

Evaluation of a Low-Cost Salmon Production Facility

Annual Report FY 1985

by

Andrew W. Hickerson, Research Biologist

and

James M. Hill, Project Coordinator

Clatsop Economic Development Committee Fisheries Project

Astoria, Oregon 97103

Funded by

Thomas 3. Clune, Project Manager

U. S. Department of Energy

Bonneville Power Administration

Division of Fish and Wildlife

Agreement No. DE-A179-83RP11887

Project No. 83-364

December 1985

TABLE OF CONTENTS

	PAGE
Table of Contents	i
List of Figures	ii
List of Tables	iii
Abstract	1
Introduction	2-3
Description of Study Area	2
Objectives	3
Methods and Materials	4-10
Community Involvement	4
Natural Outmigration of Smolts	4
Cumulative Production of Quality Salmon	5
Development of Optimum Density Levels	8
Augment a Unique Known Stock Fishery	8
Results and Discussion	11-29
Community Involvement	11
Natural Outmigration of Smolts	14
Cumulative Production of Quality Salmon	14
Development of Optimum Density Levels	15
Augment a Unique Known Stock Fishery	20
Summary of Expenditures	30
Literature Cited	31

LIST OF FIGURES

NUMBER		PAGE
1.	1985 CEDC tule fall chinook production outline	7
2.	Annual community contributions to CEDC Fisheries Project	13
3.	Youngs Bay commercial gillnet voluntary assessment participation	11
4.	1985-86 water flow graph for SF Klaskanine pond #3	16
5.	1985-86 water flow graph for Tucker Creek ponds #1 and #2	17
6.	1984-85 water flow graph for SF Klaskanine pond #3	18
7.	1984-85 water flow graph for Tucker Creek ponds XI and #2	19

LIST OF TABLES

NUMBER		PAGE
1.	Summary of 1981-85 releases from CEDC Fisheries Project facilities	6
2.	CEDC Fisheries Project personnel labor breakdown, 1985	10
3.	Community contributions to CEDC Fisheries Project, 1985	12
4.	CEDC Fisheries Project production capacities	21
5.	Harvest and survival summary of CEDC released chinook, 1980 brood	22
6.	Harvest and survival summary of CEDC released chinook, 1981 and 1982 brood	23
7.	Harvest and survival summary of CEDC/ODFW released Rogue stock chinook, 1982 brood	24
8.	Harvest and survival summary of CEDC released coho, 1980, 1981 and 1982 brood	25
9.	Youngs Bay catch direct poundage value, 1982-85	26
10.	Chinook and coho returns to CEDC traps - 1985	27
ii.	Stream survey data for tule and Rogue stock fall chinook. 1985	29

ABSTRACT

Fiscal year 1985 was the third year of a five-year study sponsored by the Bonneville Power Administration to evaluate the presently existing, low-cost salmon production facility operated and maintained by the Clatsop Economic Development Committee Fisheries Project through program measure 704 (j)(l) of the Power Planning Council's Fish and Wildlife Program.

Community contributions for 1985 amounted to 1/3 of the annual budget. Fifty percent of the contributions came from the Youngs Bay gillnetter's voluntary poundage assessment program. Local canneries buying in the Bay equally matched the gillnetter's contribution.

The natural outmigration of smolts was compared between adult coho that were initially released at 16 fish/lb and 9.5 fish/lb. The larger coho were recovered at a rate of 4.9% of total release. The smaller coho were recovered at a rate of .5% of total release. The South Fork Klaskanine chinook release again required six days of migration to travel 4.5 miles to tidewater.

The Project continues to provide cumulative production of quality salmon through its annual releases. Project personnel spend 42% of their time rearing salmon, 36% in administrative and clerical, 10% in contract obligations, and 10% in travel.

Two years of water flow was documented for each drainage. Pond volumes were roughly estimated for a preliminary density table which will be confirmed by the Clatsop County surveyor in 1986.

In 1985, 16% of the chinook catch in Youngs Bay and 6% of the coho catch were from CEDC releases. The 1983-85 total poundage value in Youngs Bay from CEDC releases was \$33,000 for chinook and \$62,000 for coho in addition, experimentally released 3-year old Rogue River stock chinook returned to Youngs Bay and generated \$1.35/lb as compared to \$.40/lib for the tule stock chinook.

Nearly 240,000 Rogue River stock chinook eggs were collected on the Lower Columbia and placed in the CEDC incubation system. The ODFW/CEDC organized Rogue stock releases will continue to increase as more eggs become available from returning adults. The Rogue stock will be added to the total 3,000,000 tule stock chinook and 300,000 coho being released on an annual basis. The result from all CEDC releases should benefit area gillnetters and provide more quality salmon for the entire Lower Columbia River region.

INTRODUCTOION

The CEDC Fisheries Project is an existing low-cost community oriented facility releasing 3,000,000 tule fall chinook and 300,000 coho annually into Youngs Bay in Clatsop County, Oregon. The Project operates through direct coordination and assistance from the Oregon Department of Fish and Wildlife (ODFW). The Project uses a low-cost approach to salmon rearing with emphasis on community support and local contributions. The Project is part of a local effort to assist the economic status of Clatsop County and was designed to operate as a subcommittee under the guidance of an organization called the Clatsop Economic Development Committee (CEDC). Similar subcommittees under CEDC control are tourism, transportation, and forestry; all of which stress the common goal of improving the economy of Clatsop County and the Lower Columbia region.

In 1983 the Bonneville Power Administration (BPA) Fish and Wildlife program started funding a 5-year evaluation of the CEDC Fisheries Project. This is the third year of the ongoing evaluation which is based on three years of coded-wire tagging (CWT) of fall chinook and coho which started in 1983. Data from the CWT operations is continually being retrieved from nearly every fishery and hatchery on the west coast. In addition, the BPA-sponsored project set down five objectives to guide the evaluation and provide valuable information in the area of salmon culture utilizing a low-cost approach. All of the information derived from the objectives will be passed on to other agencies and salmon fishery experts to assist in decision-making efforts regarding hatchery-produced salmon in the Lower Columbia.

This 1985 report is an update of the CWT program and a documentation of three years evaluation of operation and maintenance based on addressing the five objectives:

- Investigate the potential for community involvement
- Evaluate natural outmigration of smolts from earthen rearing ponds
- Provide cumulative production of large numbers of quality salmon while maintaining genetic variability
- Aid in development of optimum density levels in earthen pond environments
- Augment a unique, known stock fishery

Description of Study Area

The CEDC Fishery Project maintains and operates three earthen gravity-fed rearing ponds at the southern end of Youngs Bay. Ponds #1 and X2 are located on the Tucker Creek drainage, while pond #3 and an incubation system are incorporated on the South Fork Klaskanine River. All fish are released into Youngs Bay for subsequent return of adults

which are caught in the local Youngs Bay gillnet fishery, and thereby provide a boost to the local economy.

Objectives

During 1985 the CEDC Fisheries Project under contract with BPA, continued the evaluation of a low-cost salmon production facility, measure 704 (j)(l) of the council's Fish and Wildlife Program.

Specific objectives of fiscal year 1985 activities were as follows:

- 1) Investigate potential for community involvement
 - a. construction
 - b. operation and maintenance
- 2) Evaluate natural outmigration of smolts from earthen pond environment
 - a. general release procedure
 - b. smolt size at time of release for coho
 - c. South Fork outmigration of tule fall chinook
- 3) Provide cumulative production of large numbers of quality salmon while maintaining genetic variability
 - a. annual production goals
 - b. what stocks are used and how
 - c. economics on the job
- 4) Aid in development of optimum density levels in earthen ponds
 - a. flow and temperatures
 - b. 1985 production capacities
- 5) Augment a unique, known stock fishery
 - a. impact of CEDC releases on Youngs Bay and subsequent fisheries
 - b. impact of CEDC releases on natural spawners of Lower Columbia

METHODS AND MATERIALS

Community Involvement (Construction)

All three earthen ponds were designed and constructed to rear salmon. Participation in construction by community individuals and their contributions were documented in last year's annual report (Hickerson and Hill, 1984). Since that time volunteers have not been needed for any major construction plans.

