STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

JAY S. HAMMOND, GOVERNOR
Su Hydro Aquatic Studies
2207 Spenard Road
Anchorage, Alaska 99503

February 17, 1982

RECEIVED
MAR 8 1982
ALASKA POWER AUTHORITY

Mr. Eric Yould
Executive Director
Alaska Power Authority

Anchorage, Alaska

Dear Mr. Yould:

The Alaska Department of Fish and Game submits the following program and budget proposal (Attachments A through F) to the Alaska Power Authority (APA) as review draft of our recommendations for the Phase II FY83 Aquatic Study.

Attachment A presents the text of our present June 1981 RSA agreement with recommended changes in bracketed and underlined text immediately following the original text to be changed and which is also underlined.

We request that APA review this draft as soon as possible and a meeting with Robert Mohn and Dave Wozniak be arranged to discuss its further development at their earliest convenience.

Sincerely,

Thomas W. Trent / KD

Thomas W. Trent
Su Hydro Aquatic Studies Coordinator

cc: R. Andrews
S. Pennoyer

+ COLA
+ Overhead
+ Hours DP

ATTACHMENT A - GENERAL TERMS AND ACCORD OF AGREEMENT

The Alaska Power Authority and the Alaska Department of Fish and Game have mutually agreed:

1. that the fish and wildlife studies are necessary effort to determine potential impacts of the Susitna Hydroelectric Project on the valuable fish and wildlife resources of the Susitna River Basin.

2. that Acres-American, the prime contractor for the Susitna Hydroelectric Project Feasibility Studies, will review the results of ADF&G's field programs providing baseline fish and wildlife population and habitat information, and as the Alaska Power Authorities representative prepare the fish and wildlife Exhibit S (E), of the filing documents for the Federal Energy Regulatory Commission license for the project.

3. that, although the studies conducted in Phase I of the Susitna Hydroelectric Feasibility Studies can provide a preliminary assessment of project impacts and are a basis for preparation for the Exhibit S (E), continuation studies into Phase II will be essential to make the best judgement of the project impacts and identify fish and wildlife mitigation alternatives.

Therefore, the Alaska Power Authority has agreed to fund the Alaska Department of Fish and Game participation in the Susitna Hydro Feasibility studies, and ADF&G agrees to implement these studies (the aquatic studies) as follows:

ADF&G Studies Susitna Hydro Feasibility Study Team and its General Functions

1. The Alaska Department of Fish and Game will establish a Susitna Hydro Feasibility Studies Team.

2. The ADF&G Susitna Hydro Feasibility Studies Team will function in the:

   a. coordination and further development of the fish and wildlife studies with the APA, Acres-American, other fish and wildlife or resources agencies, and other feasibility study contractors as appropriate

   b. the development and recommendation of the Department's policies, concerns, and advices with respect to resource protection, study direction and their progress to APA, Acres-American, other fish and wildlife and resource agencies and study contractors.

c. representation of the Alaska Department of Fish and Game on the Fish and Wildlife Steering Committee, and for coordinating the involvement of other delegated Department representatives from outside the study team.

d. review and approval, as delegated by the Commissioner to the ADF&G Studies Coordinator, of the Susitna Hydro Project Feasibility Study activities of APA, Acres-American or their subcontractors which may affect State designated anadromous fish waters. (This section should be deleted)

e. implementation of the fisheries baseline studies. (Wildlife studies are covered in a separate agreement, but staff of these studies are part of the ADF&G Studies Team.)

Administration and Support

APA has agreed:

1. To fund ADF&G administration and support services for overall Susitna Hydro Project Studies coordination,

planning and implementation as shown in Attachment I (for Phase II as shown in Attachment I.). The purpose of these funds is to:

a. provide for basic State personnel and budget administration at the Anchorage office of the Study Team, and additionally fund administrative support required from within the ADF&G Division of Administration in Juneau.

b. provide for support services of:

1) ADF&G personnel to develop, manage, and analyze data being generated by the fisheries field program

2) ADF&G personnel to maintain and construct equipment apparatus needed for the field program

3) ADF&G personnel to edit scientific and technical reports and documents generated by the field research program

2. That Acres-American provide certain supplemental administration and support services directly to ADF&G as shown in Attachment II.

The purpose of this support is:

a) provide clerical assistance for typing of required reports and documents related to the Susitna Hydro Project, (until September 30, 1982).

b) provide cartographic and drafting services for required technical and scientific reports and documents (until September 30, 1982).

c) provide the full time assistance of a hydraulic engineer to the ADF&G to aid in planning, implementation and evaluation of seasonal and spatial habitat (aquatic habitat and instream flow) studies in consultation with ADF&G, the Alaska Department of Natural Resources and the U.S. Fish and Wildlife Service (until September 30, 1982)

(d) (After September 30, 1982 those positions required for support under (a) and (b) above will be funded as state positions within the Department of Fish and Game.)

(e) (After September 30, 1982 the services of a hydraulic engineer will be funded through an appropriate contract of the APA with the Phase II studies prime contractor.)

d) (f) provide office space, warehousing, workshop and outside storage space to support the fisheries field studies, and the program administrative, coordination and support staff, as well as the office supplies, office equipment and communication services required for this staff (until September 30, 1982). (After this date funds and support of these services will provided to and managed by the Alaska Department of Fish and Game.)

ADF&G agrees:

that the Clerk IV (Administrative Assistant I) under the Su-Hydro Coordinator, in addition to other duties, will be responsible for the coordination, on a departmental basis, of the monitoring and administrative processing of all personnel, purchasing, and accounting documents for the Division of Sport Fish, Division of Commercial Fisheries, and Habitat Protection Section (delete the preceeding). The Divisions of Sport Fish and Commercial Fisheries will forward all approved personnel, purchasing, and accounting documents directly to the Su-Hydro Coordinator's Office to be processed for payment, etc. The Divisions of Sport Fish and Commercial Fisheries will provide to the Su-Hydro Coordinator's Office, each month, copies of the payroll warrant registers, monthly expenditure journals (MEJs), and current year authorization balances runs for their codes affected by the APA project. The Clerk IV (Administrative Assistant I), in turn, will provide to the Divisions of Sport Fish and Commercial Fisheries monthly audit reports on the status of their fund balances.

Field Program

ADF&G agrees to implement the fisheries-aquatic studies program as shown in Attachment III. (Attachments B through)

APA and Acres-American have agreed that Acres-American will provide the equipment shown in Attachment IV (Attachments B through F) for use in the ADF&G fisheries program,(until September 30, 1982 and APA designates the contractor who will continue this function after this date). The schedule for obtaining and the release and use of this equipment to ADF&G by Acres-American will be in accordance with the field study timeframes shown in Attachment III, (Attachments D through F).

Helicopter Support

APA and Acres-American have agreed that Acres-American will provide helicopter support for transport of field crews, equipment and material in the studies area. The minimum air hour requirements for helicopter support will basically follow these outlined in ADF&G's October 31, 1979 (February 1982) study proposals and modified to the timeframes below: (delete the preceding)

	Phase II FY 83
Resident & Juvenile Anadromous Project	120 hrs.
Aquatic Habitat and Instream Flow Project	117 hrs.
Adult Anadromous Project	30 hrs.
	267 hrs.

Reporting Requirements

The Department of Fish and Game will follow the schedule of reporting requirements to Acres-American and Terrestrial Environmental Services as shown in Attachment V.

Schedule of Reports?

(The Alaska Department of Fish and Game will provide draft annual report on data collection by February 1 a final draft by March 1 of each project year, commenc with FY 83. ADF&G will provide budgetary requirements for an impact analysis of these data collection reports if APA requests the ADF&G to assist with and/or perform this function. This report would be due by May 1 of each project year.)

Procedures Manual

The Alaska Department of Fish and Game will provide procedures manual sections to Acres-American and Terrestrial Environmental Services in accordance with Attachment VI.

(The Alaska Department of Fish and Game will provide an annual update of the aquatic studies procedure manual by June 1 of each project year.)

ATTACHMENT A-1

SU HYDRO AQUATIC STUDIES FY-83 BUDGET SUMMARY

Sport Fish Line		Commercial Fish Line		
100	1,848.5	100	485.3	
200	91.1	200	17.9	
300	461.2	300	91.4	
400	233.7	400	122.5	
Subtotal	2,634.5	Subtotal	717.1	Total 3,351.6

ADF&G Equipment Supplied by Acres American, Inc.

