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## I. SPRING CREEK NATIONAL FISH HATCHERY

### A. Description of Project

Spring Creek National Fish Hatchery was established in 1901 as one of several egg collection stations for the Bureau of Commercial Fisheries Clackamas Hatchery. The original hatchery was flooded when Bonneville Dam was completed in 1938. After several modifications, the hatchery was redesigned and rebuilt by US Army Corps of Engineers in 1972.

The hatchery produces over 15 million tule fall chinook salmon annually. These fish are indigenous to the White Salmon River which enters the Columbia one half mile east of the hatchery facility. Spring Creek has successfully reared this indigenous stock for over 100 years.

The Spring Creek Tule Fall Chinook make up a large percentage of the commercial, sport ocean fishery and the Columbia River sport and tribal fishery. The fish are an index stock for the US/Canadian Treaty.

The hatchery is one of the largest water reuse hatcheries in the United States. All smolts are released directly into the Columbia River at the hatchery site. The hatchery strives to conserve generic diversity and integrity of the stock.

### B. Location

Underwood WA – North of Columbia River  
30 miles upstream from Bonneville Dam  
Manager: Ed LaMotte 509 493-1730

### C. Construction Data

Originally built in 1901  
Rebuilt in 1971-72 at a cost of \$8.1 million  
Inflation adjusted year 2000 cost is \$30.2 million  
Annualized capital cost of dollars is \$1,173,723, calculated as the annual payment needed to amortize the \$30.2 million over 50 years at 3 percent

### D. Funding

Part of Mitchell Act  
Funding: 60% Corps of Engineers  
40% National Marine Fisheries Service  
Management: Fish & Wildlife Service

### E. Budget

1. Original annual budgets as provided by Ed LaMotte (see Table 1)
2. Inflation adjusted year 2000 budget calculations (see Table 2)

F. Survival Rates to Adults of Spring Creek Releases

(supplied by Stephen Pastor, US Fish & Wildlife Service, Vancouver WA)

Brood Year	Survival Rate	Brood Year	Survival Rate
1980	.0019	1987	.0030
1981	.0038	1988	.0052
1982	.0095	1989	.0046
1983	.0017	1990	.0014
1984	.0003	1991	.0015
1985	.0015	1992	.0016
1986	.0041	1993	.0020
<b>average 1980-1993</b>	<b>.0030</b>		

G. Average Harvest Rates by Area of Harvest

Area of Harvest	Harvest Rate
OCEAN	
AK Commercial	0
AK Sport	0
BC Commercial	.24
BC Sport	.03
WA Commercial	.14
WA Sport	.06
OR Commercial	.04
OR Sport	.01
CA Commercial	.002
CA Sport	.004
Subtotal	
COLUMBIA RIVER	
GN	.27
Sport	.025
Treaty	0
Subtotal	
HATCHERY	.17
OTHER	.009
Total per Adult Value	

H. Some Budget Calculations

The average annual operating budget has remained constant at about \$900,000. The capital costs are calculated as \$1,173,723 per year. The average releases have remained fairly constant at 15 million tule fall chinook salmon annually.

The costs per release is calculated to average at \$0.060 operating cost, and \$0.078 annualized capital cost, for a total cost of \$0.138 per fall chinook released. The average survival rate between 1980 and 1993 was 0.0030. This brings the cost per survived adult to \$46.00. Between 1980 and 1993 the survival rate varied between 0.0003 for the 1984 brood year, to 0.0095 for the 1982 brood year. The resulting cost per fish caught therefore varies between \$14.53 and \$460.00 for these years.

TABLE 1 SPRING CREEK NFH BUDGET 1988-2001

YEAR	STARTING BUDGET	SALARIES	SERVICES	UTILITIES	FISH FOOD	CHEMICALS	ROUTINE MAINTENANCE	EQUIPMENT	SUPPLIES	TRANS/TRANVEL/ TRAINING	STUDIES	CONSTRUCTION	OVERHEAD COSTS	2000 PRICE INDEX
1988	659,140	318,900	2,269	99,166	49,961	12,935	8,994	7,505	13,550	6,060	0	139,800	225,426	0.756
1989	751,300	332,366	2,534	98,973	68,293	1,800	9,000	6,436	8,750	13,141	0	210,007	256,945	0.785
1990	748,660	361,776	2,415	105,039	58,733	9,886	8,666	31,113	65,680	5,870	0	99,482	256,887	0.816
1991	810,315	376,011	2,400	86,504	36,666	10,071	5,592	31,437	24,612	3,350	0	233,672	277,127	0.843
1992	765,400	423,015	2,671	97,177	58,923	3,011	4,975	0	78,033	10,095	0	87,500	261,766	0.862
1993	821,865	450,674	2,052	86,790	64,567	11,893	2,731	0	50,380	8,778	0	144,000	262,996	0.885
1994	797,905	460,984	2,491	98,900	72,967	9,828	9,900	14,751	56,932	12,060	0	59,070	378,206	0.903
1995	793,039	458,152	3,516	102,823	66,792	15,023	3,111	9,618	91,016	14,230	0	28,758	375,899	0.923
1996	768,648	480,621	1,440	110,050	63,680	12,763	5,131	1,500	72,967	7,966	0	12,500	364,339	0.940
1997	806,380	494,619	1,900	106,435	65,953	16,007	7,869	0	74,245	11,872	0	27,480	382,224	0.958
1998	817,841	524,747	2,460	104,174	84,019	9,927	4,828	2,375	36,245	31,566	0	17,500	387,656	0.970
1999	887,242	569,682	2,127	92,524	56,594	14,530	11,068	23,750	77,443	14,706	0	25,000	420,638	0.985
2000	951,132	454,232	1,533	101,869	67,382	8,080	14,090	69,542	86,953	13,000	0	134,451	325,287	1.000
2001	918,100	532,478	47,990	93,102	45,021	7,710	17,582	740	92,565	49,211	12,000	19,701	313,990	1.000
14 YEAR AVERAGE														
	806,926	445,590	5,557	98,823	61,397	10,247	8,110	14,198	59,241	14,422	857	88,494	320,670	
% of STARTING BUDGET														
		0.552	0.007	0.122	0.076	0.013	0.010	0.018	0.073	0.018	0.001	0.110	0.397	

TABLE 2

YEAR	STARTING BUDGET	SALARIES	SERVICES	UTILITIES	BUDGETS IN CONSTANT 2000 LEVELS								
					FISH FOOD	CHEMICALS	ROUTINE MAINTENANCE	EQUIPMENT	SUPPLIES	TRANS/TRA VEL/ TRAINING	STUDIES	CONSTRUCTION	OVERHEAD COSTS
1988	871,878	421,825	3,001	131,172	66,086	17,110	11,897	9,927	17,923	8,016	0	184,921	298,183
1989	957,070	423,396	3,228	126,080	86,997	2,293	11,465	8,199	11,146	16,740	0	267,525	327,318
1990	917,475	443,353	2,960	128,724	71,977	12,115	10,620	38,129	80,490	7,194	0	121,914	314,813
1991	961,228	446,039	2,847	102,614	43,495	11,947	6,633	37,292	29,196	3,974	0	277,191	328,739
1992	887,935	490,737	3,099	112,734	68,356	3,493	5,771	0	90,526	11,711	0	101,508	303,673
1993	928,661	509,236	2,319	98,068	72,957	13,438	3,086	0	56,927	9,919	0	162,712	297,171
1994	883,616	510,503	2,759	109,524	80,805	10,884	10,963	16,336	63,048	13,355	0	65,415	418,833
1995	859,197	496,373	3,809	111,401	72,364	16,276	3,371	10,420	98,609	15,417	0	31,157	407,258
1996	817,711	511,299	1,532	117,074	67,745	13,578	5,459	1,596	77,624	8,474	0	13,298	387,595
1997	841,733	516,304	1,983	111,101	68,844	16,709	8,214	0	77,500	12,392	0	28,685	398,981
1998	843,135	540,976	2,536	107,396	86,618	10,234	4,977	2,448	37,366	32,542	0	18,041	399,645
1999	900,753	578,357	2,159	93,933	57,456	14,751	11,237	24,112	78,622	14,930	0	25,381	427,044
2000	951,132	454,232	1,533	101,869	67,382	8,080	14,090	69,542	86,953	13,000	0	134,451	325,287
2001	918,100	532,478	47,990	93,102	45,021	7,710	17,582	740	92,565	49,211	12,000	19,701	313,990
14 YEAR AVERAGE													
	895,687	491,079	5,840	110,342	68,293	11,330	8,955	15,624	64,178	15,491	857	103,707	353,466
%of STARTING BUDGET		0.548	0.007	0.123	0.076	0.013	0.010	0.017	0.072	0.017	0.001	0.116	0.395

## II. CLATSOP ECONOMIC DEVELOPMENT COUNCIL (CEDC) FISHERIES PROJECT

A. Description of Project

The CEDC is both a hatchery and net pen rearing operation. It was started in 1977 as an enhancement program to the main stem Columbia gillnet fishery. The CEDC is managed and maintained by a combination of County staff and industry volunteers. The CEDC Fisheries Project capital assets used for Netpen Acclimation and Release are valued at about \$600,000. Twenty percent of the coho are at CEDC facilities from egg to release – about 18 months. The acclimation of trucked-in smolts takes from two weeks to six months. Since this is mostly an acclimation facility, the costs of raising these fish would have to be added to these costs to arrive at total costs. Most of the costs include the CEDC facility costs. Some 700,000 coho are raised full cycle. These coho costs should be considered total annual costs.

B. Location

Most facilities are located in Youngs Bay, part of the Columbia River Estuary, south and west of Astoria, Oregon.

Manager: Todd Jones 503 325-2753

C. Construction Data

Started in 1977 as an enhancement project.

Current assets valued at \$600,000. There are no estimates of total capital costs available.

D. Funding

From a variety of sources.

Partly from BPA.

Smolts for acclimation are provided from other hatcheries.

The Northwest Power Planning Council, through the BPA, provides about \$280,000 per year to this project.

Oregon Department of Fish & Wildlife provides about \$170,000. Of this amount, \$136,000 is for the propagation facility.