Community Involvement (Operation and Maintenance)

Members of the community help the Project in various ways. Local restaurants donate buckets. County and City officials contribute ideas for management. Warrenton and Astoria High School fishery students participate in various activities for hands-on experience in fish culture. All of the donations of time, money, or materials are being documented on a yearly basis and are used to demonstrate how the Fisheries Project is truly on a local level.

The success of the Project is reflected by participation of Youngs Bay gillnetters in a voluntary 5% poundage value assessment initiated by CEDC. Local gillnetters contribute 5% of the poundage value from their catch in Youngs Bay directly to the Project. Area canneries that buy in the Bay match dollar for dollar, the contributions by gillnetters. This money is used to offset the cost of salmon feed for the Project. These contributions are also being documented on a yearly basis.

Natural Outmigration of Smolts (General Release Procedure)

When the salmon are ready for release, retaining screens are removed from the end of each pond. The pond level is maintained for about one week. After one week each pond is slowly lowered to trigger outmigrant activity. Ponds are totally drained in three or four weeks. Releases are timed to take advantage of high stream flow from coastal storms when possible.

Natural Outmigration of Smolts (Smolt Size Release for Coho)

The Fisheries Project is attempting to correlate ponds #1 and X2 coho smolt size release with maximum survival. In the past, release size of coho has been 15 to 16 fish/pound based on historical information derived from various fishery literature. In 1983 the Project released 100,000 coho from pond #1 at 9.5/lb and 200,000 coho at 16/lb from Pond #2. Both ponds are adjacent and flow directly into Tucker Creek which enters Youngs Bay. Each pond had separate CWT codes with 25,000 tagged in each pond. In 1984 the variable release size was repeated for ponds #1 and #2.

Natural Outmigration of Smolts
(South Fork Klaskanine Outmigration)

In May 1984 and 1985 the 3,000,000 tule fall chinook at 80/lb were released from pond #3 on the South Fork Klaskanine River, 4.5 miles above the tidewater of Youngs Bay. During both of those releases a seine was used just above tidewater to determine how long it took for the chinook to migrate from pond #3 to tidewater. The seine was used at a single "hole" in the South Fork before release to determine resident populations of salmon. After release, seining activities were conducted daily until the migration appeared. Once the migrants were recovered, the seine was used to determine how long the outmigration lasted by seining once per week until no fish were recovered. The released population was identified by sacrificing smolts carrying a CWT.

Cumulative Production of Quality Salmon
(Annual Production Goals)

The CEDC Fisheries Project started major releases in 1981. Since that time, all releases have continued on an annual basis (Table 1). Production numbers tend to remain fixed due to environmental factors. However in 1985, coho production was increased at pond #1 by 60,000 and pond #2 by 60,000.

Cumulative Production of Quality Salmon
(What Stocks are Used and How)

Ponds #1 and #2 are used to imprint coho for the last four months of rearing prior to release. The coho are received at 25/lb in early December, typically from ODFW's Cascade hatchery. The coho are fed, imprinted, coded-wire tagged, then released into Tucker Creek.

Pond #3 is the site of chinook production. At #3 there is also an incubating system that can handle 1,500,000 eggs. During the last three years the Project incubated 1/3 of its 3,000,000 total at the South Fork and received another 2,000,000 tule stock chinook as fry from ODFW's Big Creek hatchery (Figure 1).

In 1983 the Project began an experimental release of Rogue River stock chinook in cooperation with ODFW. After the tule stocks were released, 50,000 Rogue River chinook were transferred into pond #3. The Rogue stock was reared from June to August, then released into the South Fork Klaskanine River. Rogue chinook releases for 1984 and 1985 were 13,000 and 80,000 respectively.

Cumulative Production of Quality Salmon
(Economics on the Job)

The Fishery Project employs two fulltime field personnel, one fulltime secretary, and one project leader. The Project controls all of its personnel in accordance with set standards that are derived primarily from the Clatsop County governmental structure. Clatsop County processes the payroll for the Project and assists with legal and

Table 1. Summary of 1981-85 releases from CEDC Fisheries Project facilities

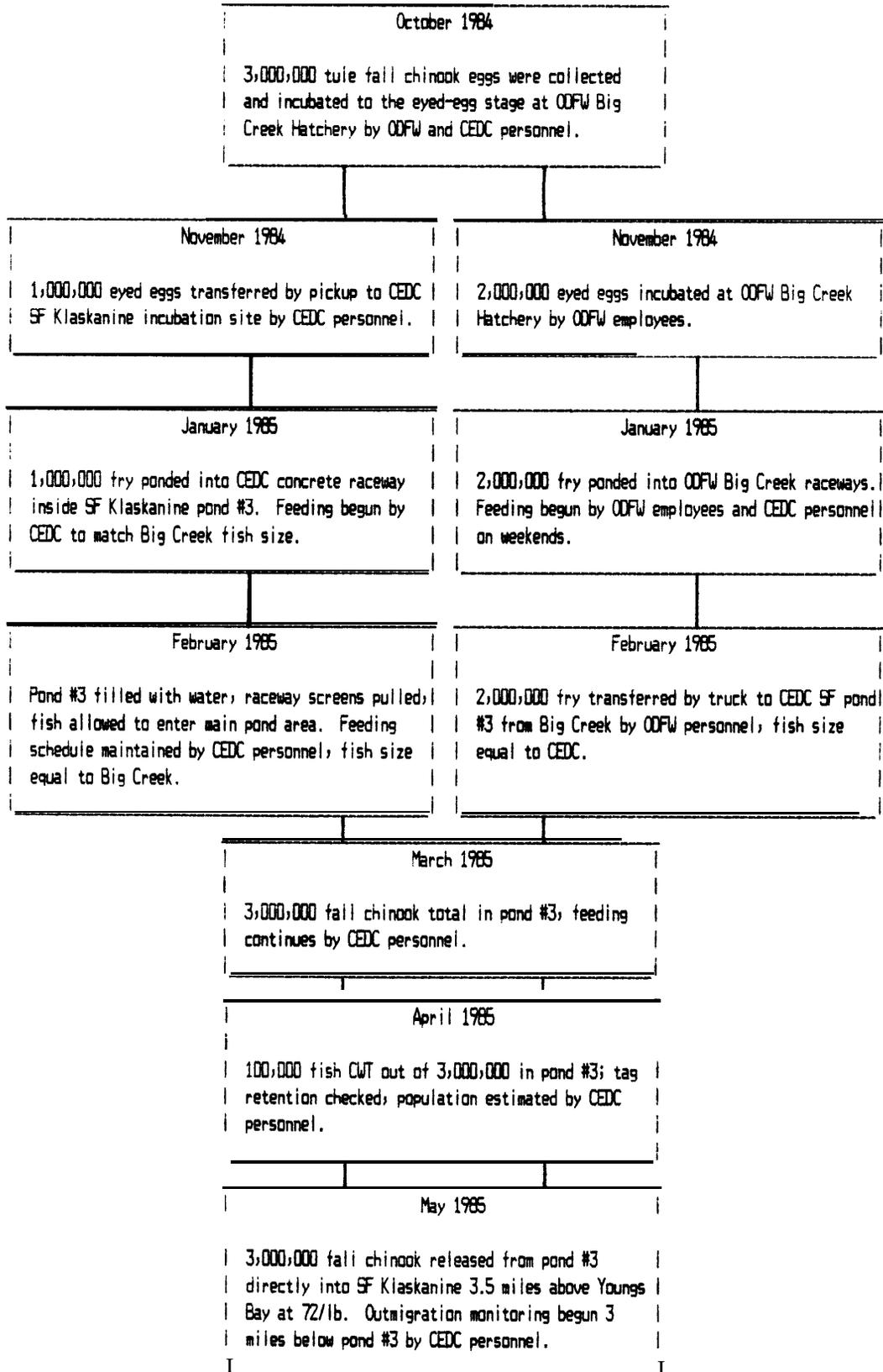
Date	Tag code	Release Site	Species	Release Numbers		% Tagged
				Total	# Tagged	
04/09/81		#1	chum	520,000		
05/15/81	7-21/58	#3	CHF	1,800,915	73,242	4.06
05/22/81	7-21/59	#1 & #2a	CHF	1,357,693	48,898	3.60
04/01/82	7-21/44	#1 & #2a	coho	300,000	53,000	17.67
05/28/82	7-24/12b	#3	CHF	1,918,862	79,695	4.15
05/28/82	7-24/13b	#3	CHF	822,366	33,857	4.12
04/05/83		#1	coho	98,278		
04/05/83	7-24/51	#2	coho	216,490	27,404	12.66
05/15/83	7-28/35	#3	CHF	2,480,354	105,139	4.24
08/04/83	7-28/57	#3	RCHF _c	32,095	28,758	89.60
08/04/83	7-28/58	#3	RCHF _c	18,053	16,176	89.60
04/13/86	7-31/41	#1	coho	93,431	26,817	28.70
04/13/84	7-31/42	#2	coho	207,943	26,697	12.84
05/15/84	7-31/43	#3	CHF	2,867,097	106,911	3.73
06/22/84		Youngs Bay	chum	10,000		
06/24/84	LV clip	#3	RCHF _c	12,638		
4/1-30/85	7-33/44	#1	coho	98,543	25,574	25.95
4/1-6/85	7-33/43	#2	coho	203,683	24,690	12.12
5/20-6/1/85	7-33/45	#3	CHF	2,994,772	101,415	3.39
05/06/85		#2	chum	953,420		
8/1-2/85	7-32/34	#3	RCHF _c	10,751	10,568	98.30
"	7-32/35	"	"	10,208	10,034	"
"	7-32/36	"	"	10,431	10,254	"
"	7-32/37	"	"	9,221	9,064	"
"	7-32/38	"	"	10,189	10,016	"
"	LV clip	"	"	31,057		