Sport Fish Line		Commercial Fish Line		
500	342.3	500	59.5	
Subtotal	342.3	Subtotal	59.5	Total 401.8
				Subtotal 3,753.4

SF - CF Support Services Supplied by Acres American, Inc. until September 30, 1982

Line	
100	34.1
300	39.2
400	1.8
Subtotal	75.1

Total 75.1

* Grand Total this Draft 3,828.5

* Includes stock separation costs but excludes Watana Camp and helicopter support costs supplied by Acres American, Inc. Personal services (line 100) do not include FY-83 salary increases appropriated by legislative action.

ATTACHMENT B - ADMINISTRATION AND SUPPORT UNIT

The Alaska Department of Fish and Game Su Hydro Aquatic Studies is composed of five organizational elements, these are:

1. Administrative and Support Unit
2. Data Processing Unit
3. Resident and Juvenile Anadromous Project
4. Aquatic Habitat and Instream Flow Project
5. Anadromous Adult Project

This program statement outlines the basic objectives for each of these program elements. Tasks to be accomplished within each element, the manpower requirements and budget to accomplish these tasks for FY 83 are in the attachment sections of the program.

ADMINISTRATION and SUPPORT UNIT

Background

The Administrative and Support Unit of the Su Hydro Aquatic Studies is composed of staff administering and directing the overall staff and activities of the other four project

elements and of staff who provide clerical, budget and expenditure, equipment purchase, and repair services for the project. This unit is responsible through the Aquatic Studies Coordinator, for coordination with APA, other agencies and contractors on administrative and technical matters, and also at the Direction of the Commissioner of the Department of Fish and Game and Directors of the Sport Fish and Commercial Fish Divisions carries out those duties assigned as necessary to accomplish and report on the Su Hydro Aquatic Studies as a office of the Department of Fish and Game.

Objectives

1. To function, in FY-83, in a coordination role between the other four organizational elements of the Su Hydro Aquatic Studies Team, other Department Divisions and:

    a) the Alaska Power Authority (APA);
    b) sub-contractors of the APA;
    c) Federal, state and local government agencies;
    d) private corporations;
    e) special interest groups; and
    f) the public

    on matters related to the Alaska Department of Fish and Game aquatic studies data collection program being conducted for the proposed Susitna Hydroelectric Project.

Tasks to be performed under this objective are:

a. to plan and coordinate the development of the fisheries, aquatic habitat and instream flow studies by the Su Hydro Aquatic Studies Team with the APA and its contractors, governmental agencies, private corporations, special interest groups, and the public as appropriate.

b. to provide support for the development of ADF&G policy with respect to the Departments concerns, advices, and recommendations regarding fisheries resource and aquatic habitat protection to the APA and its contractors, governmental agencies, private corporations, special interest groups, and the public.

c. to represent the Department of Fish and Game on the Su Hydro Steering Committee and the Su Hydro Fisheries Mitigation Task Force Core Group, and coordinate the involvement of other Departmental representatives as required on these committees.

2. To provide and coordinate administrative, personnel and equipment support services to the other four project elements in FY 83.

Tasks under this objective are:

a. to provide for the general administration of the collective ADF&G Su Hydro Aquatic Studies Office.

b. to provide basic State personnel and budget administration for the Su Hydro Aquatic Studies Team.

c. to coordinate and direct the work of the support personnel employed by Acres American for the ADF&G Su Hydro Aquatic Studies Team, until September 30, 1982.

d. to administer the purchase of capital equipment purchased through Acres-American for the Su Hydro Aquatic Studies on other contractors as designated by APA.

e. to administer, and provide for the

maintenance and repair of capital equipment used by the Su Hydro Aquatic Studies Team.

f. to review and edit as drafts of scientific and technical reports.

ATTACHMENT B-1

ADMINISTRATION AND SUPPORT UNIT

Line 100 - Personal Services

PCN	Class	Grade	MM	
4188	FB V F&G Supervisor	22	12	
4220	FB III Asst. Proj. Coord.	18	12	
4187	Biometrician III	18	12	
4222	Administrative Asst. I	12	12	
*NEW	Clerk Typist III	8	9	
*NEW	Clerk Typist III	8	9	
4194	FB III RJ	18	12	
4192	FB III AH	18	12	
1721	FB III AA	18	12	
4189	Maintenance Mech. II		12	
4185	Mechanic IV		12	P/S

How is $43000 travel broken down? What are Contractual Services?

Line 200 - Travel

Project Coordinator's Office	23.0
Project Leaders	16.6
Equipment Maintenance	4.0
	43.6

Line 300 - Contractual Services

Project Coordinator's Office	147.8
Project Leaders	37.9
Equipment Maintenance	7.0
	192.7

Line 400 - Commodities

Project Coordinator's Office	8.6
Project Leaders	5.5
Equipment Maintenance	17.0
	31.1

Grand Total (Line 100 - 400)	745.2

P/S permanent seasonal

ATTACHMENT B-1

ADMINISTRATION AND SUPPORT UNIT

Line 100 - Personal Services

PCN	Class	Grade	MM	Cost
4188	FB V F&G Supervisor	22	12	63.8
4220	FB III Asst. Proj. Coord.	18	12	50.7
4187	Biometrician III	18	12	53.6
4222	Administrative Asst. I	12	12	29.6
*NEW	Clerk Typist III	8	9	18.8
*NEW	Clerk Typist III	8	9	18.8
4194	FB III RJ	18	12	51.9
4192	FB III AH	18	12	52.9
1721	FB III AA	18	12	57.8
4189	Maintenance Mech. II		12	45.7
4185	Mechanic IV		12 P/S	34.2
				477.8

Line 200 - Travel

Project Coordinator's Office	23.0
Project Leaders	16.6
Equipment Maintenance	4.0
	43.6

Line 300 - Contractual Services

Project Coordinator's Office	147.8
Project Leaders	37.9
Equipment Maintenance	7.0
	192.7

Line 400 - Commodities

Project Coordinator's Office	8.6
Project Leaders	5.5
Equipment Maintenance	17.0
	31.1

Grand Total (Line 100 - 400)	745.2

P/S permanent seasonal

ATTACHMENT B- 2

ADMINISTRATIVE SUPPORT UNIT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	12	Desks	0.3	3.6
2	5	Book cases	0.2	1.0
3	6	File cabinets	0.2	1.2
4	12	Chairs, desk	0.2	2.4
5	2	Chair posture	0.3	0.6
6	1	Drafting table, 72"	0.5	0.5
7	1	Light table	0.7	0.7
8	2	Drafting stool	-	0.3
9	-	Drafting tools	-	0.6
10	1	Ultrasonic pen cleaner	0.2	0.2
11	1	Drafting tool cabinet	0.3	0.3
12	1	Tape recorder	0.4	0.4
13	1	Slide project or w/access.	0.5	0.5
14	2	Typing Station desk	0.3	0.6
				12.9