E. Survival Rates of Several Stocks

(supplied by Mark Lewis et al, ODF&W)

## 1. Fall Chinook

a. Rogue R. stock	1991-94 brood year	.005	average = .0035
b. URB	1994 brood year	.002	

## 2. Spring Chinook

a. Klatskanie release	1990-94	.0003	
b. Youngs R. release	1990-94	.0028	average = .0012
c. other	1994	.0004	

## 3. Coho

a. Youngs R. release	1992-96	.0100	
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- b. Klatskanie release 1992-96 .0096 average = .0133  
 c. Blind Slough release 1993-96 .0124  
 d. Tongue Point release 1993-96 .0212

F. Average Harvest Rates – Area of Harvest

	FALL CHINOOK		SPRING CHINOOK		COHO	
OCEAN	Harvest Rate		Harvest Rate		Harvest Rate	
AK Commercial	.001		.032			
AK Sport						
BC Commercial	.001		.009		.01	
BC Sport						
WA Commercial	.004		.001			
WA Sport			.001		.067	
OR Commercial	.09					
OR Sport	.004				.022	
CA Commercial	.026					
CA Sport	.005				.001	
Subtotal						
COLUMBIA RIVER						
GN	.712		.676		.852	
Sport	.04		.007		.041	
Treaty						
Subtotal						
HATCHERY	.11		.036		.007	
OTHER	.008					
TOTAL VALUES						

G. Some Budget Calculations (see budgets in Table 3 in attachment)

1. Annual variable costs per acclimated smolt (acclimation costs only)
  - a. Fall Chinook (average releases 180,000). Total 2000-01 budget of \$41,753.
    - i. costs per acclimated smolt = \$0.23
    - ii. costs per survived adult = \$65.71 at an average expected survival rate of 0.0035
  - b. Spring Chinook (average releases 850,000). Total 2000-01 budget of \$241,983.
    - i. costs per acclimated smolt = \$0.28
    - ii. costs per survived adult = \$233.33 at an average expected survival rate of 0.0012
  - c. Coho (average releases 2,700,000). Total 2000-01 budget of \$98,440.
    - i. costs per acclimated smolt = \$0.036
    - ii. costs per survived adult = \$2.71 at an average expected survival rate of 0.0133
2. Annual variable costs per full cycle raised coho (total releases 700,000). Total 2000-01 budget of \$124,249.

- i. costs per raised smolt = \$0.177
- ii. costs per survived adult = \$13.31 at an average expected survival rate of 0.0133

Table 3 Budgets for Clatsop Economic Development Council (CEDC) Fisheries Project

YEAR	STARTING BUDGET	SALARIES	SERVICES	UTILITIES	FISH FOOD	CEDC 1999-2001		EQUIPMENT	SUPPLIES	TRANS/TRAVEL/TRAINING	STUDIES	CONSTRUCTION	OVERHEAD COSTS
						CHEMICALS	ROUTINE MAINTENANCE						
ACCLIMATION COSTS BY SPECIES													
2000-2001	98,440	63,861	0	2,397	13,512	0	1,108	0	6,226	2,100	0	0	9,236
%of STARTING BUDGET		0.649		0.024	0.137		0.011		0.063	0.021			0.094
COHO													
2000-2001	241,943	143,699	0	3,884	24,134	0	7,872	0	30,213	7,407	0	0	24,734
%of STARTING BUDGET		0.594		0.016	0.100		0.033		0.125	0.031			0.102
SPRING CHINOOK													
2000-2001	41,573	24,691	0	668	4,147	0	1,353	0	5,191	1,273	0	0	4,250
%of STARTING BUDGET		0.594		0.016	0.100		0.033		0.125	0.031			0.102
FALL CHINOOK													
1999-2000	100,256	59,547	0	1,609	10,000	0	3,262	0	12,520	3,069	0	0	10,249
%of STARTING BUDGET		0.594		0.016	0.100		0.033		0.125	0.031			0.102
COHO													
1999-2000	237,560	154,111	0	5,784	32,608	0	2,675	0	15,026	5,068	0	0	22,288
%of STARTING BUDGET		0.649		0.024	0.137		0.011		0.063	0.021			0.094
SPRING CHINOOK													
1999-2000	40,820	26,480	0	994	5,603	0	460	0	2,582	871	0	0	3,830
%of STARTING BUDGET		0.649		0.024	0.137		0.011		0.063	0.021			0.094
FALL CHINOOK													
1999-2001	124,249	74,068	0	0	14,112	0	2,623	0	11,251	3,102	7,398	0	11,695
%of STARTING BUDGET		0.596			0.114		0.021		0.091	0.025	0.060		0.094
FULL CYCLE COHO													

### III. NEZ PERCE TRIBAL HATCHERY

#### A. Description of Project

The Nez Perce Tribal Hatchery (NPTH) is a hatchery supplementation program for spring and fall chinook salmon. Phase I facilities will begin supplementing spring and fall chinook populations in 2002. The NPTH utilizes a NATURES management approach during incubation and rearing in an effort to impart natural behavioral responses to juvenile fish and thereby increase their post release survival. Parr and presmolt supplementation for spring chinook will target natural spawning populations in Meadow creek, Lolo Creek, and Newsome Creek. Fall chinook supplementation will occur in the South Fork Clearwater, lower Selway and lower mainstem Clearwater rivers. Restoring an "early spawning-type" fall chinook will be a major goal in the lower South Fork Clearwater and lower Selway River habitats.

The Nez Perce Tribal Hatchery (NPTH) has been in the Council's program since 1982. It is intended to mitigate for losses caused by hydropower development and operation in the Columbia River Basin. In addition to production of fall and spring chinook, planning for coho salmon production as part of NPTH was added to the program by the NPPC in 1998. The coho master plan is expected to be completed in 2002.

- 1) Production goals: a total of 1,400,000 fall chinook and 625,000 spring chinook will be reared by NPTH. Fall chinook will be released as age 0+ smolts. Spring chinook will either be direct released as parr or acclimated at two satellite sites for volitional release as fall per-smolts.
- 2) Predicted adult returns: spring chinook are predicted to return 1,176 adults; of these 527 would be used for broodstock, 353 for natural production and 296 for harvest. Fall chinook are expected to return 2,058 adults; of these 952 would be used for broodstock, 576 for natural production, and 534 for harvest. Returns would contribute towards rebuilding goals as well as delisting goals for fall chinook. The average number of naturally spawning spring chinook in the clearwater for 1973-1994 was about 1,300 adults. Thus, this program would increase that number by 27%, in addition to providing first for harvest. The average number of fall chinook counted at Lower Granite Dam in the last 10 years has been less than 1,500 adults. This program would result in surpassing that number.

#### B. Location

Headquarters for the project are at:

P.O. Box 365  
Lapwai, ID 83540  
(208) 843-7320  
Contact Person: R. Ed Larson.

The facilities associated with this project are in Idaho; they include a Central Incubation and Rearing Facility at allotment 1705; a Juvenile rearing and adult holding facility at Sweetwater

Springs; two satellite acclimation facilities for spring chinook, one at Yoosa/Camp Creek located in the headwaters of Lolo Creek, and the other on Newsome Creek (South Fork Clearwater River tributary); a fall chinook satellite acclimation site in the lower mainstem Clearwater (North Lapwai Valley); and two "early-fall chinook" acclimation sites at Lukes Gulch (lower mainstem South Fork Clearwater River) and Cedar Flats (lower Selway River).

C. Planning and Construction Data

Total planning costs are estimated to have been \$14,153,000; land acquisition has been \$459,000 and total construction costs are estimated at \$16,050,000. Total capital costs, adjusted to 2001 dollars, are estimated to be \$31,520,000. Annualized capital cost of \$1,225,025, calculated as the annual payment needed to amortize \$31,520,000 over 50 years at 3 percent.

D. Funding

Bonneville Power Administration identified candidate supplementation sites on a number of different rivers and streams as part of the NPPC Master Plan. The NPPC approved the project to proceed with final design in January 1998. The NPPC approved construction in May 2000. Management is under the Nez Perce Tribe.

E. Annual Budgets (Aside From Planning and Construction)

1. Annual Budgets Since Year 2000

	Year	Operation and Maintenance	Monitoring and Evaluation	Total Annual Costs
a.	2000	787,2002	903,000	1,690.200
b.	2001	2,166,110	1,392,000	4,558,110
c.	2002 (budgeted)	2,845,000	1,884,430	4,729,430
d.	2003 (budgeted)	1,975,000	2,050,000	4,025,000

2. Itemized Annual Budget for 2002 as Provided by R. Ed Larson

a. Original Budget

NEZ PERCE TRIBAL EXECUTIVE COMMITTEE  
 P.O. Box 365, Lapwai, Idaho 83540

Budget Spreadsheet - BPA Contract

Project Title                      Nez Perce Tribal Hatchery - Operations & Maint.  
 Project No.                        1983-350-00  
 Contract No.                      333-00041  
 Amendment Period:              1/1/02 - 12/31/02  
 NPT Budget No.                 411-10 -

		LINE ITEM
PART I - PERSONNEL		
SALARIES & WAGES		\$884,825
PART II - OPERATING COSTS		
TRAVEL & PERDIEM		\$32,588
TRAINING		\$31,500
TELEPHONE & UTILITIES		\$283,340
RENT		\$0
SUPPLIES		\$53,350
MATERIALS		\$9,200
REPAIRS & MAINTENANCE		\$26,900
VEHICLES/GSA		\$102,300
COMPUTER SERVICES		\$7,200
EQUIPMENT LEASE		\$5,640
SUBTOTALS:		\$1,436,843
PART III ADMINISTRATIVE COSTS		
INDIRECT COSTS		\$300,300
	0.209	
PART IV NON-ADMINISTRATIVE COSTS		
EQUIPMENT		\$1,807,105
CONSULTANTS 7 CONTRACTS		\$277,600
TOTAL - PARTS I - IV		\$3,821,848
TOTAL EXPENDITURES		\$3,821,848
Deduct FY2001 Carryover (see Equipment)		-\$1,139,213
TOTAL CY2002 OBLIGATED BY BPA (new)		\$2,682,635

b. Budget as Compiled For Comparison With Other Budgets

	Year 2002	% of 1988-2002 Average Starting Budget	Budgets in Constant 2000 Levels: % of 1988-2002 Average Starting Budget
Starting budget	3,821,848		
Salaries	884,825	0.471	0.474
Services	12,840	0.006	0.006
Utilities	283,340	0.110	0.112
Fish food	-	0.061	0.063
Chemicals	-	0.010	0.010
Routine maintenance	26,900	0.009	0.009
Equipment	1,807,105	0.133	0.124
Supplies and materials	62,550	0.059	0.059
Trans/travel/training	166,388	0.024	0.023
Studies	277,600	0.019	0.018
Construction	-	0.088	0.095
Overhead costs	300,300	0.317	0.321

c. Budget that Includes Fixed and Annual Budget (in \$)

Planning & Design Costs	Land Acquisition (1999)	Total Construction costs (2001)	Operation & Maintenance since 2000	Monitoring and Evaluation since 2000
14,153,000	459,000	16,050,000	Year (2000) 787,212	Year (2000) 903,000
			Year (2001) 2,166,110	Year (2001) 1,392,000
		16,050,000	Year (2002) 2,845,000	Year (2002) 1,884,430
			Year (2003) 1,975,000	Year (2003) 2,050,000

d. Annualized Budget. Estimated Capital and Operating Costs (in \$)

- \$1,225,025 estimated annualized capital costs
- \$4,025,000 estimated operation, maintenance and monitoring costs
- \$5,250,025 estimated total annual costs

F. Survival Rates

Average survival rates for comparable sites on the Lower Snake system has been about 0.10%. Such survival rates change based on the expectation of future conditions. The NPTH supplementation plan describes the expected survival rates as follows:

"Survival Rates: Assumptions utilized in modeling returns ultimately depend on an improvement in passage conditions through the Columbia and Snake River reservoirs.