a Fish reared in both pods but tagged with same code

b Two tag codes for same group

c Experimental release of Rogue River fall chinook

Figure 1. 1985 CEDC Tule Fall Chinook Production Outline



administrative problems. The Project uses its own personnel time sheet format and documents itself financially.

At the end of 1985 the Project completed one year's worth of time documentation of all people working on the project. This was recorded and compiled in the Project's Apple IIe computer. This has allowed the Project to analyze where time is being directed on the project (Table 2).

Development of Optimum Density Levels (Flows)

All water comes from either an intake diversion system or a dam and intake system. The water is screened before it enters each pond. Ponds #1 and #2 rely on two separate forks of Tucker Creek. Pond #3 water comes directly from the South Fork Klaskanine. All flows are being documented by the Sharp Crested Weir technique (Wood, 1972). Daily pond temperatures and dissolved oxygen are also being recorded.

Development of Optimum Density Levels (Density Levels)

Each pond has a different water volume capacity. In 1985 an attempt was undertaken to determine the exact capacity of each pond. The surface area was measured by hand and multiplied by an average depth. The data that was collected is preliminary. In 1986 an agreement was reached to have the Clatsop County surveyor measure each pond to achieve an exact volume.

Augment a Unique Known Stock Fishery (Impact of CEDC Releases on All Fisheries)

From 1980-1985 all coho and chinook salmon released from CEDC facilities contained a percentage of CWT fish. Tagging was done by contract with ODFW, and along established guidelines used by the Department. The funding for the 1983-85 tagging activities was supplied by BPA under the 5-year evaluation.

Tags are being retrieved from all major fisheries and hatcheries by various ODFW samplers. The tags are the official record of survival by each species and brood. The CEDC Project receives its record on tags from the Pacific Marine Fisheries Commission, Bob Garrison and Steve King with ODFW, and the Department of Fisheries and Oceans in Canada.

Augment a Unique Known Stock Fishery (Impact on Natural Spawners)

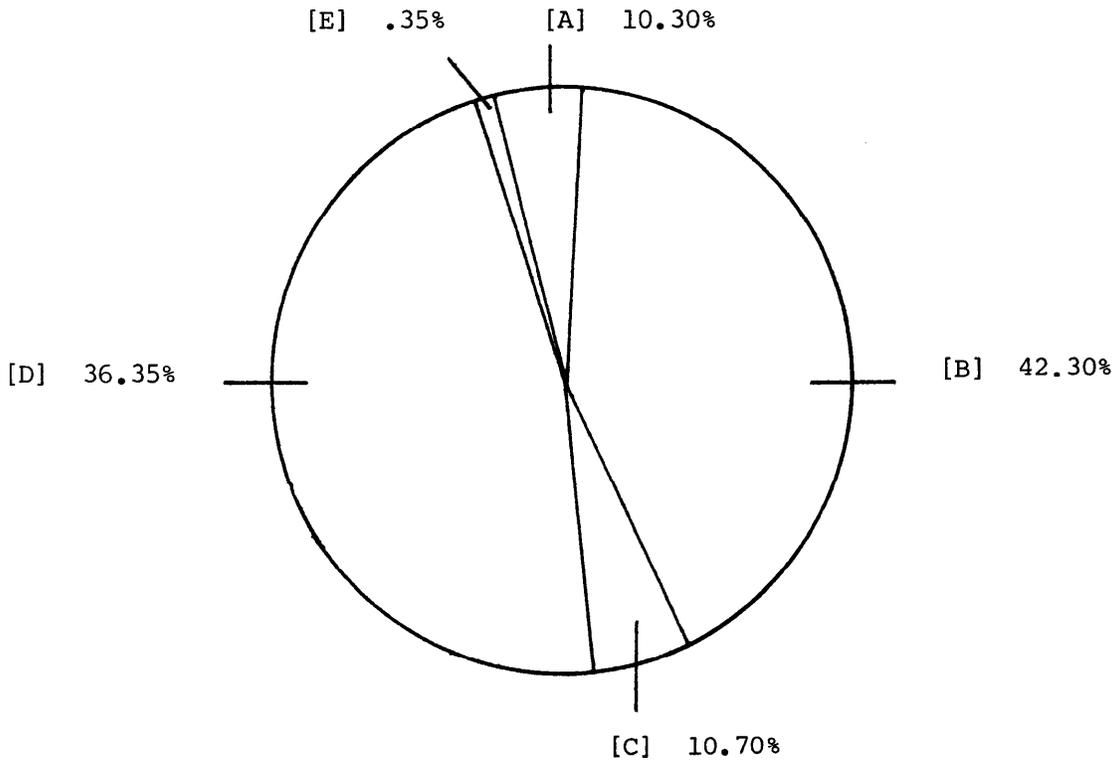
The Project operates adult traps at each pond. Eggs collected from the traps are surplus for the Project because annual production numbers are received from ODFW hatcheries. The traps also are used to retrieve any coded-wire tagged adults or jacks that make it through the various fisheries. All fish collected are documented and recorded

with ODFW in accordance with their anadromous adult transaction process.

Some of the adult salmon return and spawn naturally in Youngs Bay tributaries. CWTs are recovered from these fish after death through ODFW/CEDC organized annual stream survey activities. The total number of spawners for a given stream and their origin, is documented by the CWT retrieved system.

Table 2. CEDC Fisheries Project Personnel Labor Breakdown, 1985

Category	[A]	[B]	[C]	[D]	[E]
Travel	Pond Maintenance Gr/Bldg. Maintenance Feeding Feed Preparation Data Collection Early Rearing Construction Water Control	Contract Obligations Stream Surveys Sampling Coded-Wire Tagging Hatchery Assistance	Public Relations Conferences/Meetings Administrative Reports Clerical Bookkeeping	Stand-by	
TOTAL HOURS	869.50	3,570.50	902.50	3,068.50	29.75
% OF TOTAL	10.30%	42.30%	10.70%	36.35%	.35%



RESULTS AND DISCUSSION

Community Involvement
(Operation and Maintenance)

Each year the Project receives contributions from area individuals and local businesses (Table 3). The 1985 amounts equaled 1/3 of the annual budget. The contributions demonstrate the support from outside people to the CEDC Fisheries Project and to its goal of enhancing the area's economy, with primary benefits being derived from the Youngs Bay fishery and subsequent economic stimulus to other fishery related industry (Fig. 2).

The gillnetters of Youngs Bay also support the Project by contributing to the voluntary assessment (Fig. 3). Each year the Project attracts new fishermen into this program. The result allows the Fisheries Project to purchase additional high quality feed, which adds to the production of high quality salmon.