ATTACHMENT B-3

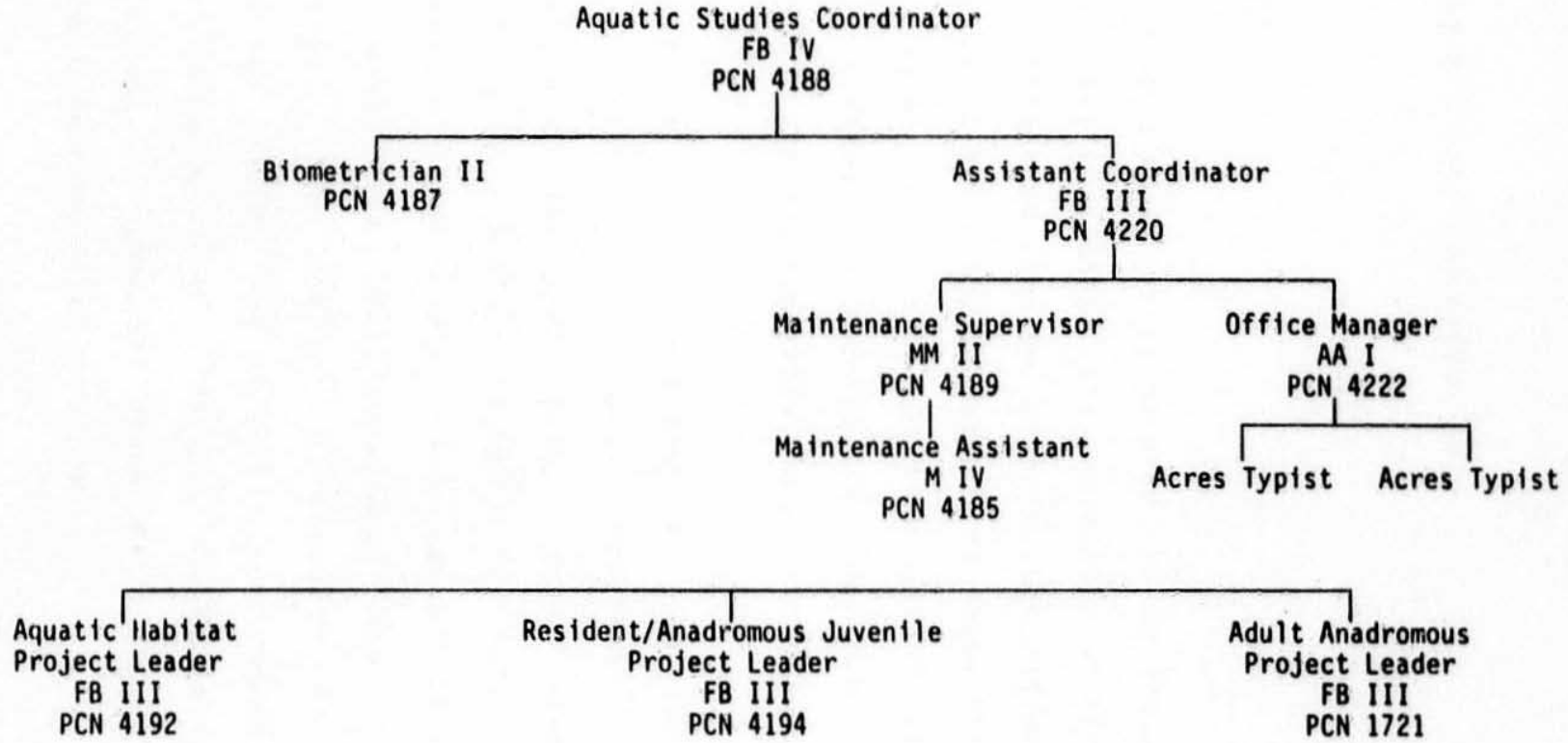
EQUIPMENT MAINTENANCE - ADMINISTRATIVE SUPPORT UNIT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	1	Tool set 2/cabinet	2.0	2.0
2	1	Sheetmetal Break, 52"	1.0	1.0
3	1	Floor jack	0.3	0.3
4	N/A	Special OB jet tools	0.6	0.6
5	N/A	Special OB tools	0.6	0.6
6	N/A	Tool Replacements	5.0	5.0
7	N/A	Metal parts bins	2.0	2.0
				11.5

ATTACHMENT B-4

ADMINISTRATIVE SUPPORT UNIT



ATTACHMENT C - DATA PROCESSING UNIT

Background

The extensive studies being carried out by the ADF&G's Su Hydro Aquatic Studies Team entail the collection of large quantities of field data concerned with the distribution and abundance of fish, and the aquatic habitat associated with these fish in the Susitna River drainage. The data processing support unit of the study team was created to provide the expertise and "manpower" necessary to catalog, summarize, and analyze these data.

The cataloguing of this field data into computer data bases is a necessary precursor to easy retrieval, analysis, and summarization of the field data. Summarization of the large quantities of cc1lected field data into a concise and understandable form requires the capabilities of a digital computer with data base management and report production capabilities. The use of a computer to help in this summarization ensures that errors in data reduction and analysis are kept to a minimum. The use of computers requires the expertise of a computer programmer and other associated electronic data processing personnel.

An additional facet of the data processing unit is its involvement by the unit's biometrician in statistical analysis of field data and experimental sampling design of field studies.

Experimental sampling design of field studies is a necessary step in any scientific investigation. The natural variability of the "real world" results in variability of field measurements resulting from a field study often appear conflicting and nonsensical. However, with a statistically designed experimental sampling procedure the resultant measurements can be depended upon to provide the best possible answer to the study's objectives.

Statistical analysis of field data is necessary due to the inherent variability of field data, for example the number of fish collected by a fish trap would vary from sample to sample even if the abundance of the fish in the natural population remained constant. On the other hand the abundance of the fish population is expected to vary between one sampling period and the next period. Accordingly, statistical analysis is necessary to ensure that observed variations in field measurements (e.g. numbers of fish collected) are large and accurate enough to indicate an actual variation in the characteristic of interest. Note that the same can be said for the opposite condition, that

is, lack of variations in field measurements must also be analyzed statistically in order to ensure that the observed stability of the measurements indicates an actual stability of the characteristic of interest.

The data processing support unit of the aquatic study team also provides biometric evaluation of scientific reports. This evaluation is designed to ensure that all analyses, interpretations, and conclusions in these reports are founded upon observed field data. Furthermore, the evaluation should make sure that all conjectures and hypotheses in these reports are labeled as such.

Objectives

The objectives of the data processing support unit of the ADF&G Su Hydro Aquatic Studies Team in FY 83 are as follows:

1. To provide data processing support to the three field program elements. The tasks under this objective are:

   a. computerization of all data collected in the field studies. This computerization into

retrievable data bases allows for easy and accurate retrieval of data for analysis and summarization;

b. production of summary report tables and computer plotted graphics, with simple univariate statistics (e.g. minimums, maximums, means, and confidence intervals); and

c. programming and execution of programs to provide computer quality execution of statistical analyses.

2. To provide statistical analysis of scientific and technical data collected by the field program elements. The tasks under this objective are:

a. computation of fish population estimates and associated confidence intervals from mark/recapture field studies and sonar counts;

b. comparison of biological attributes of fish populations (e.g. length, weight, and age) among sampling areas and sampling periods;

c. testing for possible relationships among aquatic habitat parameters; and

d. testing for possible relationships among aquatic habitat parameters and the associated fish populations in sampled areas.

3. To provide advice on experimental sampling design of the field study programs, to ensure that the field studies will yield the type and quantity of data needed to meet their objectives.

4. To provide biometric evaluation of the study team's scientific reports, to ensure that all conclusions are founded upon sound statistical analysis and interpretation of the collected field data.

Work Plan

The proposed work plan for meeting the objectives of the data processing support unit is based primarily on the procedures develop in FY 1982. During FY 1982, data collected from the winter of 1980 through the fall of 1981 was catalogued,

summarized, and analyzed. This process entailed starting up the data processing unit in terms of personnel, and computer hardware and software. The procedures develop during this time are outlined in the following discussion.

Computerization of field data entails coding of data onto keypunching coding sheets by data processing personnel. During the coding process initial checks are made for accuracy of recorded field data in terms of clarity, consistency, and feasibility (e.g. can the water temperature really be 40C?!!?). Coded keypunch forms are then sent to Boeing Computer Services (BCS) for keypunching. We have found the BCS keypunching services to be a very high quality and reasonable price. After completion of keypunching, the data is loaded into the BCS computer via cards and then processed through an error searching program called DATAMAP. DATAMAP can find gross errors due to miscoding and keypunching. These gross errors are corrected then the data is input into a data base management system call SIR (Scientific Information Retrieval). SIR provides data processing with the capability of extensive data base management tools such as sorting, conditional retrieval, simple statistics, and interfacing with more advanced computerized statistical packages (i.e. SPSS and BMDP).

An indispensable aid in the process of computerization has been the computing capabilities provided by an inhouse microcomputer. The microcomputer is a Vector Graphics 3005 system, with 56K memory, Z-80A microprocessor, 5.25 inch floppy disk drive, 5.25 inch hard disk drive with 5 megabytes of on-line storage, and a letter quality printer. The micro has been used for interaction with the BCS mainframe computer, this interaction is of a complexity and speed which could not be attained by an ordinary "dumb" terminal. Report quality tables have been produced with the microcomputer and its associated printer. An additional interface with a Tektronix 4662 flat-bed plotter provides data processing with the capability to produce report quality graphic presentation of field data.

A Tektronix 4010 graphics terminal will shortly (March-April 1982) be useful in utilizing the BCS's full range of graphics packages, which will free up inhouse programming efforts for other tasks.

During 1981 the tasks of data processing were carried out by a Biometrician II, an EDP Programmer III, and a Data Control Clerk II. These tasks were primarily directed at the first two objectives listed above (i.e. data processing support and statistical analyses), very limited experimental

design or biometric evaluation was carried out in 1981. The lack of input into experimental design in 1981 was primarily due to the late hiring of the project biometrician. However the shortage of biometric input and evaluation of project reports was due to a heavy workload of data processing and programming activities of the project biometrician. Computer programming activities by the biometrician were necessitated due to the initial start up nature of data processing (accordingly more programming was necessary in 1981 than is expected in 1982), there will still be some programming carried out by the biometrician in FY 1983. If the FY 1983 staff remains the same then a good deal of the data processing activities of the biometrican would be expected to be more time consuming in FY 1983, due to proposed increased field collection efforts and the taking over of more data processing activities that were carried out by Adult Anadromous personnel in FY 1982. Accordingly, we are proposing a new staff position for FY 83.