The assumed survival rate to smolt for spring chinook released from satellite ponds is 19.5%. This is based on a 65% post-release survival and a 30% over-winter survival. The assumed survival rate to smolt for parr releases is approximately 10%. This is based on a 65% post-release survival, 72% fingerling to parr survival, and a 30% over-winter survival. Fall chinook were assigned a 50% post-release survival. Survival rates were based on information on NATUREs rearing and Idaho Salmon Supplementation Studies assumed to be similar to those for wild fish and were estimated at approximate 0.5% and 0.15% respectively. These rates are also based on the assumption that, through the multitude of recovery actions focused on Columbia Basin salmon, passage will be improved within the next 20 years such that there is at least a stable, non-declining "progeny to parent" return rate.

"As evidenced by the phenomenal 2001 spring chinook return, an improvement in non-man caused conditions can also greatly affect survival rates. Smolt-to-adult returns, as indicated by PIT tag detections at Lower Granite Dam, for two ocean adults from Rapid River and Kooskia Hatcheries were quite high at 1.64% and 1.80% respectively. Should return rates remain as high, as a result of passage and ocean conditions, this program should have no problem in meeting its goals for annual returns. These survival rates maybe compared to the production goals and returns as outlined in the NPTH plan.

#### Long Term Numerical Production Goals and Returns:

Production goals: a total of 1,400,000 fall chinook and 625,000 spring chinook will be reared by NPTH. Fall chinook will be released as age 0+ smolts and would be distributed as follows: 500,000 at Cherrylane, 500,000 at North Lapwai Valley, 200,000 at Lukes Bulch, 200,000 at Cedar Flats. Spring chinook will either be direct released as parr or acclimated at the two satellite sites for volitional release as fall pre-smolts. The direct release site is Meadow Creek with 400,000 fish; acclimated pre-smolt releases are 150,000 at Yoosa/Camp and 75,000 at Newsome Creek.

Predicted Adult Returns: Spring chinook are predicted to return 1,176 adults; of these, 527 would be used for broodstock, 353 for natural production and 296 for harvest. Fall chinook are expected to return 2,058 adults; of these 952 would be used for broodstock, 576 for natural production and 534 for harvest. Harvest rates for both spring and fall chinook are dependent upon utilization of returning adults according to the "wild to hatchery ratio" spawning protocol."<sup>1</sup>

Calculations of their production goals and the listed production expectations are not presented in a clear manner. eg. 1,400,000 fall chinook x 50% post-release survival = 700,000 smolts x .0015 = 1050 fish to adulthood. Their expectations are for 2058 adults. Further explanation is needed to follow the calculations as presented. Using their release data and survival rates, the following returning adults may be expected. I am using two estimates of returning adults. One is based on the discussion of survival rates, the other is based on the discussion of predicted returns.

	Adults survival rate discussion	Adults	predicted returns
• Fall Chinook	$1,400,000 \times 0.50 \times 0.0015 =$	1050	2058
	Direct Releases		
• Spring Chinook	$400,000 \times 0.10 \times 0.005 =$	130	
	Pond Acclimation		
	$225,000 \times 0.195 \times 0.005 =$	219	1176
	Total Expected Surviving Adults	1,399	3234
	(at 2,025,000 releases this calculates as a 0.0007 or 0.0016 expected survival rate)		

#### G. Average Harvest Rates by Area of Harvest

Expected harvest rates are dependent on historical harvest histories throughout the range of the species as well as the production level. Low survival rates of the 1990's would curtail harvest rates throughout their rates. However, some adults may still be harvested in the ocean and Columbia River as other fisheries are prosecuted. The NPTH only presents the expected returns "296 for harvest."

#### H. Some Budget Calculations (From NPTH Plan)

Based upon the budgets and the expected adult returns (survival rates of 0.0007) the cost per release and per returning adult are as follows:

- the annual variable cost per released smolt is \$1.99
- the annualized capital cost per released smolt is \$0.605
- the total cost per released smolt is \$2.595
- the cost per returning adult is expected to be \$3,707.14 (at 0.0007 survival rate) or \$1,434.38 (at 0.0016 survival rate)

The purpose of the NPTH sites are for supplementation; costs per smolt or harvested adults may not be relevant. Other measurable benefits should be developed.

#### IV. YAKIMA FISHERIES PROJECT

##### A. Description of Project

Historically, numbers of anadromous fish returning to the Yakima River were estimated to have ranged from 600,000 to as many as 960,000 per year. Current salmonid runs in the Yakima River have been reduced to fewer than 7,000 adults. Similar declines in anadromous fish runs have occurred throughout the Columbia River Basin. The Council considers the Yakima River system a promising location for mitigation to compensate for losses from development and operation of hydroelectric projects elsewhere in the Columbia Basin. The Yakima Fisheries Project (YFP) would help determine the role that supplementation might play in increasing natural production of anadromous salmonids throughout the Columbia Basin. The YFP is a fishery research and mitigation project jointly directed by the State of Washington and the Yakama Indian Nation. Funded by the Bonneville Power Administration, the project proposes to construct, operate, and maintain anadromous fish production facilities in order to research activities designed to increase knowledge of supplementation techniques. These techniques would be applied to rebuild naturally spawning anadromous fish stocks historically present in the Yakima River Basin, and ultimately to rebuild those stocks throughout the Columbia River Basin. Although the YFP may eventually involve the supplementation of all stocks of anadromous fish known to have occurred in the Yakima River Basin, at this time only two specific projects have been proposed.

- One project would supplement depressed, naturally spawning populations of Upper Yakima spring chinook. The proposal calls for a total of 810,000 smolts to be produced.
- The second project would study the feasibility of reestablishing a naturally spawning population and a significant fall fishery for coho in the Yakima Basin. From the facilities at Prosser Dam, 700,000 coho smolts would continue to be imported into the Yakima River Basin under the tribal program. They are acclimated at the three low-tech facilities. When ready, the juvenile coho leave the acclimation facilities for outmigration to the ocean. Smolts and returning adults would be monitored for survival rates and food habits.

##### B. Location

The project includes a central hatchery facility at Cle Elum, as well as consideration of three sites with six raceways each for acclimation and release of spring chinook smolts.

No new major facilities are needed for the coho feasibility study beyond the low-tech acclimation facilities being used for the existing tribal coho program, and existing trapping and monitoring facilities at Prosser Dam.

##### C. Planning and Construction Data

Total planning, design, and construction costs have been estimated to be \$38,439,375. The largest construction costs have been \$15,876,408 to build the hatchery facilities, \$6,090,569 for the three acclimation sites, and \$3,360,011 for a river water-cooling facility. Annualized capital

cost is \$1,493,946; calculated as the annual payment needed to amortize the \$38,439,375 over 50 years at 3 percent.

D. Funding

The Northwest Power Planning Council approved a master plan for the Yakima/Klickitat Fisheries Project in October 1987. Under the NPPC Master Plan, the Bonneville Power Administration funds the YFP.

E. Annual Budgets (Aside From Planning and Construction)

Estimates provided by David Byrnes (BPA).

1. Cle Elum site budget	\$1,400,000
2. Prosser site budget	\$1,800,000
Total estimated annual cost	\$3,200,000

F. Survival Rates

This is a research facility to estimate survival rates.

## V. LEAVENWORTH NATIONAL FISH HATCHERY COMPLEX

### A. Description of Projects

This project consists of a major National Fish Hatchery at Leavenworth, WA and two satellite facilities, the Entiat and Winthrop NFHs. The Leavenworth hatchery was originally authorized by the Grand Coulee Fish Maintenance Project in 1937 and re-authorized by the Mitchell Act in 1938. It began operations in 1942. Leavenworth is one of three mid-Columbia hatcheries constructed by the Bureau of Reclamation as mitigation for the Grand Coulee Dam - Columbia Basin Project. The goal of the hatchery is to produce spring chinook and summer steelhead to compensate for fish losses in the Columbia River Basin caused by the Grand Coulee Dam.

(1) Leavenworth Hatchery: The facility rears Summer Steelhead and Spring Chinook.

Production Goal: Summer Steelhead

Produce 100,000 smolts for on-station release

Spring Chinook

Produce 1.6 million smolts for on-station release

(2) Entiat Hatchery:

Production Goal: Spring Chinook

Produce 400,000 yearling spring chinook smolts for on-station releases

Produce 400,000 sub-yearling spring chinook smolts for on-station releases

(3) Winthrop National Fish Hatchery

Production Goals:

Spring Chinook - Produce 1 million yearling spring chinook for on-station releases

Summer Steelhead - Produce 100,000 smolts for on-station release

### B. Locations

The Leavenworth hatchery is located along Icicle Creek, a tributary of the Wenatchee River approximately 30 miles above the Wenatchee's confluence with the Columbia River. The hatchery is about 4 miles northeast of Leavenworth, Washington.

Address: 12790 Fish Hatchery Road

Leavenworth, WA 98826

Address: 12790 Fish Hatchery Road Leavenworth, WA 98826

The Entiat National Fish Hatchery is located along the Entiat River, east of Entiat, Washington. The facility is operated as a satellite of Leavenworth NFH.

Winthrop NFH is located along the Methow River in north-central Washington, near the town of Winthrop

#### C. Construction Data

Construction of the entire complex was completed in 1939-1940 at a low nominal cost of roughly \$2.5 million. Based upon our convention for calculating annual capital costs by amortizing the original construction over 50 years at 3% interest, we attribute no annual capital costs to these hatcheries because they are basically depreciated out.

#### D. Funding

The hatchery complex is operated by the U.S. Fish and Wildlife Service and funded by the U.S. Bureau of Reclamation.