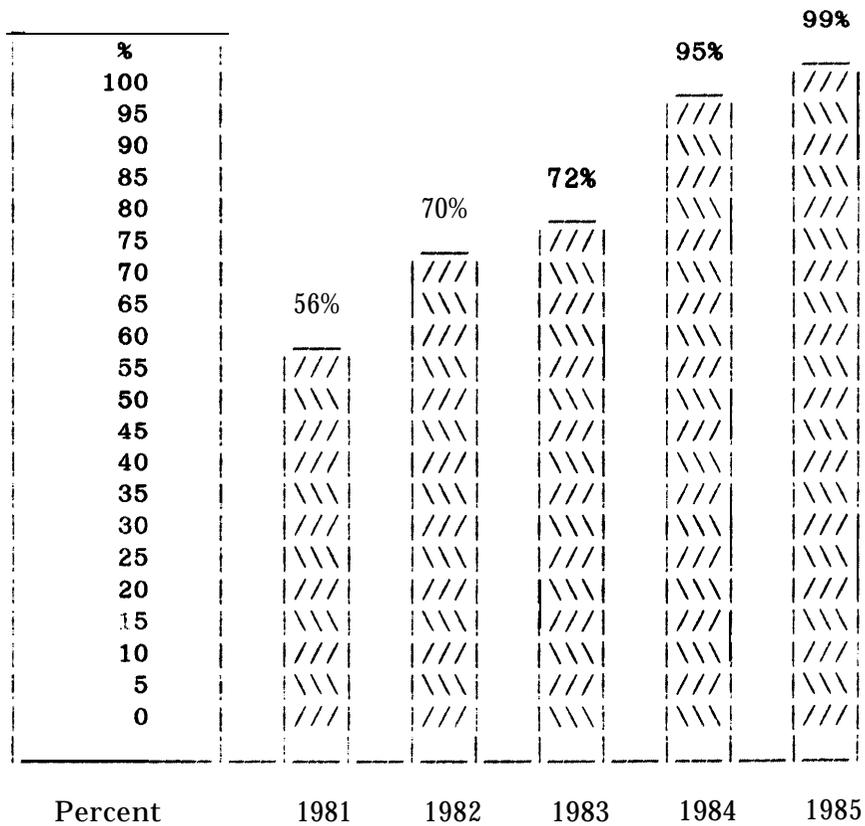


Figure 3. Youngs Bay Commercial Gillnet
Voluntary Assessment Participation

Table 3. Community Contributions to CEDC Fisheries Project 1985

Contributor	Contribution	In-Kind	Cash
Astoria Thunderbird Charter	Cash Donation		\$100.00
Bank of Astoria	Printing of Checks	\$34.69	
Big Creek Hatchery	Technical Support	\$120.00	
Bioproducts, Inc.	Feed Price Discounts & Feed	\$1,187.00	
Bornstein Seafoods	Fish Carcasses/Assessment Match	\$78.60	\$12,479.08
Clatsop County	Payroll/Admin./Legal	\$84.00	
Dave Crawford	Computer Access. (Apple IIe)	\$250.00	
Crown Zellerbach	land Lease	\$225.00	
Dale Curry	Acquisition of Office Desk	\$20.00	
Fishhawk Fisheries	Assessment Match		\$134.98
Lesa Hill	Contract Labor (YB Flags)	\$10.00	
Stan Kahn	Net	\$75.00	
Klaskanine River Hatchery	Tech. Support/Freezer Space	\$366.67	
Lou Larson	Legal Services	\$80.00	
Duncan Law	Admin. Assist./Grant Award	\$220.00	
Ocean Foods of Astoria	Cash Donation		\$250.00
ODFW	Technical Assistance	\$249.96	
OSU Extension (J. Bergeron)	Technical Support	\$249.96	
OSU Seafoods Laboratory	Office/Lab Equipment and OfficeLab/Freezer Space	\$7,590.00	
Otter Trawl Commission	Xerox Copier Use/Supplies	\$350.04	
Point Adams Packing Co.	Assessment Match		\$7,168.89
Joan Pratt	Accounting Counsel	\$80.00	
RCA Service Co.	Office Desk	\$150.00	
Fenton Stoke Id	Buckets	\$40.00	
Mr. and Mrs. P.B. van Weel	Cash Donation		\$10.00
Vanderveldt Family	Land Lease	\$200.00	
Youngs Bay Fishermen	Poundage Assessment		\$21,442.77
	Subtotal	\$11,660.92	\$41,585.72
	TOTAL		\$53,246.64

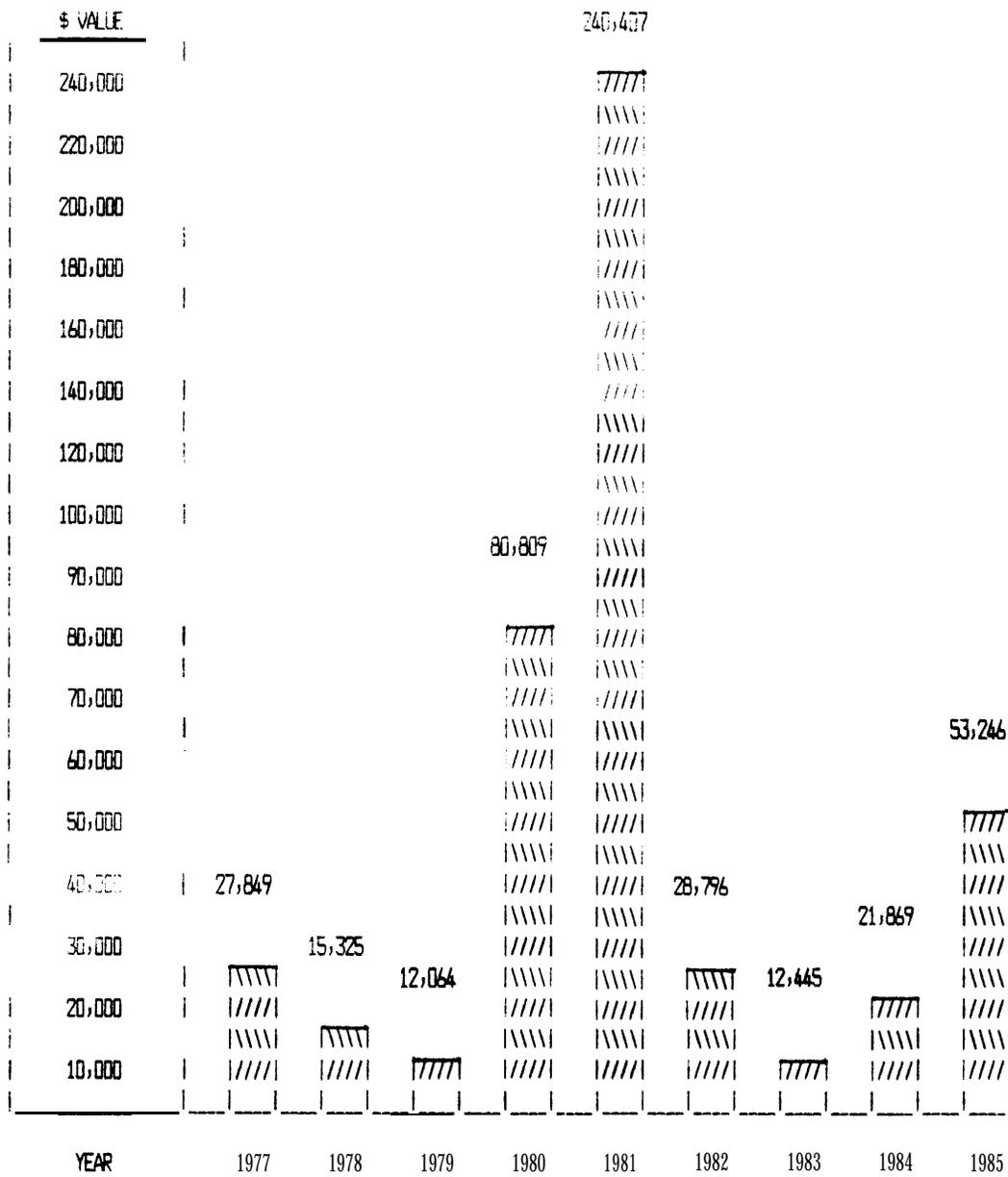


Figure 2. Annual Community Contribution to CEDC Fisheries Project

Natural Outmigration of Smolts (Smolt Size Release for Coho)

In 1983 the Fisheries Project released different sized coho from ponds #1 and X2 with CWT codes 7-31/41 and 7-31/42 respectively. Tag group 7-31141 was released at 9.5/lb and 7-31142 at 16/lb. The recovery of the two different codes and expansion to number of fish available can be seen in Table 8 for the '82 coho brood. The results are only from a one-time release of these variable sized coho; however, the increased survival of the larger fish suggests a certain advantage of larger versus smaller fish at time of release. The larger fish could be more adept at avoiding predators during outmigration. The repeated variable release of 1984 will give more data on this subject and will help the Project predict an optimum size of release for coho leaving the Tucker Creek drainage.