The new position is a Fishery Biologist I/II. We are requesting a fishery biologist (rather than a programmer or a data control clerk) due to the need for someone in data processing with experience in field data collection techniques and biological conditions, that is someone who could readily recognize and correct "problems" with field

data. Presently, this recognition and correction of problems is carried out by the biometrician and field biologist in the three field projects. Additional duties of the fishery biologist would be to coordinate data processing activities such as collecting data from the three field projects (this would sometimes entail field work), coordinate and help in coding of data onto keypunch coding forms, and coordinate report production and analyses on the computer. The coordination of report production and computer analyses would be under supervision of the biometrician, but standard report production activities could and would be coordinated by the fishery biologist.

The time freed by the taking up of duties by the new data processing fishery biologist would allow the staff biometrician more time for the last two data processing objectives listed above. The staff data control clerk would have enough time to do most of the coding and error checking of the data . Finally, the staff programmer would be freed from data processing activities and could devote full time to programming.

It is still anticipated that some temporary help will be needed for some coding and error checking of data.

Accordingly, the budget includes nine months of fishery biologist I wages to be used for "picking up" seasonal personnel after the end of the ice-free field season.

The budget for travel, commodities, and capital purchases is designed to provide adequate funds for all of data processing's task. Some of the funds outlined are items necessary to support a new fishery biologist position. The proposed data processing budget does not include administrative and support funds for the new fishery biologist position (e.g. desk and moving cost). Most of the new equipment and funds are necessary to allow the staff biometrician and the programmer with adequate tools to do their job. The two new microcomputers requested (along with the semi-disk and software packages) are necessary in order to allow both the biometrician and programmer to do accomplish their assigned tasks in an efficient manner, while still providing access of the present microcomputer to the data control clerk and the new fishery biologist.

ATTACHMENT C-1

DATA PROCESSING UNIT

Line 100 - Personal Services

PCN	Class	Grade	MM		
4193	EDP Programmer III	17	12		[illegible]
4191	Data Control Clerk II	11	12		31.8
*NEW	FB I/II	16	12		42.0
4190	Cartographer II	15	9		28.1
BORROWED	FB I	14	9		29.7
				Subtotal	178.4

Line 200 - Travel

Travel & Per Diem		2.4
	Subtotal	2.4

Line 300 - Contractual Services

Boeing Computer Services		72.0
Instream Flow Analysis		20.0
Training		3.5
Other		11.0
	Subtotal	106.5

Line 400 - Commodities

Data Processing Related Supplies		6.8
Drafting Supplies		1.0
	Subtotal	7.8

Grand Total (Line 100 - 400)	295.1

20 K Contract for instream flow analysis

ATTACHMENT C-1

DATA PROCESSING UNIT

Line 100 - Personal Services

PCN	Class	Grade	MM		Cost
4193	EDP Programmer III	17	12		46.8
4191	Data Control Clerk II	11	12		31.8
*NEW	FB I/II	16	12		42.0
4190	Cartographer II	15	9		28.1
BORROWED	FB I	14	9		29.7
				Subtotal	178.4

Line 200 - Travel

Travel & Per Diem		2.4
	Subtotal	2.4

Line 300 - Contractual Services

Boeing Computer Services		72.0
Instream Flow Analysis		20.0
Training		3.5
Other		11.0
	Subtotal	106.5

Line 400 - Commodities

Data Processing Related Supplies		6.8
Drafting Supplies		1.0
	Subtotal	7.8
Grand Total (Line 100 - 400)		295.1

ATTACHMENT C-2

DATA PROCESSING UNIT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	2	Vector Graphic microcomputer	9.0	18.0
2	3	Semidisk, disk emulators	2.3	6.9
3	4	A/B switch boxes w/cables	0.3	1.2
4	2	Microcomputer terminal tables	0.3	0.6
5	1	VA3451 triple Modem	1.0	1.0
6	1	Datapod reader	1.8	1.8
7	1	Datapod storage eraser	0.2	0.2
8	4	Software packages	---	1.9
9	2	Hewlett-Packard 11-C calculators	0.2	0.4
10	-	Parts in excess of $100.00 not covered under warranties	---	3.0
				35.0

Data Processing Supervisor
Biometrician II
PCN 4187

Acres Cartographer
until
30 September, 1982
Cartographer II
PCN 4190

FB I/II
NEW PCN

EDP Programmer III
PCN 4193

Data Control Clerk II
PCN 4191

ATTACHMENT D - RESIDENT AND JUVENILE ANADROMOUS PROJECT

Background

During FY 82 Resident and Juvenile Anadromous (RJ) investigations were initiated to describe distribution and relative abundance of resident and juvenile anadromous fish within the project area. The RJ studies conducted from November, 1980 to October, 1981 provided information on 11 known resident fish, five juvenile anadromous and one adult anadromous fish species, as listed below.

Resident fish

Rainbow trout
Arctic grayling
Burbot
Round whitefish
Humpback whitefish
(Coregonus sp.)
Longnose sucker
Dolly Varden/char
Threespine stickleback
Slimy sculpin
Northern pike
Arctic lamprey

Juvenile Anadromous Fish:

Chinook salmon
Coho salmon
Chum salmon
Sockeye salmon
Pink salmon

Adult Anadromous Fish

Bering cisco

Data collected by RJ crews during FY 82 have furnished valuable baseline data however, it is essential to continue and expand these studies over several years in order to accurately describe the seasonal distributions of resident and juvenile anadromous fish in the Susitna River and to determine the various biological and hydrological factors related to their presence. Sampling procedures based on FY 82 results will be implemented in FY 83 to permit a more comprehensive evaluation of seasonal fish distribution, biological, and habitat characteristics of the sites to be sampled.

In the Phase II RJ studies, further information will be collected on male/female ratios of adult residents. Additional seasonal distribution, relative abundance, and biological data will be gathered on juvenile residents and juvenile pink, chum, and sockeye salmon in order to evaluate habitat requirements for various stages of their life histories. The fact that Phase I data did not provide a basis for determining the rearing characteristics and habitat for sockeye fry and juveniles is one example of the need for further study in this subject area. Expanded studies proposed for Phase II will also compile more detailed information on location of mainstem and slough spawning sites, spawning habits and timing, incubation of embryos, and seasonal movements for all species. A primary interest will be to characterize the timing of spawning for burbot and grayling in the Susitna River. Another facet of the 1982 studies will be to collect and evaluate baseline benthic and fish stomachs data to provide the basis for developing a more comprehensive food habitat program in 1983 (FY 84).

Positive results obtained from a limited amount of sampling with electroshockers in 1981 have indicated that expanded use of this technique for tagging and radiotelemetry will be of considerable value in Phase II studies. Use of a smolt trap is being incorporated into the FY 83 studies in order to determine timing of smoltification and outmigration of juvenile salmon from the Talkeetna to Devil Canyon reach. Additionally, a study has also been proposed for FY 83 to initiate an evaluation of transmission and access corridor areas to determine potential impacts on fishery resources in these areas. This study proposal is based on the ADF&G's recommendations made in our November 1979 plan of study. The components of this RJ study proposal are:

1. Resident and Juvenile Anadromous Distribution Study
2. Anadromous Outmigration (Smolt) Study
3. Electrofishing Survey
4. Upper River - Impoundment Study
5. Upper River - Access and Transmission Corridor Study

Resident and Juvenile Anadromous Distribution Study

Background

During FY 82 joint crews of Resident and Juvenile Anadromous (RJ) and Aquatic Habitat and Instream Flow (AH) personnel collected fishery and habitat data at 82 habitat location sites within the study area. These data provided a basis for describing the baseline seasonal characteristics of the distribution of fish within the study area and the general water chemistry and hydrological characteristics associated with fish trapping locations. This data collection will be continued and expanded in Phase II to further refine the Phase I data base and thus provide better understanding of general fish distribution, timing of spawning, rearing, incubation, and passage events and the general habitat characteristics of the Susitna River system. Resident and juvenile anadromous fish distribution studies will be conducted, unlike Phase I studies, solely by RJ personnel to permit AH personnel to concentrate on specialized habitat studies.

Objectives

A. Define seasonal distribution and relative abundance of resident and juvenile anadromous fish in the Susitna River between Cook Inlet and Devil Canyon.

Task 1. Through direct field observations and measurements expand and refine the result of the 1981 RJ/AH Habitat Location Study regarding relative abundance, geographical and seasonal distribution, and movement of resident and juvenile anadromous fishes.