#### E. Budgets

Cost Data provided by Leavenworth hatchery manager on forms entitled "Operations/Maintenance Cost Data" Form 3-110 (Rev. 4/88) for years 1988 through 1997.

These data are summarized in Table 1. The Gross National Product Price Deflator was used to convert all nominal dollars values into 2000 \$.

Table 1. Annual Cost data for Leavenworth Complex Hatcheries.

	Costs in Nominal Dollars			Costs in 2000 \$		
	F. Year	Operational Costs	Maintenance/ Equipment	F. Year	Operational Costs	Maintenance/ Equipment
<b>Entiat</b>	1997	\$223,037	\$39,891	1997	\$234,493	\$41,940
	1996	\$234,463	\$47,707	1996	\$251,227	\$51,118
	1995	\$190,400	\$32,539	1995	\$207,964	\$35,541
	1994	\$194,445	\$59,415	1994	\$217,013	\$66,311
	1993	\$188,285	\$13,551	1993	\$214,513	\$15,439
	1992	\$176,137	\$89,732	1992	\$205,490	\$104,685
	1991	\$162,794	\$329,501	1991	\$194,546	\$393,768
	1990	\$154,104	\$67,030	1990	\$190,864	\$83,020
	1989	\$141,351	\$176,428	1989	\$181,884	\$227,019
	1988	\$142,521	\$26,718	1988	\$190,382	\$35,690
<b>Winthrop</b>	1997	\$294,842	\$37,458	1997	\$309,986	\$39,382
	1996	\$316,674	\$13,913	1996	\$339,316	\$14,908
	1995	\$316,165	\$781,818	1995	\$345,331	\$853,939
	1994	\$301,471	\$64,043	1994	\$336,461	\$71,476
	1993	\$310,443	\$58,178	1993	\$353,688	\$66,282
	1992	\$264,513	\$401,780	1992	\$308,593	\$468,735
	1991	\$262,941	\$130,526	1991	\$314,226	\$155,984
	1990	\$222,860	\$20,128	1990	\$276,022	\$24,929
	1989	\$219,908	\$46,504	1989	\$282,967	\$59,839
	1988	\$219,886	\$16,137	1988	\$293,727	\$21,556
<b>Leavenworth</b>	1997	\$918,459	\$158,125	1997	\$965,634	\$166,247
	1996	\$807,875	\$155,803	1996	\$865,638	\$166,943
	1995	\$789,435	\$1,156,885	1995	\$862,259	\$1,263,605
	1994	\$760,394	\$91,748	1994	\$848,649	\$102,397
	1993	\$590,409	\$109,199	1993	\$672,653	\$124,410
	1992	\$561,749	\$468,468	1992	\$655,362	\$546,536
	1991	\$520,496	\$495,346	1991	\$622,015	\$591,959
	1990	\$442,585	\$201,998	1990	\$548,161	\$250,183
	1989	\$411,578	\$35,944	1989	\$529,599	\$46,251
	1988	\$370,785	\$119,073	1988	\$495,300	\$159,059

## F. Fish Production and Survival

Major sources of information were the tag-recapture data base maintained at StreamNet online Hatchery Releases data base; and Stephen M. Pastor. 1998. Annual Report 1998. Annual Coded Wire Program Missing Production Groups. US Fish and Wildlife Service, Vancouver, WA; plus additional data sheets for 1991 – 1994 from Hans Radtke.

The simplest procedure is to multiply the estimated survival times the reported number of fish released to get number of adults produced. However, as shown in Tables 2a – 2c, the survival estimates are not available for all fish released. The chinook yearlings (Age 1) were most frequently included in the coded wire tagging effort and, consequently, are most frequently covered by the survival data. The chinook fingerling (Age 0) releases are rarely tagged, and the summer steelhead from Leavenworth and Winthrop were apparently not tagged at all. For Age 0 releases, four years of data were available for Leavenworth, one year for Entiat, and no years for Winthrop. To fill in these gaps we computed the ratio of Age 0 to Age 1 survival for the four years in which both were estimated from tagging programs at Leavenworth. The resulting relative survival rate for Age 0 chinook is 0.078. To estimate number of adults returning from Age 0 releases at Entiat and Winthrop hatcheries, we multiply the number released times the survival rate of Age 1 releases for the same brood year and hatchery times the relative survival rate of 0.078. These results are displayed in Tables 2b and 2c.

For summer steelhead releases, the Leavenworth hatchery manager, Greg Pratschner, explained that no steelhead survival data are available for the Leavenworth hatchery because those fish are not coded-wire tagged. He suggested that we use survival data for the Dworshak hatchery which is about the same distance upriver from the Columbia river mouth and is comparable in other respects. Since there appears to be no reason to assume that the year-to-year variation in survival in the Snake river would coincide with survival in the upper Columbia river, we use the average annual survival rate for Dworshak summer chinook of 0.892% from Pastor (1998). This results in the estimated steelhead adult returns displayed in Table 2a. Similarly, there were no survival rates available for releases of coho and summer steelhead at Winthrop hatchery. To fill that gap we applied the Winthrop Age 1 chinook release survival rate to the coho releases and applied the average Dworshak summer steelhead survival rate to the steelhead releases at Winthrop. These estimated adults are included in the total returns reported in Table 3c.

## G. Costs per Release, Adult return, and Fish Caught

The Operating and Maintenance costs at each of the three facilities was divided by the number of fish released (total over all species and ages), the number of estimated adult returns, and the number of estimated adult fish caught. These figures are displayed in the right hand columns of Tables 3a – 3c. For each facility, the main result is the average for all years covered as shown in the last row of each table. These figures are equal to the total costs divided by the total number of fish (releases, adult returns, and fish caught), not the average of the annual values displayed in the columns above. The cost per release is lowest at the Leavenworth facility, averaging 33.1 cents per fish released, and ranging from 10.6 cents to 73.4 cents. Entiat and Winthrop hatcheries have almost the same average costs per release at 46 cents and 47 cents respectively. The cost

per release is fairly stable from year to year at Entiat and Winthrop as compared to the cost at Leavenworth.

Cost per adult return, estimated using the available survival rates (some of which are borrowed from similar projects), vary from \$192.0 at Leavenworth to \$1,360.63 at Entiat to \$1,615 per adult at Winthrop. The higher costs per adult at the Entiat and Winthrop facilities are partly attributable to the higher cost per release (about three times higher) but also do to substantially lower estimated survival rates for yearling chinook.

Estimates of cost per fish caught are based upon percent of adult returns taken in the fishery as reported in Pastor (1998). The estimated fractions of the adult return caught in the fishery are very small: 4% for Leavenworth Age 1 chinook, 2% for Entiat Age 1 spring chinook, and 7% for Winthrop Age 1 spring chinook. These percentages were applied to all fish produced at the respective hatcheries. Hence, the estimated cost per adult caught are a huge multiple of the estimated cost per adult returned.

Table 2a. Leavenworth NFH fish releases, survival estimates and estimated # of adults.

BroodYr	Spring Chinook - Age 0			Spring Chinook - Age 1			Summer Chinook	Summer Steelhead	
	Releases	Survival	Est. # Adults	Releases	Survival	Est. # Adults		Releases	Estimated Adults
1981				2,459,500			111,600		
1982	729,237			2,316,480					
1983				2,515,309					
1984	100,750			2,706,796				35,198	
1985				2,510,000	0.44%	11,099		104,500	
1986	434,500			2,363,295	0.12%	2,782		77,000	
1987	352,500	0.00%	11	2,239,677	0.28%	6,244		95,182	
1988	2,643,350	0.00%	90	3,347,303	0.47%	15,732		106,034	946
1989	399,068	0.09%	355	2,258,034	0.20%	4,403		114,103	1,018
1990	285,536	0.00%	13	2,286,828	0.00%	87		119,275	1,064
1991				1,757,925	0.03%	522		34,598	309
1992				1,523,846	0.06%	893		104,145	929
1993				1,712,648	0.19%	3,199		87,722	782
1994				1,706,060	0.05%	932		80,000	714
<b>Total 1988-94</b>	<b>3,327,954</b>	<b>0.014%</b>	<b>458</b>	<b>14,592,644</b>	<b>0.18%</b>	<b>25,768</b>	<b>645,877</b>	<b>5,761</b>	

Table 2b. Entiat Hatchery -- Spring Chinook. Fish release, survival, and estimated # of adults.

BroodYr	Releases Age 0	Total Survival*	No. Adults	Releases Age 1	Total Survival	No. Adults
1981				956000		
1982				717646		
1983	150000			894600		
1984				835000		
1985				920000		
1986				839000		
1987				904256		
1988	49605	0.006%	3	652340	0.102%	665
1989				817700	0.050%	409
1990	377840	0.000%	1	343150	0.004%	14
1991	361590	0.002%	5	376462	0.026%	98
1992	332178	0.002%	7	378729	0.035%	131
1993	399429	0.002%	9	391211	0.038%	150
1994	186817	0.003%	6	335593	0.055%	185
Total 1988-94	1707459		31	3295185	0.050%	1652

\* Relative survival of Age-0 to Age-1 at Leavenworth (0.078) times Age 1 survival at Entiat.