Natural Outmigration of Smolts (South Fork Outmigration)

In 1984 and 1985 the chinook outmigration took six days to reach tidewater, 4.5 miles from the release site. No chinook of the pond #3 size or condition were recovered in the seine until six days after release for both years. After the sixth day salmon were readily seen from a South Fork Klaskanine bridge entering tidewater below the seining site. The 6-day period for outmigration takes longer than initially thought by Project personnel.

The distance to tidewater from release is only 4.5 miles, however this stretch of river includes seven major log jams. The river structure consists of deep holes followed by shallow gravel beds. The minimum flow for the South Fork at this time of year is around 8,000 gpm, which is considered low.

The indications from the outmigrants reveal that the chinook need time to work through the maze of holes and log jams. The 4.5-mile stretch could pose a physical problem for the 80 fish/lb smolts, or the chinook are not migrating at their full potential pace. Whatever the reason, by staying longer in the narrow river the chinook are subject to increased predation from water, land, and air.

Cumulative Production of Quality Salmon (Annual Production)

The Project has been able to meet its annual production goals each year. To date, there has been no major loss of fish due to hatchery techniques or diseases. All salmon released have been certified by ODFW pathologists to be healthy. All future releases will be at the same population levels with more attention being given to size and time of release.

Cumulative Production of Quality Salmon (What Stocks are Used and How)

Ponds #1 and #2 will continue to raise coho on the regular schedule. However when possible, these ponds can be used to imprint chum after the coho are released. This was done in 1981 and 1986 with the imprinting lasting 2 - 3 weeks in May - June.

Pond #3 will continue to be used for chinook production. Approximately 3,000,000 tule stock chinook will be released annually with 1,000,000 of these being incubated at the CEDC incubation system at the South Fork. However, there will be an increase in release numbers for Rogue River stock fall chinook.

In the fall of 1985 CEDC was able to accept all Rogue eggs that came back from the experimental release of 1983. These eggs are currently being ponded into the concrete raceway inside pond #3. The Rogue stock chinook will be kept separate from the tule chinook and will be released in August 1986. The total release number will be approximately 250,000. In the future more Rogue stock chinook can be expected to be released as more eggs return to the Lower Columbia.

Cumulative Production of Quality Salmon (Economics on the Job)

Table 2 gives the breakdown of time for the Project. One of the outstanding features for the CEDC Project is the travel time. Ponds X1 and #2 are located 12 miles from the office. Pond #3 is 15 miles from the office and 12 miles from #1 and #2. The time spent on daily travel from pond to pond cuts down on time spent in rearing and maintenance during an 8-hour day. This use of time has to be planned in advance to coordinate all activities at all ponds efficiently.

The other categories of time usage will be closely documented each year. Since this project is unique, the time sheet system will allow the Project leader to evaluate each year and apply the results to the upcoming year of production.

Aid in Development of Optimum Density Levels (Flows)

In May 1986, two years of water flow will have been documented (Fig. 4,5,6,7). Each data point is minimum flow recorded through the year. The rearing activity in the ponds reacts closely with the fast flood and recovery of each water body which is common for a typical coastal stream. Consequently, each pond has to be able to handle high water conditions by design. This is accomplished by having flood bypasses and by using stop logs at each pond to maintain certain pond levels.

Aid in Development of Optimum Density Levels (Density Levels)

The exact density level of each pond is not available at this time. However, a preliminary density table has been constructed based on