Task 2. Record age class composition, length frequencies, sex ratios, and general life history information on captured fish.

B. Characterize the seasonal habitat requirements of selected anadromous and resident species within the study area.

Task 1. Monitor water quality and staff gages at designated habitat locations.

Task 2. Map habitat characteristics and locations of sampling sites within each habitat location.

Resident and juvenile anadromous fish distribution data will be collected from habitats located in the following 3 lower Susitna River areas.

1) Deshka to Talkeetna - Mainstem, sloughs, and tributary mouths
2) Talkeetna to Devil Canyon - Mainstem, sloughs, and tributary mouths
3) Indian River and Portage Creek - Tributaries

DRAFT

Work Plan

Summer Field Season - May through October

4 people

Two two-man crews will collect RJ habitat location data below Devil Canyon. One crew will be based out of a camp at Sunshine and will sample habitat locations between the Deshka River (RM 40.6) and Talkeetna (RM 97.0). This crew will also operate the lower east bank Sunshine Station fishwheel from ice out until the Adult Anadromous crew takes over on June 7. The second crew will have base camps at Talkeetna and Gold Creek and will be responsible for sampling habitat locations from Talkeetna (RM 97.0) to Devil Canyon (RM 148.8). Both of these crews will assist with the smolt trap at Talkeetna and sampling habitat locations on Indian River and Portage Creek.

Tasks 1 and 2 will be accomplished by continuing the basic RJ/AH habitat location study program initiated in 1981.

The following refinements will be made to the program:

a. discontinue sampling locations downstream of the Deshka River (RM 40.6)

b. determine whether habitat locations in the Delta Islands to Devil Canyon reach should be added, dropped or modified and to select FY 83 locations.

c. sample each habitat location for one 24 hour period each two weeks.

Task 3 will be accomplished similar to the above.

The Resident and Juvenile Anadromous crews will be trained by Aquatic Habitat personnel to measure aquatic habitat parameters and subsequently take over the responsibility of collecting this data at habitat locations.

Winter Field Season - November through April

During this period three two-man crews will conduct winter sampling at habitat locations below Devil Canyon. Two crews will be based at the Talkeetna ADF&G house at Talkeetna and will sample habitat locations between the Deshka River (RM 40.6) and Mainstem 2 (RM 114.4). The third crew will work out of a cabin at Gold Creek and will sample habitat locations between Curry (RM 120.7) and Devil Canyon (RM 148.8). Habitat locations which can not be reached safely by snowmachine will be sampled on a reduced schedule via helicopter.

Anadromous Outmigration (Smolt) Study

Background

Previous studies of the Susitna River have utilized minnow traps, beach seines, and electrofishing for the collection of juvenile anadromous species to characterize their early life histories. Minnow traps have not proven to be successful in certain lotic environments for the capture of pink, sockeye, and chum salmon juveniles. High river velocities and uneven substrates conditions preclude the use of beach seines. Electrofishing is restricted at times by conductivity and reduced visibility. A mainstem river stationary fish trap and the installation of a weir at Iron Creek were originally proposed in the ADF&G Preliminary Final Plan of Study in November, 1979. A memorandum on June 2, 1980 to the Alaska Power Authority reiterated the Department's recommendation to establish a stationary fish trap and develop suitable sampling techniques for the collection of juvenile anadromous species. However, neither the fish trap or weir were funded by the APA in Phase I studies.

The need for incorporation of additional sampling techniques to adequately determine the complete life histories of juvenile anadromous fish in the Susitna River has been a fundamental advice of the Alaska Department of Fish and Game. It is necessary to deploy a downstream migrant fish trap for the study of smoltification and outmigration of juvenile salmon. Mainstem and slough surveys of salmon spawning sites should be conducted to

assess the spawning success, over winter survival, and emergence timing for these species. These techniques in conjuction with the standard sampling gear will provide the data base necessary for the characterization of the early life histories of juvenile anadromous species in the Susitna River.

Objectives

A. Determine timing of smoltification and/or outmigration of juvenile salmon from the Talkeetna to Devil Canyon reach of the Susitna River.

Task 1. Determine the age class composition of coho and chinook salmon smolts/outmigrants.

Task 2. To provide qualitative estimates of spawning success, over winter survival of eggs and alevin, and timing of emergence for slough and mainstem spawning salmon species between Talkeetna and Devil Canyon.

Work Plan

The smolt trap will be located at Talkeetna Station and will be run continuously by a two man crew from July 1 to September 31, 1982 and the period immediately following ice out to June 30, 1983. Size frequency and

age analysis by species will be determined from subsamples of collected fish.

Slough pre-emergent studies will be limited to the Talkeetna to Devil Canyon reach. Periodic pre-emergent sampling with standard pre-emergent gear will be conducted at known mainstem and slough spawning sites and beach seines and electrofishing will be incorporated as time and conditions allow.

Surveys of known sockeye salmon spawning sites will be conducted utilizing pre-emergent gear, beach seines, and electrofishing to determine the distribution and relative abundance of juvenile sockeye salmon.

Electrofishing Survey

Background

Electrofishing was conducted in early October, 1981 for 10 days by Resident and Juvenile (RJ) and Aquatic Habitat (AH) personnel in the mainstem Susitna River between river mile 70.0 to 105.5 utilizing a boat mounted electrofishing unit. Sampling of resident fish during this time, had three objectives: (a) locate mainstem river spawning areas of various species of resident fish, (b) conduct a tag and recapture program, and (c) to capture adult resident fish for the radio telemetry program.

Electrofishing during October resulted in locating mainstem Susitna River spawning of Bering cisco. Sexually mature round whitefish in spawning condition were also captured in the mainstem Susitna River. Two hundred and ten resident fish and 312 Bering cisco were collected and floy tagged during the 10 days of electrofishing. Fifteen fish were recaptured, during the sampling trip.

Electrofishing was also utilized during this time to capture adult resident fish for the radio telemetry program. Electrofishing was utilized due to the high survival rate of fish collected by this sampling method (greater than 95%) than other methods (gillnets and trotlines).

Electrofishing conducted in the mainstem Susitna River in October demonstrated the practicality of boat mounted electroshocking units as a

sampling method in the Susitna River. Due to mobility, little interference to electrofishing was caused by the effects of the Susitna River (water velocity, debris, etc.) which limited the effectivness of other sampling gear (gillnets, etc.). Also, due to the mobility of electrofishing gear, interference with the public was not encountered nor is anticipated in future sampling. The practicality of expanded sampling utilizing electrofishing is further demonstrated by the relatively, high capture and survival rates of adult resident fish electrofished compared to other sampling methods.

Due to these reasons sampling utilizing boat mounted electrofishing units should be expanded to further define distribution and relative abundance and to characterize the seasonal habitat requirements of anadromous and resident species within the study area.

Objectives

A. Define distribution and relative abundance of resident and juvenile anadromous fish in the Susitna River between Cook inlet and Devil Canyon.

Task 1. Identify life functions (i.e. spawning, rearing, migration, feeding) associated with the mainstem Susitna River habitats.

Task 2. Record descriptive information on captured fish and discuss seasonal migration patterns on selected adult resident species.

Task 3. Carry out adult anadromous fish studies as outlined.

Task 4. Work in conjuction with the adult anadromous fish project on the expanded resident fish radio telemetry studies. These are discussed in the AA Project plan of study.

B. Characterize the seasonal habitat requirements of selected anadromous and resident species within the study area.

Task 1. Collect aquatic habitat and instream flow data, i.e. point velocities and conductivity data as determined by AH personnel.

Task 2. Provide locations of fish and AH data to the AH point specific crew.

Work Plan

Electrofishing, incorporating a boat mounted electrofishing unit, will be conducted from July 1, 1982 to freeze-up. Two RJ biologists will utilize the electrofishing equipment; and, if a third person is needed to sample on occasion, he will come from existing staff.

Objective A, Tasks 1 and 2 will be accomplished by periodically sampling a number of pre-selected locations. Additional sampling (up to 33% of the

total effort) will be conducted in locations selected in the field in an attempt to locate concentrations of fish. Tagging, tag recovery, and collection of biological data will also be conducted. Tasks 3 and 4 will be to determine slough and mainstem Susitna River spawning and milling areas of adult anadromous fish as outlined in the Adult Anadromous (AA) study; however, all costs to accomodate these tasks are contained in the RJ program.

Objective B, Tasks 1 and 2 to characterize aquatic habitat conditions are discussed in the AH study.

Field stations for this program will be located at Sunshine, Talkeetna, and Gold Creek, during the open water season.