Table 2c. Winthrop NFH. Fish Releases, survival rates, and estimated # of adults

Brood Year	Spring Chinook			Spring Chinook			Coho	Summer Steelhead
	Releases Age 0	Est. Survival	Est. Adults	Releases Age 1	Est. Survival	Est. Adults	Releases	Releases
1981				953,500				
1982	281,300			1,348,081				
1983				1,205,070				
1984				1,098,688				
1985				1,105,000				
1986				1,090,000				
1987				865,734				
1988	250,000			1,121,395				
1989				1,055,056	0.021%	225		
1990	417,864	0.000%	0	624,771	0.001%	7		
1991				950,624	0.000%	-		
1992				556,313	0.017%	94		
1993				770,847	0.028%	219		
1994	186,817	0.001%	2	152,893	0.014%	21	235,281	141,798
1988-94	854,681	0	2	5,231,899	0.014%	706	235,281	141,798

Table 3a. Leavenworth Hatchery. Estimated Cost per Release, Adult, and Harvest

Brood Year	Total Releases	Total Adults	Operations & Maintenance Costs	Cost per Release	Cost Per Adult	Cost per Fish Caught
1988	6,096,687	16,768	\$647,960	\$0.106	\$38.6	\$966.1
1989	2,771,205	5,776	\$570,092	\$0.206	\$98.7	\$2,467.6
1990	2,691,639	1,164	\$789,930	\$0.293	\$678.7	\$16,966.8
1991	1,792,523	831	\$1,205,032	\$0.672	\$1,450.8	\$36,269.3
1992	1,627,991	1,822	\$1,195,147	\$0.734	\$656.0	\$16,399.1
1993	1,800,370	3,981	\$790,518	\$0.439	\$198.5	\$4,963.7
1994	1,786,060	1,646	\$943,679	\$0.528	\$573.5	\$14,336.4
1988-94	18,566,475	31,987	\$6,142,358	<b>\$0.331</b>	<b>\$192.0</b>	<b>\$4,800.6</b>
Ave./Yr.	2,652,354	4,570	\$877,480			

Table 3b. Entiat Hatchery. Cost per Release, Adult Return, and Harvest

Brood Year	Total Releases	Total Adults	Operations & Maintenance Costs	Cost per Release	Cost Per Adult	Cost per Fish Caught
1988	701,945	669	\$223,861	\$0.32	\$334.65	\$16,732.44
1989	817,700	409	\$404,814	\$0.50	\$989.77	\$49,488.27
1990	720,990	15	\$270,998	\$0.38	\$17,820.17	\$891,008.45
1991	738,052	105	\$583,980	\$0.79	\$5,544.44	\$277,222.06
1992	710,907	140	\$308,433	\$0.43	\$2,203.76	\$110,187.97
1993	790,640	162	\$228,063	\$0.29	\$1,408.47	\$70,423.44
1994	522,410	191	\$281,130	\$0.54	\$1,472.05	\$73,602.55
1988-94	5,002,644	1691	\$2,301,278	<b>\$0.46</b>	<b>\$1,360.63</b>	<b>\$68,031.36</b>
Ave./Yr.	714,663	242	\$328,754			

Table 3c. Winthrop Hatchery - Cost per Release, per Adult, and per Fish Caught

Brood Year	Total Releases	Total Adults	Operations & Maintenance Costs	Cost per Release	Cost Per Adult	Cost per Fish Caught*
1988	1,371,395	-	\$312,200	\$0.23	-	
1989	1,055,056	225	\$339,378	\$0.32	\$1,510	\$21,574
1990	1,042,635	7	\$297,779	\$0.29	\$41,183	\$588,322
1991	950,624	-	\$466,746	\$0.49	-	
1992	556,313	94	\$772,962	\$1.39	\$8,222	\$117,450
1993	770,847	219	\$416,521	\$0.54	\$1,903	\$27,180
1994	716,789	1,319	\$404,777	\$0.56	\$307	\$4,383
1988-94	6,463,659	1,64	\$3,010,364	<b>\$0.47</b>	<b>\$1,615</b>	<b>\$23,068</b>
Ave./Yr.	923,380	266	\$430,052			

\* Assuming 7% of returning adults are caught, based upon Pastor (1998).

## VI. PRIEST RAPIDS HATCHERY

### A. Description of Project

The Priest Rapids Hatchery is operated as mitigation for spawning ground inundation caused by the Priest Rapids Project ( Priest Rapids and Wanapum dams) of the Grant County Public Utility District. It is operated by the Washington Department of Fish and Wildlife. It produces upper river bright fall chinook.

#### **Production Goal: URB Fall Chinook**

Produce 100,000 lb of sub-yearling URB fall chinook for on-station release  
Produce 1.7 million URB fall chinook smolts as part of John Day mitigation  
Provide URB chinook eggs to other facilities which rear this stock.

**Water Supply:** Water is supplied to the hatchery from the Columbia River and wells. The majority of the water is supplied by gravity flow from the Columbia River (44,883 gpm) with the wells supplying 8,000 gpm.

#### **Facilities:**

Adult Holding: 6 concrete adult holding ponds - 26,250 cf each  
Incubation: 80 full stacks of vertical tray incubators (1,280 trays)  
Early Rearing: None  
Raceways: 12 vinyl-lined starter raceways - 1,600 cf each  
Rearing Ponds: 6 concrete ponds - 26,500 cf each  
Satellite Facilities: None

### B. Location

The hatchery is located just below Priest Rapids Dam along the Columbia River. The mailing address is P.O. Box 937, Mattawa, WA 99349

### C. Construction data

The hatchery was originally constructed as a spawning channel in the early 1960s, but was unsuccessful (S. Hammond). It was converted into a hatchery beginning in the late 1970s, and was completed in 1984. In 1963 a construction cost of \$5.9 million was incurred in building the original 3/4-mile long spawning channel, water intake, water supply system, & related plumbing. Much of that capital investment was not directly applicable to the current hatchery operation, but 1000 feet of the channel is used in lieu of concrete or vinyl raceways and some of the water supply system was re-used for the hatchery. We attribute half the original investment cost to the Priest Rapids hatchery, but we note that this is an arbitrary assignment. Alternatively, one could take that entire investment as a sunk cost and attribute none of those early capital expenses to the current hatchery. The remaining capital expenses listed in Table 1 below occur annually, with major new construction occurring in 1983.

D. Funding. Funding is from the Grant County Public Utility District (96%+) and the US Army Corps of Engineers (4%).

E. Budget and Costs of Hatchery Operation

Annual budget data were provided by Stuart Hammond of the Grant County Public Utility District. These data are summarized in Table 1. The accumulated capital account is calculated by adding the initial \$2.9 mil. investment to the 1978 capital expense, and then for each subsequent year adding in the reported capital expense and deducting 2% for depreciation. The annualized capital cost is calculated as the annual payment needed to amortize the accumulated capital account at 3 percent over 50 years.

Table 1. Priest Rapids Hatchery Operations and Capital Expenditures. Nominal cost data from Stuart Hammond, Grant Co. PUD.

Brood Year	Nominal Costs		GDP Price Deflator Base 2000	Real Costs		Accumulated Capital Account	Annualized Capital Expense
	O&M	CAPITAL		O&M	Annual Capital		
					\$ 2,955,999		
1978	\$56,319	\$11,345	0.45009	\$ 125,128	\$ 25,206	\$ 2,981,205	\$115,866
1979	\$59,608	\$27,297	0.487601	\$ 122,247	\$ 55,983	\$ 2,977,564	\$115,724
1980	\$84,159	\$27,386	0.532362	\$ 158,086	\$ 51,443	\$ 2,969,456	\$115,409
1981	\$122,091	\$1,915,258	0.582026	\$ 209,768	\$3,290,675	\$ 6,200,742	\$240,995
1982	\$223,223	\$14,781	0.618323	\$ 361,013	\$ 23,904	\$ 6,100,631	\$237,104
1983	\$184,755	\$108,637	0.642796	\$ 287,424	\$ 169,007	\$ 6,147,626	\$238,931
1984	\$187,086	\$19,151	0.666692	\$ 280,618	\$ (28,725)	\$ 6,044,797	\$234,934
1985	\$227,831	\$7,806	0.687739	\$ 331,276	\$ 11,350	\$ 5,935,251	\$230,676
1986	\$257,702	\$83,282	0.702889	\$ 366,633	\$ 118,485	\$ 5,935,031	\$230,668
1987	\$221,230	\$202,163	0.724001	\$ 305,565	\$ 279,230	\$ 6,095,560	\$236,907
1988	\$282,268	\$258,537	0.748607	\$ 377,058	\$ 345,358	\$ 6,319,007	\$245,591
1989	\$264,675	\$45,646	0.77715	\$ 340,571	\$ 58,735	\$ 6,251,361	\$242,962
1990	\$313,012		0.8074	\$ 387,679	\$ -	\$ 6,126,334	\$238,103
1991	\$320,009		0.83679	\$ 382,425	\$ -	\$ 6,003,807	\$233,341
1992	\$373,550	\$2,511	0.857158	\$ 435,801	\$ 2,930	\$ 5,886,661	\$228,788
1993	\$379,497		0.877732	\$ 432,361	\$ -	\$ 5,768,928	\$224,212
1994	\$383,360		0.896005	\$ 427,855	\$ -	\$ 5,653,549	\$219,728

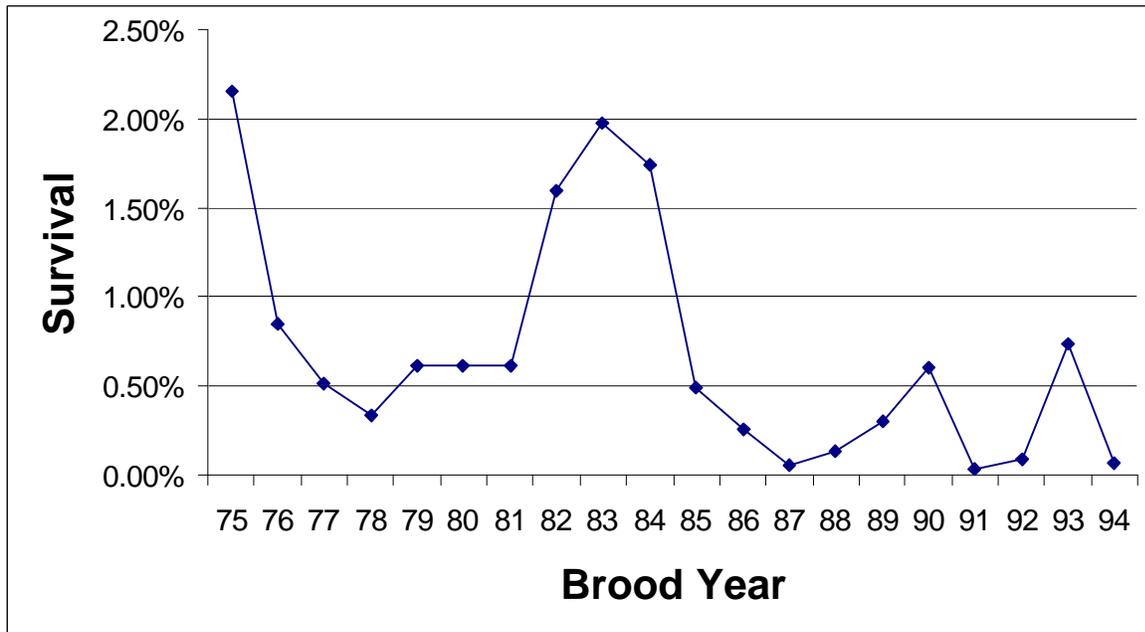
\* annual payment on a 50-year loan at 3% on accumulated capital cost.

F. Survival Rates to Adults of Priest Rapids Hatchery Releases

The fish release data and survival rates are from: Jim Byrne and Howard Fuss. 1999. Annual Coded Wire Tag Program, Washington Missing Production Groups Annual Report for 1998

Table 2. Fish Release and survival rates for Priest Rapids hatchery. Estimated adults.