Figure 4. Water Flow at CEDC Pond #3, 1985-86
South Fork Klaskanine River

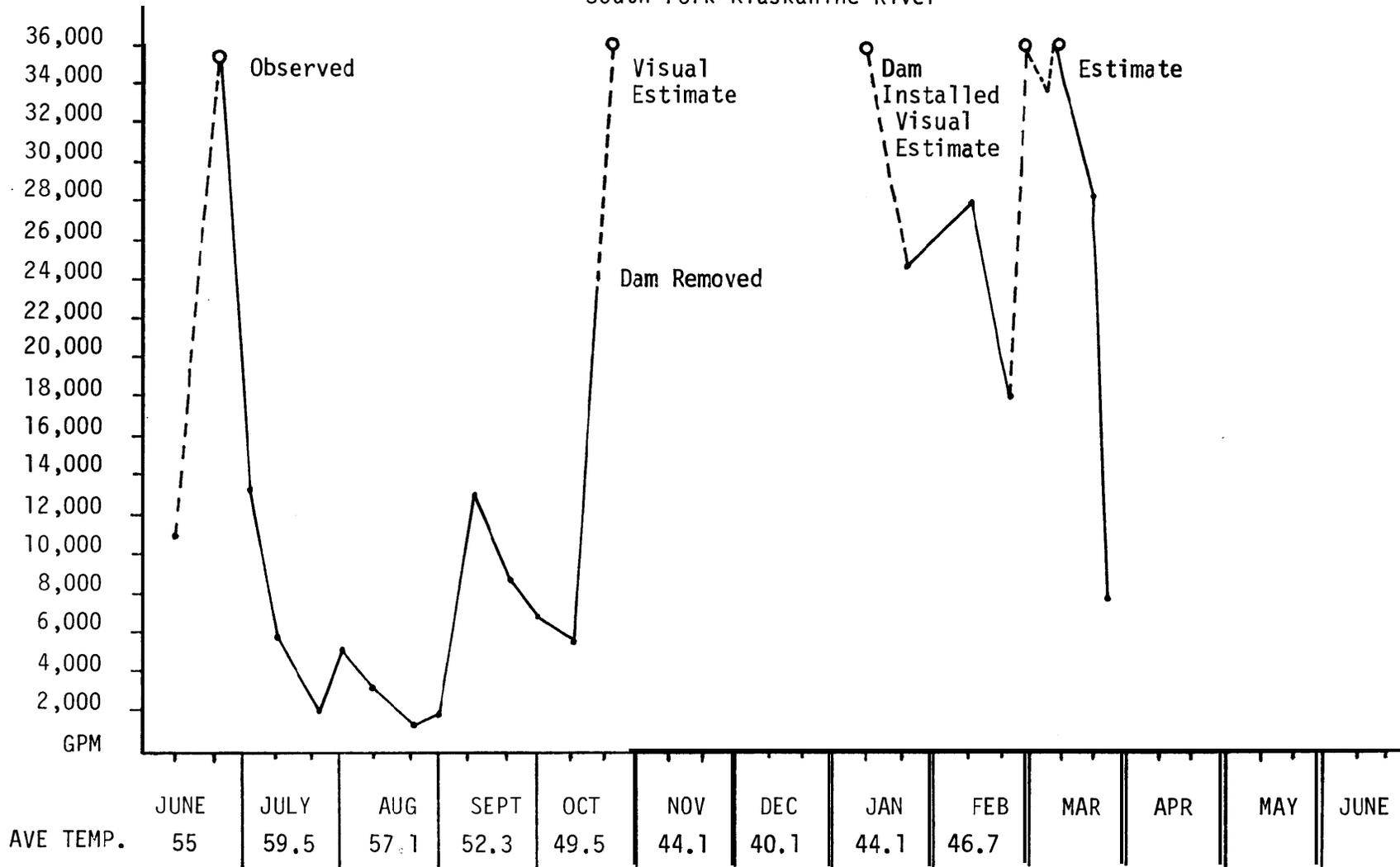


Figure 5. Water Flow at CEDC Ponds #1 and #2, 1985-86
Tucker Creek

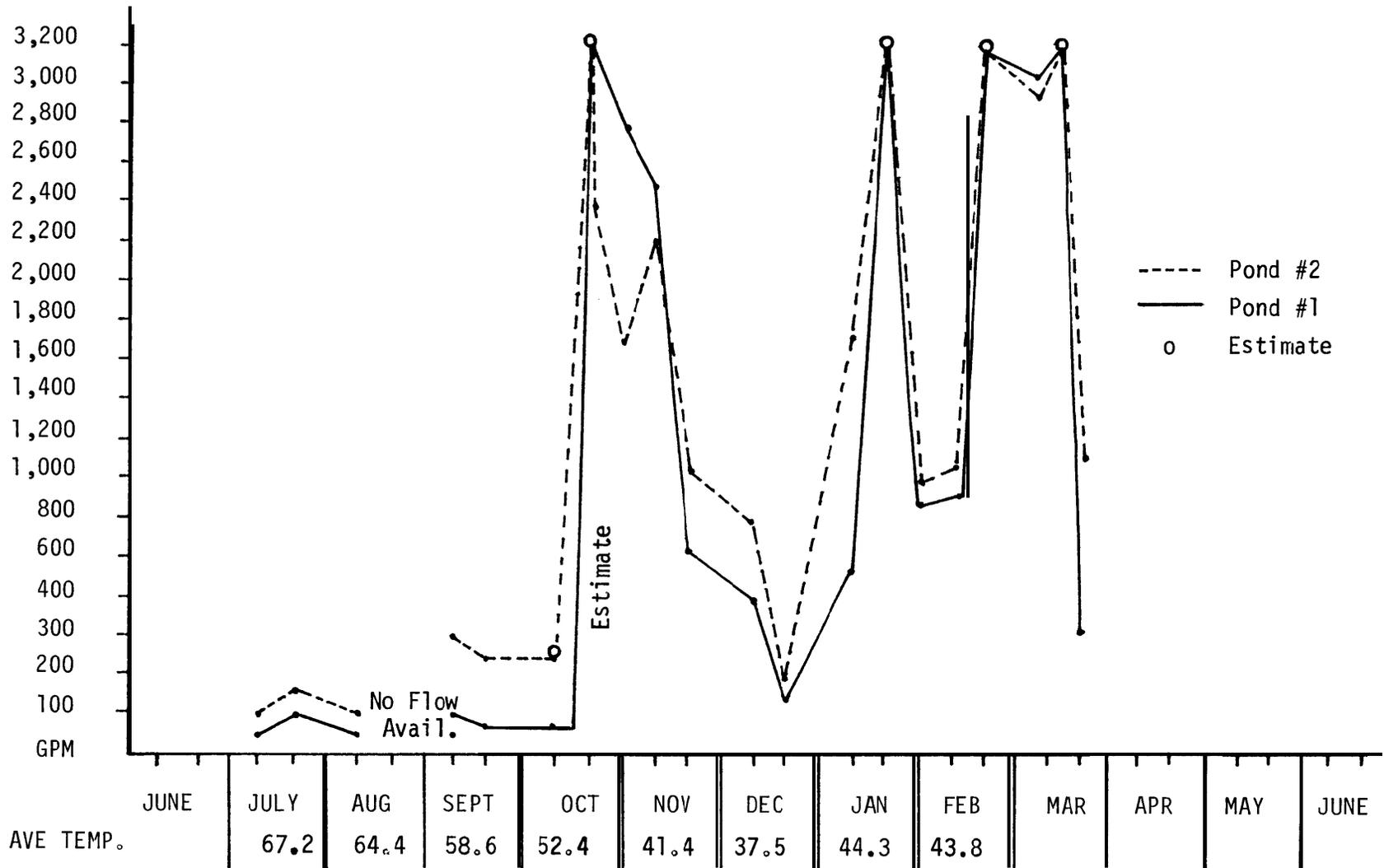


Figure 6. Water Flow at CEDC Pond #3, 1984-85
South Fork Klaskanine River

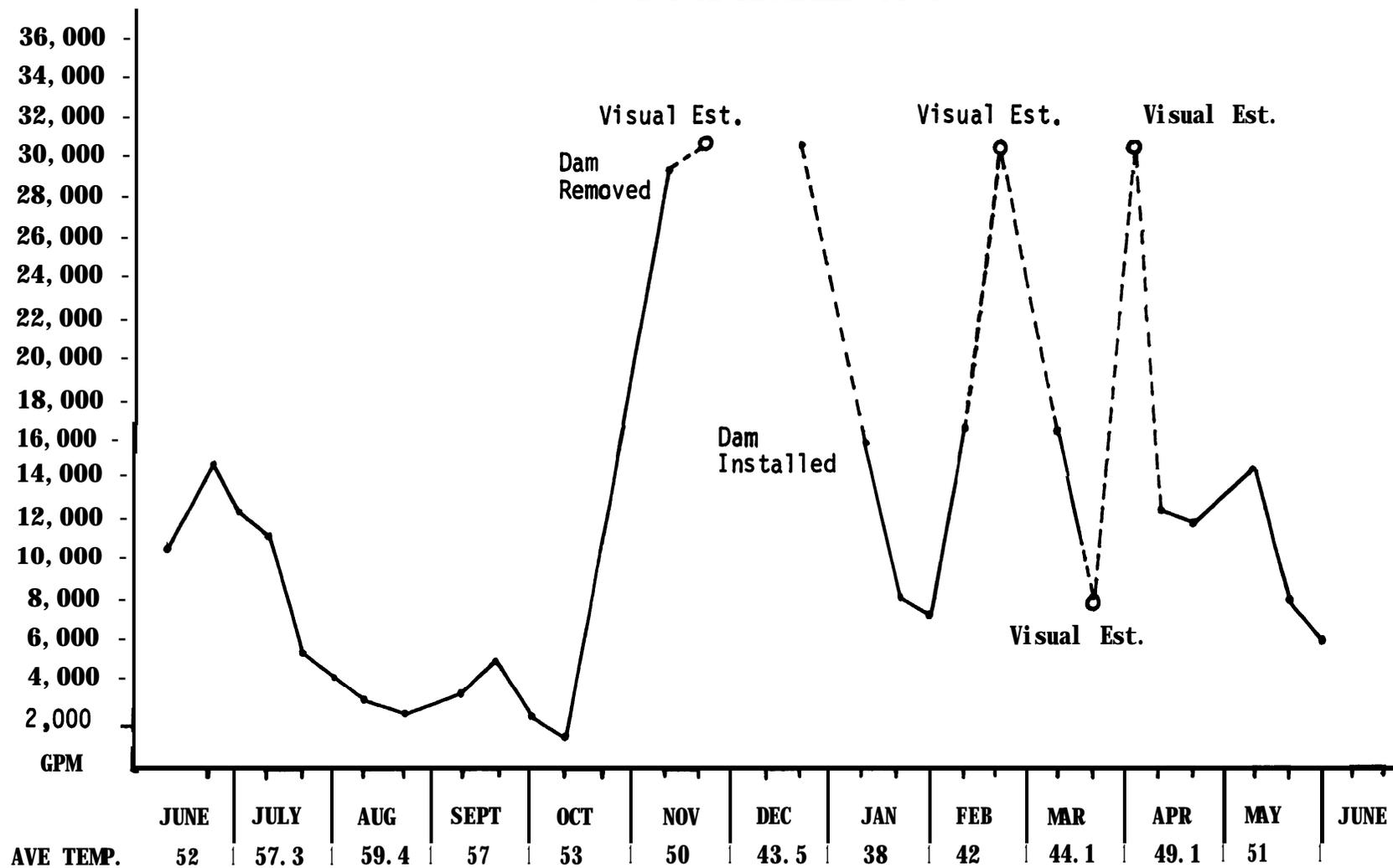
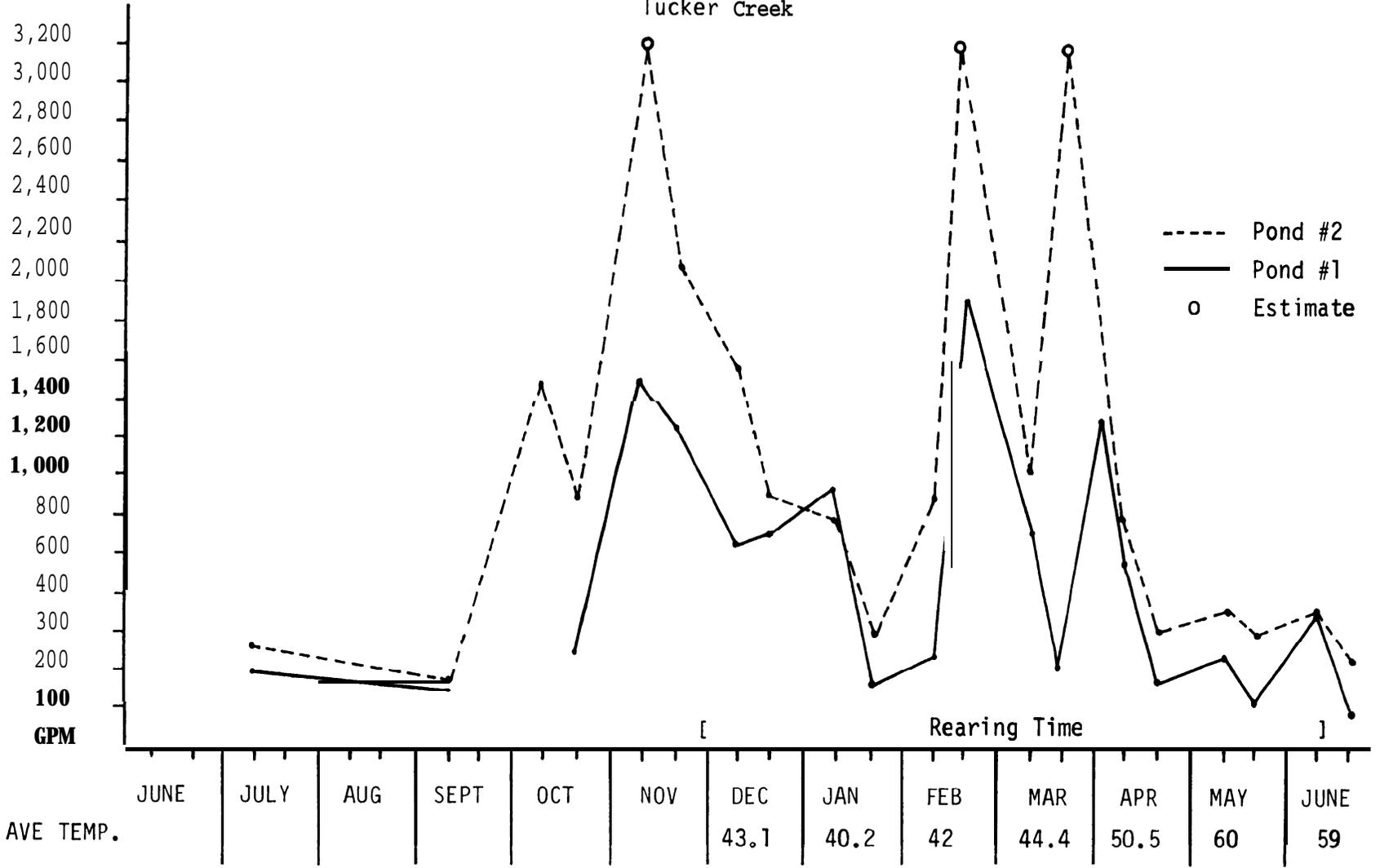