Equipment budgeted by AH will be provided to the RJ project to characterize the habitat requirements of selected anadromous and resident species. All other costs are listed herein.

Upper River-Impoundment

Background

Phase I Upper River Impoundment Studies were conducted by joint RJ and AH crews to identify resident and juvenile anadromous fish species, their relative abundance and the general aquatic habitat characteristics in areas which would be innundated above Devil Canyon. Additional investigations were conducted to identify, on a preliminary basis, habitats above the impoundment which would be available to the existing fishery if the dams were built. Phase II investigations are designed to refine and augment the Phase I studies. A primary concern will be to focus the FY 83 activities on the stretch of river immediately above the proposed impoundment elevations. Other activities will be initiated to provide better fish distribution in adjacent lakes and a better knowledge of fishery activity in the mainstem Susitna River.

These investigations will be performed by a joint RJ/AH three to four man crew on a year round basis.

Objectives

A. Determine the seasonal distribution and relative abundance of selected resident fish populations within the study area above Devil Canyon.

Task 1. Identify passage, spawning, incubation, and rearing locations selected resident species and estimate their comparative importance.

Task 2. Record descriptive information for fish captured and discuss seasonal migration patterns of selected adult resident species.

B. Characterize the seasonal habitat requirements of selected anadromous and resident species within the study area (refer to age study plan).

Work Plan

Summer

Two biologists, 1 RJ, 1 AH will operate out of a proposed tent camp located at the mouth of Watana Creek. An AH crew leader will also participate on a part time basis. The study area for Phase II field work will include the one mile reach of each of the eight major tributaries upstream from the

proposed impoundment elevation, (the projected location of the new "mouth"), a number of habitat locations in the Susitna and its sloughs, the Upper Deadman River system and the eight existing habitat locations. Access from Anchorage to the study area will be via chartered fixed wing aircraft. Access to the actual habitat locations will be via Acres helicopter and ADF&G riverboat.

The sampling plan will provide for:

1. Monthly visits to the eight tributary mouth habitat locations sampled in 1981

2. Monthly visits to 5 mainstem and slough habitat locations (to be selected in spring 1982)

3. Population estimates for selected resident fish species in the lake located at 32N 07E 29.

4. Evaluation of the Upper Deadman and Deadman Lake system grayling and lake trout populations

5. One time only evaluation of grayling population and aquatic habitat located in the reach of each tributary beginning at the proposed impoundment elevations and extending one mile upstream. These surveys will be conducted in July and early August when grayling distribution is most extensive.

Winter

Three biologists will conduct two five day sampling trips, one each in early March and in late March or early April using Acres helicopter. Work will concentrate on the Susitna and potential overwintering locations in each tributary. Watana camp will be utilized as a base of operation.

Upper River-Access and Transmission Corridor Study

Background

Phase I studies did not include fishery and habitat evaluation of the proposed access and transmission corridors as proposed by the ADF&G in 1979. Therefore, the proposal below has been designed to generate baseline data to provide a basis for evaluating the impacts of the proposed Access and Transmission Corridor.

Objectives

A. Determine the open water seasonal distribution and relative abundance of selected resident and anadromous fish populations within the access/transmission corridors.

Task 1. Identify passage, spawning, incubation, and rearing locations and estimate their comparative importance.

Task 2. Record descriptive information on captured fish and discuss seasonal migration patterns.

B. Characterize the seasonal habitat requirements of selected anadromous and resident species within the study area (refer to age study plan).

The study area and information collected by location for the access/transmission corridor fisheries evaluation are outlined below:

1. Indian River, 3 east side tributaries, Miami Lake
   a. Adult salmon enumeration/timing
   b. Adult salmon spawning distribution
   c. Juvenile salmon seasonal distribution by species
   d. Adult resident seasonal distribution and relative abundance
   e. Adult resident spawning distribution and timing
   f. Juvenile resident distribution
   g. Aquatic habitat evaluation for each of the above

2. High Lake lakes area 5 lakes
   a. Resident fish species composition
   b. Resident fish population age class composition
   c. Resident fish population relative abundance
   d. Aquatic habitat evaluation

3. Devil Creek (Upper)
   a. Resident fish species composition
   b. Resident fish species age class composition
   c. Resident fish species relative abundance
   d. Aquatic habitat evaluation

4. Tsusena Creek (Upper)
   a. Resident fish species composition

b. Resident fish species age class composition

c. Resident fish species relative abundance

d. Resident fish species spawning location

e. Resident fish species intrasystem movements

f. Resident fish species timing of d and e above

g. Resident fish species rearing distribution

h. Aquatic habitat evaluation

Work Plan

Field activities will bel limited to ice free months between July 1, 1982 and October 15, 1982, resuming May 1, 1983 through June 30, 1983.

A crew of three biologists two RJ, one AH will operate with ADF&G charter and Acres helicopter support out of Gold Creek and Watana beginning July

1, 1982, RJ will provide 1 FBII crew leader, AH will provide 1 FBI on a full-time basis who will be supported by his AH crew leader on a part-time basis.

1. Indian River

a. Adult Anadromous: 1) A total of four aerial surveys once each two weeks beginning July 25, 1982 2) Ground truth surveys on selected reaches and in east side tributaries

b. Juvenile Anadromous: 1) Select five sites utilizing the four 1981

sites 2) Minnow trap 10 traps each site once per month through October 3) Minnow trap/electrofish east side tributaries 4) Record species composition subsample total length, catch rates

c. Resident Fish Species: 1) Concentrate on rainbow and grayling 2) Hook and line at mouth minimum of 5 man-hours per month, tag and release, record bio data 3) Operate electro fishing boat at mouth each month 4) Hook and line at selected sites upstream each month

2. Alpine Lakes (5 Lakes)

a. Test net prior to August 15; if grayling or lake trout are present test net again prior to freeze up and collect biological data

b. Aquatic habitat evaluation described in the Aquatic Habitat project

3. Upper Devil Creek

a. Hook and line/electro fish twice during ice free months once July 1 - August 15, once August 15 to freeze up. Collect biological data and tag fish.

b. Aquatic habitat evaluation

4. Tsusena Creek

a. Grayling - 1) Once monthly hook and line and electro fish 2) Bio data and tag 3) At least once during ice free months preferably late July early August sample upper reaches

sites 2) Minnow trap 10 traps each site once per month through October 3) Minnow trap/electrofish east side tributaries 4) Record species composition subsample total length, catch rates

c. Resident Fish Species: 1) Concentrate on rainbow and grayling 2) Hook and line at mouth minimum of 5 man-hours per month, tag and release, record bio data 3) Operate electro fishing boat at mouth each month 4) Hook and line at selected sites upstream each month

2. Alpine Lakes (5 Lakes)

a. Test net prior to August 15; if grayling or lake trout are present test net again prior to freeze up and collect biological data

b. Aquatic habitat evaluation described in the Aquatic Habitat project

3. Upper Devil Creek

a. Hook and line/electro fish twice during ice free months once July 1 - August 15, once August 15 to freeze up. Collect biological data and tag fish.

b. Aquatic habitat evaluation

4. Tsusena Creek

a. Grayling - 1) Once monthly hook and line and electro fish 2) Bio data and tag 3) At least once during ice free months preferably late July early August sample upper reaches

ATTACHMENT D-1

RESIDENT AND JUVENILE ANADROMOUS PROJECT

Line 100 - Personal Services

PCN	Class	Grade	MM		Cost
4184	FB II	16	12		53.7
4204	FB II	16	12		43.6
4201	FB II	16	12		43.6
4200	FB II	16	12		43.6
4205	FB II	16	12		42.0
4206	FB II	16	12		42.0
4204	FB I	14	12		37.8
4198	FB I	14	11		34.7
4197	FB I	14	11		34.7
4203	FB I	14	11		34.6
4199	FB I	14	9		28.3
*NEW	FB I	14	9		27.4
*NEW	FB I	14	6		18.3
				Subtotal	484.3

Line 100 - Personal Services Subelement

Habitat Location Study (summer)		167.3
(winter)		
Electrofishing Survey		78.2
Outmigrant Study		81.4
Impoundment Study		60.2
Access/Transmission Study		53.6
Data Processing Coordinator		43.6
	Subtotal	484.3

Line 200 - Travel

Habitat Location Study (summer)		2.7
(winter)		1.0
Electrofishing Survey		.9
Outmigrant Study		1.0
Impoundment Study		0.5
Access/Transmission Study		0.5
	Subtotal	6.6