Brood Year	Migration Year	Fall Chinook Age 0	Survival Rates Brood Year	Estimated Adults
1978	1979	826,500	0.34%	2,810
1979	1980	2,383,500	0.62%	14,778
1980	1981	4,819,500	0.61%	29,399
1981	1982	5,509,500	0.62%	34,159
1982	1983	10,276,500	1.60%	164,424
1983	1984	9,742,701	1.98%	192,905
1984	1985	6,988,800	1.74%	121,605
1985	1986	6,363,000	0.49%	31,179
1986	1987	6,998,500	0.25%	17,496
1987	1988	7,709,000	0.05%	3,855
1988	1989	5,404,550	0.13%	7,026
1989	1990	6,431,100	0.30%	19,293
1990	1991	5,333,430	0.61%	32,534
1991	1992	7,000,100	0.03%	2,100
1992	1993	7,134,159	0.08%	5,707
1993	1994	6,705,836	0.73%	48,953
1994	1995	6,702,000	0.07%	4,691
Totals		106,328,676	0.65%	732,914



## G. Costs per Release, per Adult, and per Fish Caught

Based upon the budgets and release-survival data, the cost per release and per adult return are calculated as shown in Table 3 below. The cost per release is relatively stable around the average of \$ 0.05 operating costs, or \$0.084 total cost, per fall chinook released. Given the pattern of survival from release to adult over 1978-1994, the average cost per adult produced is \$7.27 operating costs or \$12.27 total cost.

Finally, based upon the distribution of tag returns from fisheries as presented in Jim Byrne and Howard Fuss (1999), roughly 53% of the adults produced are caught in fisheries while the remaining 47% returns to the hatchery. The resulting average cost per dollar of fish harvested is an estimated \$23.07.

Table 3. Priest Rapids Hatchery. Cost per Adult Fall Chinook Produced and per Release.

Year	O & M 2000 \$	Annualized Capital Cost	Number of Releases	O&M Cost per Release	O & M plus		Adult Production	Op Cost per Adult	Total Cost per Adult
					Capital Cost per Release	per Release			
1978	\$125,128	\$115,866	826,500	\$0.15	\$0.29	2,810	\$44.53	\$85.76	
1979	\$122,247	\$115,724	2,383,500	\$0.05	\$0.10	14,778	\$8.27	\$16.10	
1980	\$158,086	\$115,409	4,819,500	\$0.03	\$0.06	29,399	\$5.38	\$9.30	
1981	\$209,768	\$240,995	5,509,500	\$0.04	\$0.08	34,159	\$6.14	\$13.20	
1982	\$361,013	\$237,104	10,276,500	\$0.04	\$0.06	164,424	\$2.20	\$3.64	
1983	\$287,424	\$238,931	9,742,701	\$0.03	\$0.05	192,905	\$1.49	\$2.73	
1984	\$280,618	\$234,934	6,988,800	\$0.04	\$0.07	121,605	\$2.31	\$4.24	
1985	\$331,276	\$230,676	6,363,000	\$0.05	\$0.09	31,179	\$10.63	\$18.02	
1986	\$366,633	\$230,668	6,998,500	\$0.05	\$0.09	17,496	\$20.95	\$34.14	
1987	\$305,565	\$236,907	7,709,000	\$0.04	\$0.07	3,855	\$79.27	\$140.74	
1988	\$377,058	\$245,591	5,404,550	\$0.07	\$0.12	7,026	\$53.67	\$88.62	
1989	\$340,571	\$242,962	6,431,100	\$0.05	\$0.09	19,293	\$17.65	\$30.25	
1990	\$387,679	\$238,103	5,333,430	\$0.07	\$0.12	32,534	\$11.92	\$19.23	
1991	\$382,425	\$233,341	7,000,100	\$0.05	\$0.09	2,100	\$182.10	\$293.22	
1992	\$435,801	\$228,788	7,134,159	\$0.06	\$0.09	5,707	\$76.36	\$116.44	
1993	\$432,361	\$224,212	6,705,836	\$0.06	\$0.10	48,953	\$8.83	\$13.41	
1994	\$427,855	\$219,728	6,702,000	\$0.06	\$0.10	4,691	\$91.20	\$138.04	
<b>Totals</b>	<b>\$5,331,508</b>	<b>\$ 3,629,940</b>	<b>106,328,676</b>	<b>\$0.05</b>	<b>\$0.084</b>	732,914	\$7.27	\$12.23	

## VI. IRRIGON HATCHERY COMPLEX

### A. Description of Project

Irrigon Hatchery and its associated satellite facilities are part of the Lower Snake River Compensation Program administered by the U.S. Fish and Wildlife Service. The facilities are operated by the Oregon Department of Fish and Wildlife. The facilities were built by the U.S. Army Corps of Engineers starting in 1982. It is the central steelhead rearing station for the LSRCP in Oregon, incubating and rearing steelhead from both the Grand Ronde and Imnaha river stocks. Overall Irrigon releases 1.7 million smolts each year into streams at several points along the Wallowa, Imnaha, and Grand Ronde Rivers.

The spawning of these fish takes place 170 miles from Irrigon Hatchery at three separate trapping and acclimation sites located at the headwaters of the steelhead's spawning grounds. The most prominent of these, Wallowa Hatchery, provides an ongoing support through trapping, spawning and acclimation release activities for the Irrigon Hatchery. Each year, Big Canyon and Little Sheep Creek Trapping and Acclimation Stations provide additional sources of steelhead during the spawning season

Irrigon is also used as a final rearing site for legal-sized rainbow trout destined for northeast Oregon waters.

### B. Location - Near Irrigon, OR on the Columbia River

Irrigon Hatchery  
Route 2, Box 149  
Irrigon, OR 97844

Irrigon Hatchery is located on 35 acres of land adjacent to the Columbia River.

### C. Construction Data

Table 1. Original Construction Costs.

	Completion Year	Const. Cost Nominal	Real Cost in 2000 \$	Amortized at 3%
Irrigon	1985	\$8,117,000	\$12,198,098	\$474,085
Wallowa	1985	\$2,206,000	\$3,315,142	\$128,845
Little Sheep Creek	1987	\$1,780,000	\$2,440,959	\$94,869
Big Canyon Satellite	1986?	\$1,809,000	\$2,480,727	\$96,414
Total Irrigon-related		\$13,912,000	\$20,434,926	\$794,213

D. Funding

Bonneville Power Administration funds the Irrigon hatchery through the Lower Snake River Compensation Program which is administered by the US Fish and Wildlife Service. The budget is reviewed by the Northwest Power Planning Council's Independent Scientific Review Panel for coordination purposes.

E. Budget

Budget information provided by the USFWS, Lower Snake River Compensation Program Office were used to evaluate the Irrigon and McCall hatcheries. Each budget worksheet covers a fiscal year (e.g. FY85 is October 1984 through September 1985), and we have worksheets for FY85 through FY97. The annual budgets for each facility are broken down into categories: personnel costs, operating expenditures, and capital outlays. The facilities covered by the budget data are Irrigon SFH, Wallowa SFH, Wallowa Satellites, Lookingglass SFH, McCall SFH, Magic Valley SFH, Sawtooth SFH, East Fork FF, and LSRCP Management. The annual budgets for the Irrigon and McCall hatcheries are transferred from the USFWS to the States of Oregon and Idaho annually. From these data sheets we summarized the annual on-site operating and capital costs for the Irrigon and McCall hatcheries.

In addition to these individual facility budgets, USFWS provided annual summaries for the Lower Snake River Compensation Plan Activities for fiscal years 1985 through 2000. These sheets provided annual program expenditures by the USFWS in support of the hatchery program. These costs, which don't occur on-site at the hatcheries, include (a) Abernathy SCTC, (b) funds for the PIT tag program, (c) the USFWS Regional Office in Idaho, and (d) LSRCP Management and Coordination . These items are not listed separated for the Oregon hatcheries before 1994. Assuming that these are joint costs of operating the entire LSRCP hatcheries system, we can proportion out the total joint expenses based upon pounds of fish reared by each facility or complex.

Table 2. Funding Levels from USFW for Irrigon/Wallowa/LittleSheep/BigCanyon

FY	Personnel	Operations	Annual Capital	Total Hatchery Funds from FWS	Allocated Joint Costs	Amortized Construction Cost	Total Annual Cost
1985	\$ 179,577	\$ 248,195	\$ -	\$ 427,772	\$329,121	\$ 794,214	\$ 1,551,106
1986	\$ 247,555	\$ 496,336	\$ 8,451	\$ 748,833	\$234,103	\$ 794,214	\$ 1,777,149
1987	\$ 289,075	\$ 577,137	\$ -	\$ 870,958	\$401,246	\$ 794,214	\$ 2,066,417
1988	\$ 363,757	\$ 607,968	\$ 24,511	\$ 1,000,812	\$385,679	\$ 794,214	\$ 2,180,704
1989	\$ 371,106	\$ 609,739	\$ 8,070	\$ 993,322	\$115,052	\$ 794,214	\$ 1,902,588
1990	\$ 359,838	\$ 680,287	\$ 12,255	\$ 1,056,620	\$110,361	\$ 794,214	\$ 1,961,194
1991	\$ 376,898	\$ 609,133	\$ 14,235	\$ 1,004,370	\$151,951	\$ 794,214	\$ 1,950,535
1992	\$ 393,993	\$ 581,898	\$ 20,418	\$ 1,000,323	\$158,835	\$ 794,214	\$ 1,953,371
1993	\$ 370,795	\$ 610,205	\$ 14,124	\$ 1,001,551	\$216,177	\$ 794,214	\$ 2,011,942
1994	\$ 363,404	\$ 603,135	\$ 37,099	\$ 1,009,937	\$227,775	\$ 794,214	\$ 2,031,925
1995	\$ 355,530	\$ 584,649	\$ 13,543	\$ 959,884	\$268,287	\$ 794,214	\$ 2,022,385
1996	\$ 361,557	\$ 527,514	\$ -	\$ 895,122	\$280,309	\$ 794,214	\$ 1,969,645
1997	\$ 351,161	\$ 509,658	\$ -	\$ 866,756	\$285,059	\$ 794,214	\$ 1,946,028
Total	\$ 4,384,247	\$ 7,245,854	\$ 152,705	\$ 11,836,260	\$ 3,163,954	\$ 10,324,776	\$ 25,324,990
Average	\$ 337,250	\$ 557,373	\$ 11,747	\$ 910,482	\$ 243,381	\$ 794,214	\$ 1,948,076

#### F. Fish Production and Survival

1. Fish Production – releases of summer steelhead smolts were once released at several locations in the Grand Ronde and Imnaha river basins. Recently, the smolts are released at Wallowa FH and Big Canyon in the Grand Ronde and at Little Sheep Creek in the Imnaha basin.

a. Annual summary sheets from USFWS office in Boise, labeled “Table 1. Lower Snake River Compensation Plan Activities for FY’s 1985 – FY 2000. These summaries include “Funding Levels” for each project complex, Species, Type (size), and Fish Released in numbers and pounds.

b. The Annual Stock Assessment Coded Wire Tag Program reports (Missing Production Group reports) from ODFW. I have the 2000 Annual Report, the 1997 Annual Report, and the 1993 Annual report, which span the Brood years from 1985 to 1995.

c. Fish Passage Center data base. The data in this appears to coincide with the release data from USFWS summary sheets.