Figure 7. Water Flow at CEDC Ponds #1 and #2, 1984-85
Tucker Creek



available data (Table 4). The 1986 report will provide accuracy based on the 1986 summer survey of each pond. A profile of the rearing densities of each pond will be collected to be compared to the ultimate survival of each brood raised in that pond at that particular time.

Augment a Unique Known Stock Fishery Impact of CEDC Releases

CEDC-released salmon are contributing to ocean commercial and sport catches from Alaska to California (Tables 5, 6, 7, 8). They are also being caught in the Columbia River sport and gillnet fisheries. However, the major impact is in the Youngs Bay gillnet fishery.

From 1983 to 1985 CEDC-released tule chinook accounted for 20%, 22% and 16% respectively of the total chinook catch in Youngs Bay (Table 9). In addition, the CEDC coho accounted for 18%, 7%, and 6% respectively of the total for the 3-year period. The Youngs Bay chinook poundage value for CEDC fish from 1983 to 1985 was approximately \$33,000. The coho poundage value for the same period was approximately \$62,000.

The catch of CEDC releases in Youngs Bay hopefully will increase. All of the data recovered so far is based on releases began in 1980 shortly after the beginning of the Project. CEDC personnel are improving rearing techniques and are designing release strategies of time and size that should lead to increased survival by all broods. In addition, releases of the Rogue River stock fall chinook should provide a higher flesh grade upon return to Youngs Bay.

The experimentally released Rogues in 1983 generated \$1.35/lb as adults returning in 1985. This compared to \$.40/lb for the tule stock chinook. The added input of the Rogue stock into Youngs Bay has been applauded by many area fishermen. The appearance of the Rogue Stock in Youngs Bay is from a combined effort by CEDC and ODFW specialists as both organizations strive to improve the quality and quantity of Lower Columbia River salmon.

Augment a Unique Known Stock Fishery (Impact on Natural Spawners)

The 1985 adult trapping program once again collected surplus eggs for the Project. The most significant was the collection of 46,000 Rogue River chinook eggs from the pond #3 trap. Even with seasonally low river flows, the adult Rogues migrated up the South Fork Klaskanine River in greater abundance than the tule stocks (Table 10). Most of the Rogue River stock chinook had to be held one month in holding pens before spawning occurred. Other migrants that entered the river chose to spawn naturally below the pond in the numerous gravel beds that make up the bottom structure of the South Fork Klaskanine.

Chinook natural spawning activity in Youngs Bay tributaries for 1985 was below the 1984 level. This coincides with the reduced tule chinook catch in the Youngs Bay gillnet fishery. However, the

Table 4. CEDC Fisheries Project Production Capacities

REARING SITE & SPECIES	Species and # fish	Rearing Time Period	Approx Size When Received Fish/lb	Approx Size When Released Fish/lb	Approx Pond Capacity Gal.	Average Pond Flows G.P.M.	Pond Water Turnover Rate Hours	Optional Flow Avail. G.P.M.	Minimum Flow Recorded G.P.M.	Fish Density When Received Fish/gal	Pond Loading When Received LB/GL/MN	Pond Loading When Released LB/GL/MN
Earthen Pond #1 Coho	100,000	12/1/84 to 4/1/85	24	10	1,000,000	600	27	0	150	.1	6.9	16.6
Earthen Pond #2 Coho	200,000	12/1/84 to 4/1/85	24	16	1,100,000	1,000	18	0	300	.18	8.3	12.5
Earthen Pond #3 Tule chf	3,000,000	3/12/85 to 6/1/85	350	80	750,000	5,000	2.5	3,000	NA	4.	1.7	7.5
Concrete Raceway Inside Pond #3 Rogue chf	83,000	6/9/85 to 8/1/85	73	10	40,000	3,000	.25	3,000	NA	2.	.37	2.6
Earthen Pond #4 coho-WT	17,936	6/1/85 to 12/31/85	122	14	60,000	250/300	4/3.3	0	NA	.3	.60	5.1

Table 5. Harvest and Survival Summary of CEDC Released Chinook, 1980 Brood

TAG CODE	[7-21/58]						[7-21/59]					
BROOD	Tule						Tule					
	80						80					
YEAR OF CATCH	1982		1983		1984		1982		1983		1984	
CATCH REGION	#	#	#	#	#	#	#	#	#	#	#	#
	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish
BC NW Trawl												
BC SW Trawl												
BC Johnson St. Net												
WA Net							8	214				
WA Sport							12	320				
OR Trawl									3	80	2	53
OR Sport												
YOUNGS BAY Gillnet			6	147	5	123			22	587	18	481
Columbia R. Gillnet									11	293	7	187
OR Buoy 10 - Sport												
CA Trawl												
CA Sport												
Hatchery Returns												
TOTAL			6	147	5	123	20	534	36	960	27	721
BROOD SURVIVAL PERCENTAGE				.008		.007		.04		.07		.05
BROOD SURVIVAL BY ALL AGE CLASSES =				.015						.17		