Line 300 - Contractual Services

Habitat Location Study (summer)		10.4
(winter)		6.8
Electrofishing Survey		3.3
Outmigrant Study		2.5
Impoundment Study		11.5
Access/Transmission Study		30.7
	Subtotal	65.2

ATTACHMENT D-1 CONTINUED

Line 400 - Commodities

Habitat Location Study	(summer)	29.6
	(winter)	15.7
Electrofishing Survey		13.1
Outmigrant Study		8.1
Impoundment Study		4.9
Access/Transmission Study		5.2
	Subtotal	76.6

Grand Total (Line 100 - 400)	632.7

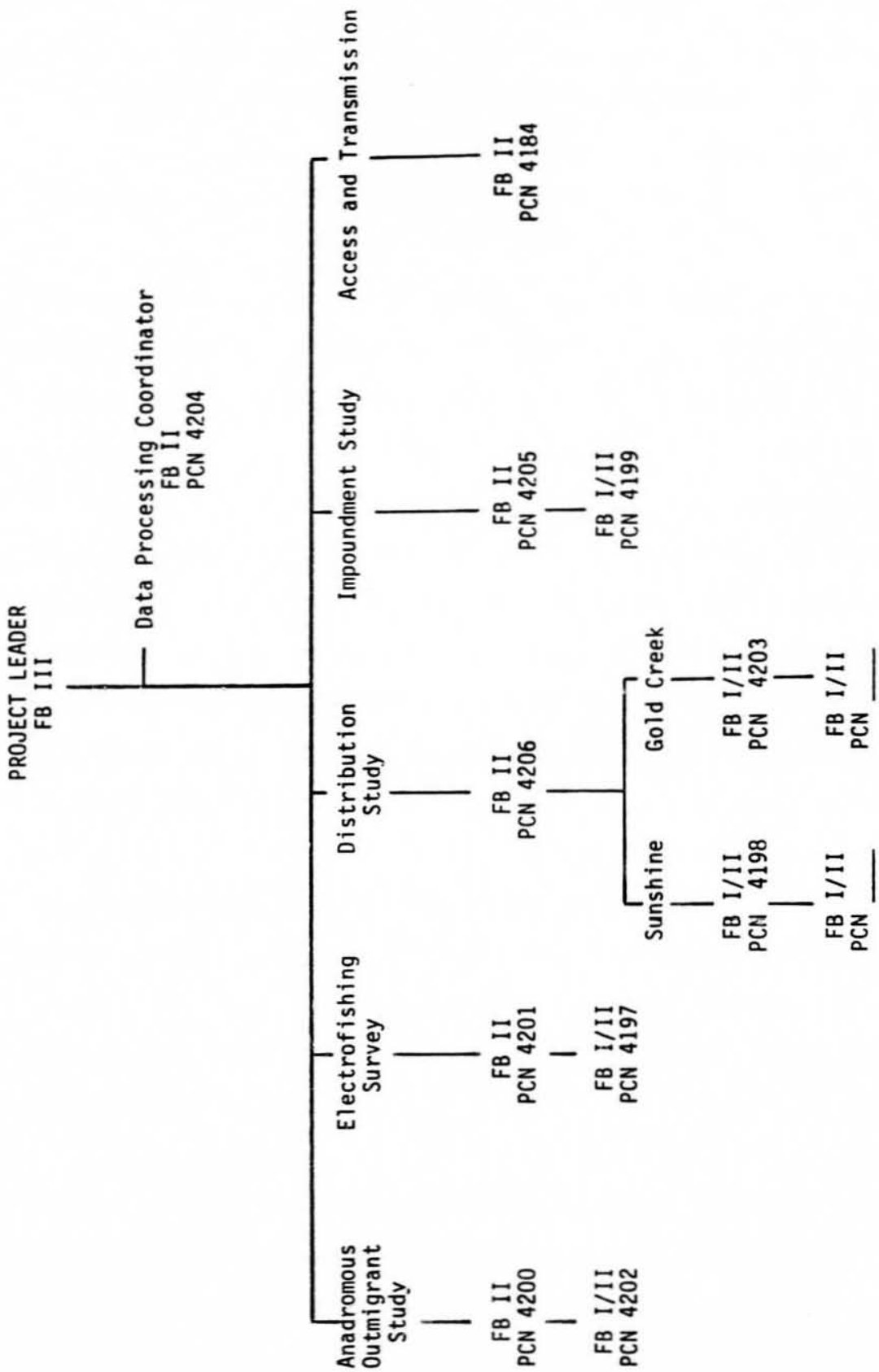
ATTACHMENT D-2

RESIDENT AND JUVENILE ANADROMOUS PROJECT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	2	Truck	10.8	21.6
2	2	Snowmachine	2.0	4.0
3	1	Riverboat (20') console and controls	3.0	3.0
4	2	Riverboat (18') w/ 48" bottom	1.6	3.2
5	1	Outboard engine, 75 h.p.	2.3	2.3
6	1	Jet unit	0.9	0.9
7	2	Outboard engine, 35 h.p.	1.1	2.2
8	2	Outboard lift	0.4	0.8
9	1	Outboard engine, 15 h.p.	1.0	1.0
10	1	Spillsbury base radio w/accessories	2.3	2.3
11	6	Wall tents	--	1.5
12	1	Tent, three person	0.4	0.4
13	1	Firearm	0.4	0.4
				43.6

RESIDENT AND JUVENILE ANADROMOUS FISHERIES PROJECT



ATTACHMENT E - AQUATIC HABITAT AND INSTREAM FLOW PROJECT

Background

During FY 82 Aquatic Habitat and Instream Flow (AH), investigations were initiated to describe physical and chemical characteristics of various types of fish habitat within the project area.

The AH studies also provided information necessary for testing the accuracy of physical (discharge and temperature) models which are being used to predict post-project impacts of the proposed dam on aquatic habitat characteristics. The FY 82 data indicated that the models need refinement and additional field data must be collected to calibrate them.

Used in conjuction with the rest of the project studies, the aquatic habitat information clearly demonstrates that clear water sloughs provide the most important salmon spawning habitat of the habitats evaluated this year, in the Devil Canyon to Talkeetna segment of the river.

Although the AH studies concentrated on slough and side channel habitats, Adult anadromous and resident and juvenile anadromous fish distribution studies conducted in 1981 indicated the use of

mainstem spawning habitat for chum and coho salmon and Bering cisco. FY 83 Phase II investigations have therefore been designed to characterize these mainstem spawning habitats and the influence of incremental changes in discharge on the mainstem habitat.

Another facet of the 1981 studies was describing point specific fishery habitats at fish trapping sites. It will be necessary to expand these studies and conduct comprehensive point specific evaluations for each life phase of selected fish species in various habitats within the study area during FY 83. This information will then be used to generate habitat utilization criteria in terms of depth, substrate, and velocity, dissolved oxygen, ph, temperature, and conductivity, for the various life phases and fish species studied. These point specific data, when combined with selected habitat data which identify the quantity of habitat having certain velocity, depth substrate, and water quality characteristics at various discharges, can then be used to define impacts and mitigation strategies for the project based on the concept of flow regulation.

Preliminary aquatic habitat investigations conducted in the area above Devil Canyon during 1981 were directed at determining the physical and chemical characteristics of fish habitat which would be inundated by the proposed impoundment.

Eight major tributaries were selected for study in this area and investigations centered on the lower mile of each. Less detailed

studies were conducted on the upper areas of these streams, the mainstem Susitna and various sloughs and side channels. These studies were initiated to determine the extent of loss of habitat to resident species in this area most notably the Arctic grayling. Investigations will be expanded in FY 83 to include more detailed studies of the mainstem Susitna, and sloughs and side channels which might be utilized as spawning or rearing habitat by grayling. Also, the upper areas of the selected tributaries directly above the proposed impoundment elevation will be examined to determine if this area provides similar habitat to that now present at the mouth of each stream.

Because 1981 studies did not include an evaluation of transmission and access corridor areas, studies have been proposed for FY 83 to initiate an evaluation of these areas. Complete habitat evaluations will be conducted at all areas where stream crossings may occur or where construction of any type may have an impact on water quality or stream channel characteristics. These studies will provide the basis minimizing or avoiding impacts along these routes.

The large amount of data generated and the time and manpower resources required to reconcile, reduce, and verify the accuracy of these data in preparation for transfer to the data processing support unit underestimated in FY 82. To correct this problem, the Phase II FY 83 AH program has been organized to insure personnel will be assigned to insure data are properly treated prior to transferring it

to the data processing support unit.

Phase II AH studies will be interrelated and coordinated with other fisheries and related project studies to insure maximum and efficient usage of project resources.