Note: The Annual Stock Assessment, Coded Wire Tag Program reports deal with sites and releases for which there are tagging programs. Not all sites/hatcheries/species are covered by tagging. Hence, the total releases documented in these reports will be equal to or less than the total production from the hatcheries. In some cases, the totals from the stock assessment report

miss a significant component of the hatchery production. For example, the 1994 steelhead smolt release total for Irrigon hatchery is 1,475,631, while the total release reported in the 2000 Annual Stock Assessment report is 1,061,751 – a difference of 413,880. We have survival estimates only for the groups of fish that were tagged. So, we extrapolate the average survival rate across for tagged groups to the total reported releases from the hatchery. There is a potential problem with this method if the survivals from the non-tagged groups are significantly different from the tagged groups. For instance, if the non-tagged steelhead released from Irrigon were fingerlings rather than smolts, this procedure will over-estimate the survival and contribute to adults for the hatchery as a whole (because fingerlings have a lower survival rate).

Table 3. Overall Releases, Survival, and adult production of summer steelhead from Irrigon. Extrapolation of survival rate from sampled release sites to unsampled releases to yield a total estimated number of Adults.

Release Year	ODFW Stock Assessment Report			USFWS Totals	
	Total Release Tag Groups	Total Est. Adults	Ave. Survival	Total Releases	Est. Total Adults
1985				458578	
1986				564623	
1987	309782	3634	1.17%	1648618	19289
1988	672854	4376	0.65%	1986510	12912
1989	1071320	5892	0.55%	1663967	9152
1990	800334	1805	0.23%	1655900	3809
1991	550490	5409	0.98%	1716355	16820
1992	753795	7687	1.02%	1632235	16649
1993	1042324	721	0.07%	1691718	1184
1994	1057405	2785	0.26%	1475631	3837
1995	950871	5566	0.59%	1691513	9980
1996	1061701	4956	0.47%	1664523	7823
1997	1090434	4229	0.39%	1705453	6651
Average	720101	3620	<b>0.50%</b>	1504279	8316
Total				19555624	108106

Based upon estimated returns to the hatchery presented in Garrison, et al. (2001) for brood years 1985-1988 and in Lewis, et al. (2001) for brood years 1991-1995, we estimate that 44.91 percent of the adult survivors are caught in freshwater fisheries. Applying this percentage to the total adult survivors yields an estimated total contribution to fisheries of 48,549 for the 11 years covered by the adult survivor data.

## G. Costs per Release, per Adult Survivor, and per Fish Harvest

The costs for the Irrigon hatchery are compared with three measures of hatchery production: fish released, survival (number of adults returning), and contribution to fisheries (fish harvested). As shown in Table 4, the calculations can be performed with three different levels of cost: on-site hatchery costs (which represent the budget at ODFW funded by FWS), on-site costs plus a share of the Joint costs for the LSWCP incurred by USFWS), and total costs which equal on-site, plus joint, plus amortized construction costs. Average cost per smolt released for the 13 years of records is \$0.61 on-site costs, \$0.77 on-site plus joint costs, and \$1.30 total costs. Given the average survival to adult for tagged fish from the Irrigon complex, the costs per adult over 11 years of record are \$98.60 for just on-site costs, \$122.66 for on-site plus joint costs, and \$203.47 for total costs. Given that 44.91 percent of the adults are caught in fisheries, the hatchery cost per adult harvested is calculated to be \$219.57 for on-site costs, \$273.13 for on-site plus joint program costs, and \$453.08 for total costs per fish.

Table 4. Irrigon Hatchery Costs per Release (over 13 years), per Adult Return (over 11 years) and per Fish Harvested (11 years).

	Production	On-site Hatchery Costs	On-Site + Joint Costs	Total Costs
	13 years	\$11,836,260	\$15,000,214	\$25,324,990
Smolt Releases	19,555,624	\$0.61	\$0.77	\$1.30
	11 years	\$10,659,655	\$13,260,386	\$21,996,735
Adult Returns (11 yr.)	108,106	\$98.60	\$122.66	\$203.47
Harvest (11 yr.)	48,549	\$219.57	\$273.13	\$453.08

## References:

Lewis, Mark A., Christine Mallette, William M. Murray, and Kent Taylor. 2001. Annual Stock Assessment – Coded Wire Tag Program (ODFW) 2000 Annual Report. Oregon Department of Fish and Wildlife.

Garrison, Robert L., Dennis L. Issac, Mark A Lewis, and William M. Murray. 1994. Annual Coded Wire Tag Program Oregon Missing Production Groups Annual Report 1993. Oregon Department of Fish and Wildlife. Available at:  
<http://www.efw.bpa.gov/egi-bin/efw/FW/publications.egi>

Table 5. Number of Releases from each facility. According to USFWS summary pages and ODFW Stock Assessment Coded Wire Tag Reports (missing production group reports). Survival rates available only in conjunction with ODFW data.

Release Year	Brood Year	Irrigon		Wallowa FH			Little Sheep			Big Canyon		
		Number	Release	ODFW	Survival		ODFW	Survival		ODFW	Survival	
					USFWS	ODFW		USFWS	ODFW		USFWS	ODFW
		Age 0	Age 1									
1985			458578									
1986			314420		250203							
1987	1985		695186	194582	615594	1.400%	115200	93738	0.790%		244100	
1988	1986		1016680	589118	496726	0.720%	83736	248114	0.160%		224990	
1989	1987	52283	644104	822426	545711	0.550%	248894	249456	0.550%		224696	
1990	1988	27800	633100	550876	497800	0.210%	249458	250000	0.260%		275000	
1991	1989	212485	597724	300927	606677	0.960%	249563	242982	1.010%		268972	
1992	1990	243941	262863	236513	668920	1.080%	243008	277704	1.040%	274274	422748	0.950%
1993	1991		416392	496805	1037630	0.080%	246787	237696	0.010%	298732		0.100%
1994	1992		<b>1475631</b>	495164		0.240%	286716		0.230%	275525		0.340%
1995	1993		<b>1691513</b>	494342		0.740%	300775		0.220%	155754		0.800%
1996	1994		<b>1664523</b>	495137		0.430%	287836		0.430%	278728		0.570%
1997	1995		<b>1705453</b>	494481		0.420%	322146		0.260%	273807		0.480%
1998	1996		<b>1501124</b>									
1999	1997	155005	<b>1723964</b>									
2000	1998		<b>1120154</b>									

Note: releases listed in Irrigon column after 1993 release year at total releases from all locations based upon USFWS reports.

## VIII. MCCALL HATCHERY

A. Description of Project

The McCall hatchery was constructed in 1979 by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP) – a program to mitigate for anadromous fishery losses caused by the construction of four the four lower Snake River hydroelectric dams. The hatchery was authorized by Congress in the Water Resources Development Act of 1976. The McCall facility includes two, large outdoor ponds for rearing, 14 indoor rearing tanks, and incubation facilities. Adult summer chinook salmon are captured and held until spawning at the South Fork Salmon River satellite, which includes two adult holding ponds and a covered spawning area. The objective of this project is to return 8,000 adult summer chinook to the south fork of the Salmon River. To achieve this the hatchery produces 1.0 million summer chinook smolts (50,000 pounds) for release into the south fork of the Salmon River.

B. Location

The hatchery is located within the city limits of McCall, Idaho on the North Fork Payette River, approximately 0.25 miles downstream from Payette Lake. Its address is McCall Hatchery Idaho Department of Fish and Game, P.O. Box 1021, McCall, ID 83638.

C. Construction data

The McCall hatchery was completed in September 1981 with a reported construction cost of \$4,615,000. The South Fork Salmon River satellite facility was completed in July 1980 with a reported construction cost of \$838,000. Converted to 2000 \$ using the GNP price deflator, the total capital cost is \$10.76 million. The annual cost of amortizing this capital outlay over 50 years at 3% interest is \$418,015.

Table 1. Hatchery Construction Costs

	<b>Construction Year</b>	<b>Const. Cost Nominal</b>	<b>Real Cost in 2000 \$</b>	<b>Amortized at 3% over 50 Years</b>
<b>McCall</b>	<b>1981</b>	\$4,615,000	\$ 9,102,564	\$ 353,776
<b>So. Fork Salmon R.</b>	<b>1980</b>	\$ 838,000	\$ 1,652,860	\$ 64,239
<b>Total</b>		\$5,453,000	\$10,755,424	\$ 418,015

Bill Hutchinson. 1993. Operational Plans for Anadromous Fish Production Facilities in the Columbia River Basin, Vol. II: Idaho Department of Fish and Game Hatcheries. U.S. Department of Energy, Bonneville Power Administration. Project No. 92-043.q

## D. Funding

Bonneville Power Administration funds the McCall hatchery through the Lower Snake River Compensation Program which is administered by the US Fish and Wildlife Service. The budget is reviewed by the NPPC's ISRP for coordination purposes.

## E. Budget

Budget information provided by the USFWS, Lower Snake River Compensation Program Office were used to evaluate the Irrigon and McCall hatcheries. Each budget worksheet covers a fiscal year (e.g. FY85 is October 1984 through September 1985), and we have worksheets for FY85 through FY97. The annual budgets for each facility are broken down into categories: personnel costs, operating expenditures, and capital outlays. The facilities covered by the budget data are Irrigon SFH, Wallowa SFH, Wallowa Satellites, Lookingglass SFH, McCall SFH, Magic Valley SFH, Sawtooth SFH, East Fork FF, and LSRCP Management. US Fish and Wildlife Service funds the Irrigon and McCall hatcheries through cooperative agreements with the States of Oregon and Idaho annually. From these data sheets we summarized the annual on-site operating and capital costs for the McCall hatchery.

