Mouth With Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	347	0	570	778	231	0
Between 1 & 2 Dams	17	0	18	70	24	0
Between 2 & 3 Dams	49	0	6	0	35	2
Between 3 & 4 Dams	53	0	5	0	36	0
Between 4 & 5 Dams	57	34	27	98	34	22
Between 5 & 6 Dams	0	0	17	0	0	0
Between 6 & 7 Dams	4	0	39	10	4	0
Between 7 & 8 Dams	13	12	11	10	3	4
Between 8 & 9 Dams	125	324	67	42	81	7
Between 9 & 10 Dams	13	25	0	5	4	106
Above Chief Joseph Dam	0	0	0	0	0	0
Above Hells Canyon Dam	0	0	0	0	0	0
Totals:	678	395	760	1,012	451	141

TABLE 11 (cont.)

Number of Adults at Spawning Grounds Without Dams (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	347	0	570	778	231	0
Between 1 & 2 Dams	21	0	23	87	30	0
Between 2 & 3 Dams	76	0	9	0	55	3
Between 3 & 4 Dams	104	0	9	0	70	0
Between 4 & 5 Dams	140	83	67	240	82	55
Between 5 & 6 Dams	0	0	51	0	0	0
Between 6 & 7 Dams	16	0	147	37	15	0
Between 7 & 8 Dams	60	55	51	48	15	21
Between 8 & 9 Dams	748	1,932	400	247	484	42
Between 9 & 10 Dams	97	189	0	36	27	788
Above Chief Joseph Dam	338	764	322	308	142	1,682
Above Hells Canyon Dam	352	1,573	653	0	197	13
Totals:	2,298	4,595	2,302	1,782	1,347	2,603

All Species Total: 14,926,000

TABLE 11 (cont.)

Dam Produced Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0	0	0	0	0	0
Between 1 & 2 Dams	5	0	6	21	7	0
Between 2 & 3 Dams	32	0	4	0	23	1
Between 3 & 4 Dams	58	0	5	0	39	0
Between 4 & 5 Dams	93	55	44	160	55	36
Between 5 & 6 Dams	0	0	38	0	0	0
Between 6 & 7 Dams	13	0	119	30	12	0
Between 7 & 8 Dams	51	47	43	41	13	18
Between 8 & 9 Dams	664	1,717	356	220	430	37
Between 9 & 10 Dams	88	173	0	33	25	721
Above Chief Joseph Dam	338	764	322	308	142	1,682
Above Hells Canyon Dam	352	1,573	653	0	197	13
<hr/>						
Totals:	1,695	4,329	1,590	813	942	2,509

All Species Total: 11,877,000

TABLE 11 (cont.)

Hydropower-Related Salmon and Steelhead Loss (Thousands)

<u>Area of Production</u>	<u>Spring Chinook</u>	<u>Summer Chinook</u>	<u>Fall Chinook</u>	<u>Coho</u>	<u>Steelhead</u>	<u>Sockeye</u>
Below Bonneville	0	0	0	0	0	0
Between 1 & 2 Dams	4	0	5	19	6	0
Between 2 & 3 Dams	29	0	3	0	21	1
Between 3 & 4 Dams	52	0	5	0	35	0
Between 4 & 5 Dams	83	49	40	143	49	32
Between 5 & 6 Dams	0	0	34	0	0	0
Between 6 & 7 Dams	12	0	106	27	11	0
Between 7 & 8 Dams	45	42	38	37	11	16
Between 8 & 9 Dams	591	1,528	317	196	383	33
Between 9 & 10 Dams	79	154	0	29	22	642
Above Chief Joseph Dam	311	703	296	283	130	1,548
Above Hells Canyon Dam	176	787	327	0	98	7
Totals:	1,382	3,262	1,170	733	766	2,278

All Species Total: 9,590,000