Table 6. Harvest and Survival Summary of OEDC Released Chinook, 1981 and 1982 Brood

TAG CODE	[7-24/12]		[7-24/13]		[7-28/35]							
	Tule 81		Tule 81		Tule 82							
BROOD												
YEAR OF CATCH	1984		1985 *		1984		1985 *		1984		1985 *	
CATCH REGION	#	#	#	#	#	#	#	#	#	#	#	#
	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish
BC NW Trawl							10	240				
BC SW Trawl			4	96			8	192			11	258
BC Johnson St. Net											2	47
WA Trawl												
WA Sport												
OR Trawl	3	72										
OR Sport												
YOUNGS BAY Gillnet	7	168	12	289	2	48					12	282
OSJ Exp. Net												
OR Buoy 10 - Sport												
CA Trawl												
CA Sport												
Hatchery Returns	2	48										
TOTAL	12	288	16	385	2	48	18	432			25	587
BROOD SURVIVAL PERCENTAGE		.015		.02		.006		.053				.02
BROOD SURVIVAL BY ALL AGE CLASSES =			.035				.058				.02	

* Preliminary Data

Table 6. Harvest and Survival Summary of CEDC Released Chinook, 1981 and 1982 Brood

TAG CODE	[7-24/12]				[7-24/13]				[7-28/35]			
	Tule		Tule		Tule		Tule		Tule		Tule	
BROOD	81		81		81		81		82		82	
YEAR OF CATCH	1984		1985 *		1984		1985 *		1984		1985 *	
CATCH REGION	# Tags	# Fish	# Tags	# Fish	# Tags	# Fish	# Tags	# Fish	# Tags	# Fish	# Tags	# Fish
BC NW Trawl							10	240				
BC SW Trawl			4	96			8	192			11	258
BC Johnson St. Net											2	47
WA Trawl												
WA Sport												
OR Trawl	3	72										
OR Sport												
YOUNGS BAY Gillnet	7	168	12	289	2	48					12	282
OSU Exp. Net												
OR Buoy 10 - Sport												
CA Trawl												
CA Sport												
Hatchery Returns	2	48										
TOTAL	12	288	16	385	2	48	18	432			25	587
BROOD SURVIVAL PERCENTAGE		.015		.02		.006		.053				.02
BROOD SURVIVAL BY ALL AGE CLASSES =			.035				.058				.02	

* Preliminary Data

Table 8. Harvest and Survival Summary of CEDC Released coho; 1980, 1981, and 1982 Brood

TAG CODE	[7-21/44]		[7-24/51]		[7-31/42]		[7-31/41]									
BROOD	80		81		82		82									
YEAR OF CATCH	1982		1983		1984		1985*									
	#	#	#	#	#	#	#	#								
CATCH REGION	Tags	Fish	Tags	Fish	Tags	Fish	Tags	Fish								
BC Nw Trail																
BC Sw Trail					161	1261	11	81								
BC Johnson St. Net					91	711		11	41							
Columbia River Test					11	81	61	471								
WA Sport					121	951	71	551	731	2561						
OR Trail			2971	16631	31	241	121	941	621	2171						
OR Sport	21	111	1741	9741	1171	9241	271	2111	1471	5151						
YOUNGS BAY Gillnet	311	1741	1171	6551	3801	30021	631	4911	541	1891	7551	26271				
Columbia R. Gillnet					51	391	2541	20071	191	1491	31	111	1461	5111		
OR Buoy 10 - Sport					1231	9721	51	391			351	1231				
CA Trail			521	2911		971	7661					81	281			
CA Sport			231	1291		451	3551					51	181			
Hatchery Returns					151	1181	11	81	201	681						
TOTAL	331	1851	6631	37121	51	391	10721	84681	11	81	1401	10941	771	2681	12351	43101
BROOD SURVIVAL PERCENTAGE		.061		1.251		.021	3.91		.0041		.531		.291		4.61	
BROOD SURVIVAL BY ALL AGE CLASSES =		1.3		3.9		.5		4.9								

* Preliminary Data

Table 9. Youngs Bay Catch Direct Poundage Value
1982 - 1985

Year	chinook			coho			chum		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
1982	5,129	101,772	\$67,000	12,258	109,742	\$95,000	264	3,237	\$2,000
1983	3,553	66,002	\$48,000	3,550	23,484	\$24,000	5	60	--
1984	3,696	74,179	\$62,000	40,620	374,768	\$421,000	177	21212	\$1,000
1985	3,466	64,393	\$57,000	51,202	473,873	\$454,000	19	209	\$100

Catch Poundage Value in Youngs Bay From CEDC-Reared Salmon

Year	chinook			coho			chum		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
1983	734	13,635	\$9,916	655	4,323	\$4,417			
1984	820	16,457	\$13,755	3,002	27,618	\$31,025	Insignificant		Numbers
1985	571	10,563	\$9,350	3,118	28,685	\$27,240			

Percent of Total Catch Value of CEDC-Reared Salmon for Youngs Bay Gillnet

Year	chinook	coho
1983	20%	18%
1986	22%	7%
1985	16%	6%

Table 10. Chinook and Coho Returns to CEDC Traps - 1985

Species	Trap Site	Sex	# Trapped	# CWT Recovered	Release site at CWT Recoveries	Brood
Tule FCH	S. Fork	M	9			
		F	1			
		J	2			
RogueFCH	S. Fork	M	28	20	SouthFork	82
		F	22	22	South Fork	82
		J	2		South Fork	83
Coho	Pond #2	M	8			
		F	12	1	Pond #2	82
		J	71	15	#2 (13) , #1 (2)	83

tributaries do have some straying by CEDC-released salmon. CWT documentation shows that a large portion of the Lewis and Clark River spawners are from the pond #3 tule chinook releases (Table 11). The straying is beneficial to the adjacent streams of Youngs Bay where there are excellent spawning beds available. Any successful natural spawning that does occur provides more fish for the Youngs Bay system. The combination of salmon from CEDC and ODFW hatchery releases and natural spawning activity should result in an increase in quality adult return numbers which would economically benefit not only Youngs Bay gillnetters, but also the entire Lower Columbia region.

Table 11. Stream Survey Data For Tule and Rogue Stock Fall Chinook, 1985

SPECIES	STREAM	# FISH			# CODED-WIRE TAGS RECOVERED/RELEASE AGENCY		
		1983	1984	1985	1983	1985	1985
[Tule]	S.F. Klaskanine	18	67	22	0	1/CEDC 3 no tags	1/CEDC
	N.F. Klaskanine	35	17	1	0	1/ODFW	0
	Youngs River	0	9	1	0		0
	Lewis & Clark	256	194	63	3/NMFS 4/CEDC 4/ODFW	4/CEDC 2 no tags	2/CEDC
	Tucker Creek	0	0		0	0	0
	Walluski River	0	0	2	0	0	0
[Rogue]	S.F. Klaskanine	0	0	9	0	0	9/ODFW BC & CEDC

SUMMARY OF BPA PROJECT EXPENDITURES, 1985

Personal Services:

Wages	16,600.00
Benefits	7,490.00

Total Wages/Benefits	\$24,031.48
----------------------	-------------

Operations and Maintenance:

Travel	733.00
Supplies	5,175.60
Contract Tagging	8,441.40
AHS Materials/Supplies	5,000.00
AHS Feed	0.00

Total Operational	\$19,350.00
-------------------	-------------

Indirect Costs	6,398.76
----------------	----------

TOTAL EXPENDITURES	\$49,780.24
--------------------	-------------

Literature Cited

Hickerson, A. W. and Hill, J. M. (1984). Evaluation of a Low-Cost Salmon Production Facility. Annual report prepared for the Bonneville Power Administration. Division of Fish and Wildlife.

Wood, J.W. (1974). Diseases of Pacific Salmon, Their Prevention and Treatment. State of Washington Department of Fisheries, Hatchery Division, second edition.