In addition to these individual facility budgets, USFWS provided annual summaries for the Lower Snake River Compensation Plan Activities for fiscal years 1985 through 2000. These sheets provided annual program expenditures by the USFWS in support of the hatchery program. These costs, which don't occur on-site at the hatcheries, include (a) Abernathy SCTC, (b) funds for the PIT tag program, (c) the USFWS Regional Office in Idaho, and (d) LSRCP Management and Coordination. Assuming that these are joint costs of operating the entire LSRCP hatcheries system, we allocated the total joint expenses to McCall hatchery based upon pounds of fish released by McCall relative to the total produced by the LSRCP.

**Table 2. Summary of Budgets and Cost Data from USFWS in 2000 \$. (rev. 4/30/92)**

FY	Personnel	Operations	Annual Capital	Total FWS Funds	Joint Costs	Amortized Construction Costs	Total Costs
1985	\$122,928	\$302,060	\$15,479	\$440,466	\$43,455	\$418,015	\$901,936
1986	\$125,440	\$297,344	\$21,866	\$444,650	\$90,224	\$418,015	\$952,889
1987	\$105,866	\$316,365	\$38,534	\$460,765	\$56,353	\$418,015	\$935,133
1988	\$119,841	\$335,317	\$68,254	\$523,413	\$54,944	\$418,015	\$996,372
1989	\$122,675	\$267,134	\$1,274	\$391,083	\$18,358	\$418,015	\$827,455
1990	\$128,554	\$262,794	\$23,407	\$414,755	\$16,701	\$418,015	\$849,471
1991	\$112,456	\$296,133	\$23,725	\$432,313	\$13,360	\$418,015	\$863,688
1992	\$137,564	\$372,432	\$53,434	\$563,429	\$18,429	\$418,015	\$999,874
1993	\$138,983	\$331,420	\$5,537	\$475,940	\$22,058	\$418,015	\$916,013
1994	\$143,189	\$256,921	\$126,578	\$526,689	\$28,067	\$418,015	\$972,771
1995	\$140,087	\$251,354	\$17,985	\$409,426	\$41,773	\$418,015	\$869,213
1996	\$151,383	\$194,819	\$2,660	\$348,862	\$27,161	\$418,015	\$794,037
1997	\$163,095	\$202,569	\$7,620	\$373,284	\$11,731	\$418,015	\$803,030
Average	\$131,697	\$283,589	\$31,258	\$446,544	\$34,047	\$418,015	\$898,606
Total	\$1,712,061	\$3,686,662	\$406,351	\$5,805,074	\$442,614	\$5,434,193	\$11,681,882

## F. Survival Rates to Adult for McCall Hatchery Releases

Release of summer chinook smolts at the South Fork Salmon river site is the primary output of the hatchery (Table 3), but there are also fingerling releases and occasional shipments of eggs from the McCall facility which are not considered here. Total production of adult fish from the McCall hatchery, from both smolt and sub-yearling releases, is calculated from estimated harvests, in-river survival rates, and returns to the hatchery rack. The McCall hatchery manager provided numbers of fish returning to the hatchery rack and numbers caught in the sport fishery in the South Fork of the Salmon river. Cindy LeFleur (WDFW and Salmon TMT) provided estimates of contribution to river fisheries and inriver survival for Snake river summer chinook. Joe Oatman provided estimates of tribal harvests. The procedure for estimating total adult return and contribution to fisheries assumes that Columbia river survival and harvest rates for Snake river summer chinook apply specifically to McCall hatchery fish. The table and notes in Appendix 1 explain the computations resulting in the data in Table 3. It should be noted that the adult harvest years 1989 – 2001 roughly correspond to returns from brood years 1985 – 1997. The alignment of specific brood year releases with adult year returns in Table 3 does not imply a one-to-one relationship between the two. Adults return at various ages (after 1 or 2 or 3 years in the ocean), and hence the contribution of each brood year to adult returns and fishery harvests are spread among years 3 to 5 years from the brood year. The objective of this adult/harvest accounting is to provide a 13-year production history for comparison to the 13-year hatchery construction/operating cost history, not to compute the production or cost for a particular fiscal year or brood year.

Table 3. Estimated McCall summer chinook hatchery returns to the hatchery rack, South Fork Salmon River sport harvest, and Zones 1-6 Columbia river harvest.

Brood Year	Smolt Release	Adult Return Year	Sport Harvest SFSR	# Harvested in Zone 1-6 Fishery	Tribal Harvest	Rack Return	Total Harvest + Hatchery Return
1985	958,300	1989	0	67	0	935	1002
1986	1,060,400	1990	0	6	16	969	991
1987	947,395	1991	0	9	2	1212	1223
1988	1,032,500	1992	0	50	69	2848	2968
1989	708,600	1993	0	25	207	2697	2931
1990	901,500	1994	0	15	6	527	548
1991	607,298	1995	0	6	0	275	281
1992	1,060,163	1996	0	36	12	873	921
1993	1,074,598	1997	434	165	267	3368	4245
1994	559,226	1998	0	15	71	822	909
1995	238,647	1999	213	44	62	1670	1773
1996	393,873	2000	734	160	447	6093	7581
1997	1,143,083	2001	6003	136	1,795	9576	17606
Average	821,968		568	56	227	2,451	3,306
Total	10,685,583		7,384	734	2,954	31,865	42,980

### G. Costs per Release, per Adult Return, and per Fish Harvested

To provide an overview of the costs of producing summer chinook at the McCall hatchery, we have summarized costs in three ways and fish production in three ways. Fish production is measured as: (1) number of smolts released, (2) total number of adults returned (to hatchery plus fisheries), and (3) total number of fish estimated to have been harvested in various fisheries. These correspond to the three rows in Table 4 below. The hatchery costs are reckoned as: (1) reported on-site operating, maintenance, and annual capital expenses, (2) reported on-site expenses plus allocated joint program costs, and (3) Total on-site, joint, and amortized capital construction costs. This results in nine average cost estimates as reported in the Table 4. Each represents costs for the 13 years recorded in Table 2 divided by total production over 13 years from Table 3.

It is important to note that costs are reported for fiscal years, releases are reported by brood year, and returns are reported by calendar year. Because summer chinook smolts are typically reared from the fall of their brood year until the spring 1-1/2 years later, annual cost figures do not correspond to particular annual release numbers. There are typically at least two brood years in the hatchery as the costs are accruing during a fiscal year. Similarly, the adult returns from a particular release are counted in at least three calendar years. As a consequence of the mis-matches among annual accounting figures, there is no sense to calculating costs per smolt or costs per adult on an annual basis. Only the aggregate performance over a string of years, long enough to incorporate all costs associated with smolt production and all returns from those smolt releases, provides a guide to the typical costs of fish production at the hatchery.

Depending upon which cost aggregate is used, the average costs per summer chinook smolt released ranges from \$0.54 to \$1.09 for the 13 years in which data were available on costs, releases, and returns: 1985 - 1997. Cost per adult return ranges from \$135 to \$271.8. And cost per fish harvested ranges from \$522 to \$1,051.

Table 4. Cost Calculation Summary. Total costs over 13 years, Total production (smolts, adult return, and harvest) over 13 years, and cost per unit production.

		13-Year Costs		
		On-site Costs	On-site + Joint Costs	Total
13-Yr. Production		\$5,805,074	\$6,247,688	\$11,681,882
<b>Smolts</b>	10,685,583	\$0.54	\$0.58	\$1.09
<b>Adults</b>	42,980	\$135.06	\$145.36	\$271.80
<b>Harvest</b>	11,115	\$522.28	\$562.10	\$1,051.01

Appendix 1. Calculation of Numbers of McCall summer chinook returning as adults. 6/3/02

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			Sport Harvest SFSR		SFSR	Computed	From Table 5. Cindy LeFleur			Est. # to Col. R. mouth	Est. SAR	Est.
Brood Year	Smolt Release	Adult Return Year	Rack Return	Adults	Jacks	Tribal Harvest	Total Salmon River Run	Harvest Rate, Zones 1-6	Survival Bon - MCN	Survival MCN to LWG	Retn to Col R. Mouth	# Caught in Zone 1-6 Fishery
1985	958,300	1989	935	0		0	935	5.3%	0.8056	0.9178	1265	67
1986	1,060,400	1990	969	0		16	985	0.5%	0.8526	0.9046	1277	6
1987	947,395	1991	1212	0		2	1214	0.6%	1.0427	0.8099	1438	9
1988	1,032,500	1992	2848	0		69	2917	1.1%	0.8341	0.7548	4633	51
1989	708,600	1993	2697	0		207	2904	1.0%	1.0883	1	2668	27
1990	901,500	1994	527	0		6	533	2.1%	0.9076	0.8299	708	15
1991	607,298	1995	275	0		0	275	1.6%	0.8923	0.8	385	6
1992	1,060,163	1996	873	0		12	885	3.0%	0.9184	0.7955	1211	36
1993	1,074,598	1997	3368	434		267	4069	3.5%	0.8074	1	5040	176
1994	559,226	1998	822	0		71	893	1.3%	0.895	0.7957	1254	16
1995	238,647	1999	1670	0		62	1732	1.9%	0.9636	0.8359	2150	41
1996	393,873	2000	6093	655	213	447	7408	1.9%	0.8751	0.9274	9128	173
1997	1,143,083	2001	9576	6003	79	1,795	17453	0.6%	0.9619	0.7121	25480	153

**Column Source**

- 1 Smolt Release Data from "McCall Fish Hatchery releases and returns 1978 – present"; based on hatchery length-frequency aging method. All data taken from hatchery run reports and BY reports Provided by Paul Kline, McCall Hatchery
- 2 Year in which fish return after 2 years in ocean. Some return a year earlier as jacks, some return 1 year later.
- 3 Hatchery Rack return from "McCall Fish Hatchery releases and returns 1978 – present; based on hatchery length-frequency aging method.
- 4 & 5 Sport harvest in South Fork Salmon River fishery (SFSR) from spreadsheet provided by Paul Kline, McCall Hatchery.
- 6 Hatchery rack return plus SFSR sport fishery harvest
- 7 Harvest by Nez Perce and Shoshone-Bannock tribes in the South Fork of the Salmon River. (from Joe Oatman, Nez Perce Tribe, 6/3/02)
- 8, 9 & 10 Table 5. Snake River adult summer chinook database. 1979-2001. Delivered by FAX from Cindy LeFleur, WDFW. 3/5/02
- 11 Computed by dividing col. 8 by (col.11 x col.12)
- 12 Computed as (col. 12) / (col. 1)
- 13 Equals Col. 13 x Col. 9

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