Phase II FY 83 AH studies will be subdivided into two segments: 1) point specific fishery habitat evaluations (Tasks 1.1 and 1.2) of the principal resident fish, and juvenile and adult anadromous salmon habitats; and 2) selected stream flow dependent habitat evaluations of slough and mainstem habitats in the study area (Task 1.3).

Objective

1. Characterize the seasonal spawning, incubation, rearing, and passage habitat requirements of selected anadromous and resident species within the study area.

   Task 1.1 Through direct field observations and measurements identify the physical and chemical conditions which appear to be influencing the suitability of various habitat types for the species and life history stages of interest.

   Task 1.2 Through direct field observations and measurements characterize the physical and chemical parameters of the various habitat types found in the study area.

   Task 1.3 Through direct field observations and measurements, characterize the influence of a range of flow regimes on the physical and chemical parameters associated with selected habitats.

The AH program study area is divided into 3 geographical areas:

1) Cook Inlet to Devil Canyon
2) Devil Canyon to Tyone River
3) Corridor Study Area

Point Specific Evaluations

Background

The large number of FY 82 fish sampling sites primarily restricted the collection of point specific depth, velocity, and substrate data to juvenile anadromous fish trap sites.

Because these data are required to identify the physical conditions of the river which appear to influence the suitability of various habitat types for the species and life history stages of interest, a major objective has been placed on expanding point specific data in FY 83.

The primary emphasis will be directed toward identifying point specific characteristics of mainstem, slough, and side channel spawning habitats for the adult salmon and selected resident species such as burbot and grayling. Additional efforts will be focused on collecting point specific data for rearing, incubation and passage habitats. Dissolved Oxygen, ph, temperature and conductivity data will also be collected in the vicinity of point specific evaluation sites to characterize the overall general water quality characteristics associated with fish activities and useage of habitats.

Tasks

1. Through direct field observations and measurements

identify the physical and chemical conditions which appear to be influencing the suitability of various habitat types for the species and life history stages of interest.

Work Plan

Open Water Season

Four AH crews will collect point specific velocity, depth, and substrate data below Devil Canyon. One crew will be assigned to an electrofishing boat and coordinate with AA and RJ electrofishing crews in addition to the three other AH point specific crews. The AH electrofishing crew will locate and sample fish habitats between the estuary and Devil Canyon. The other three point specific crews will subdivide the estuary to Devil Canyon Study area into 3 river segments;

1) Estuary to Kashwitna
2) Kashwitna to Talkeetna; and
3) Talkeetna to Devil Canyon

The three crews will employ a variety of fish sampling techniques to identify fish locations prior to characterizing depth, velocity, and substrate characteristics of the water column occupied by the fish. Conductivity, ph, temperature and dissolved oxygen data will also be

collected at these locations. Supplemental dissolved oxygen, temperature, stage, and conductivity data will be collected at habitat locations as part of the RJ Fish Distribution Study by RJ staff. Aquatic Habitat personnel will train the RJ crews to collect the AH data. Conductivity data will also be collected by AH, RJ, and AA electrofishing boat personnel. Velocity and depth data will also be collected by AH, RJ, and AA electrofishing crews at fish spawning locations.

Ice Covered Season

During this sampling period two AH crews will continue to collect point specific data between the Estuary and Devil Canyon to characterize ice covered point specific fish habitats.

Selected Habitat Evaluation

Background

In FY 82 Selected Habitat Evaluations of discharge influenced water quality and hydrological characteristics were conducted at five sloughs upstream of Talkeetna, and side channels and mainstem river sites located between the estuary and Devil Canyon. These data enabled project personnel to evaluate the accuracy of hydrological and water temperature models which will be used to predict discharge influenced impacts on fishery habitats. The FY 82 data clearly demonstrated the importance of these studies and need to expand this data base in FY 83 if the goals of defining discharge influenced impacts to fishery habitats by the proposed project as well as designing discharge related mitigation options are to be achieved.

Tasks

1. Through direct field observations and measurements characterize the physical and chemical parameters of the various habitat types found in the study area.

2. Through direct field observations and measurements characterize the influence of a range of flow regimes of the physical and chemical parameters associated with selected habitats.

Work Plan

Open Water Season

Two mobile AH crews will collect selected habitat data between the Cook Inlet and Devil Canyon at slough and mainstem locations. The primary emphasis of their activities will be directed towards expanding the data base at the five slough areas evaluated in Phase I and developing a similar data base at mainstem spawning sites between Talkeetna and Devil Canyon. Surface water thermographs and staff gages (surveyed to datums) will be installed at selected locations in the study area between Cook Inlet and Devil Canyon survey study sites, and collect instantaneous reading of dissolved oxygen, ph temperature, and conductivity collected. Additional thermographs will be installed to characterize relationships between surface and groundwater sources at spawning locations. Other efforts will be directed towards examining discharge habitats below Talkeetna.

Ice Covered Season

One AH crew will continue collecting selected habitat data throughout the winter field season.

Work Plan

Open Water Season

Two mobile AH crews will collect selected habitat data between the Cook Inlet and Devil Canyon at slough and mainstem locations. The primary emphasis of their activities will be directed towards expanding the data base at the five slough areas evaluated in Phase I and developing a similar data base at mainstem spawning sites between Talkeetna and Devil Canyon. Surface water thermographs and staff gages (surveyed to datums) will be installed at selected locations in the study area between Cook Inlet and Devil Canyon survey study sites, and collect instantaneous reading of dissolved oxygen, ph temperature, and conductivity collected. Additional thermographs will be installed to characterize relationships between surface and groundwater sources at spawning locations. Other efforts will be directed towards examining discharge habitats below Talkeetna.

Ice Covered Season

One AH crew will continue collecting selected habitat data throughout the winter field season.

Upper River Study - Impoundment

Background

Fiscal Year 82 studies were designed to determine the impacts of converting this lotic system into a lentic environment by the proposed reservoirs. Fiscal Year 82 Investigations were limited to the lower mile of eight tributaries studied and less comprehensive evaluations of the upper reaches of these tributaries in the vicinity of the proposed impoundment elevations. Fiscal Year 83 studies are designed to refine the FY 82 data base and better evaluate the potential of the lotic habitat located immediately above the proposed reservoir surface elevations to substitute for the existing lotic habitats.

Tasks:

1. Through direct field observations and measurements identify the physical and chemical conditions which appear to be influencing the suitability of various habitat types for the species and life history stages of interest.

2. Through direct field observations and measurements characterize the physical and chemical parameters of the various habitat types found in the study area.

Upper River Study - Impoundment

Background

Fiscal Year 82 studies were designed to determine the impacts of converting this lotic system into a lentic environment by the proposed reservoirs. Fiscal Year 82 Investigations were limited to the lower mile of eight tributaries studied and less comprehensive evaluations of the upper reaches of these tributaries in the vicinity of the proposed impoundment elevations. Fiscal Year 83 studies are designed to refine the FY 82 data base and better evaluate the potential of the lotic habitat located immediately above the proposed reservoir surface elevations to substitute for the existing lotic habitats.

Tasks:

1. Through direct field observations and measurements identify the physical and chemical conditions which appear to be influencing the suitability of various habitat types for the species and life history stages of interest.

2. Through direct field observations and measurements characterize the physical and chemical parameters of the various habitat types found in the study area.

DRAFT

Work Plan

Open Water Season

2 people

One full time and one part time AH biologist will work with RJ biologists in conducting fishery and aquatic habitat evaluations in the proposed impoundment area. A combined crew of AH and RJ biologists will collect conductivity, ph, dissolved oxygen, and temperature data at all sampling locations. Depth, velocity and substrate data will be collected at selected sites to characterize spawning and rearing habitat of species of interest. The most intensive studies will be undertaken during the open water season. During this time operations will be conducted out of a proposed tent camp located at the mouth of Watana Creek. A more detailed description of objectives and tasks related to this study is presented in the RJ Impoundment Plan Of Study (POS). Budgetary items not included in the RJ POS are incorporated in the AH program where appropriate.

Ice Covered Season

Three biologists will conduct two five-day sampling trips, one each in March and April. Work will concentrate on locating major overwintering habitat in the main Susitna and selected tributaries. Transportation will be by snowmobile with Acres helicopter support. Operations during this time will be conducted from Watana Camp.

Upper River - Access and Transmission Corridor Study

Background

The ADF&G proposed studies for evaluating Access and Transmission Corridor in October 1979. Because these studies were not funded in FY 82, they are again being proposed for FY 83. The ADF&G considers an evaluation of these areas to be an integral part of the overall Su Hydro project feasibility assessment.

Tasks:

1. Through direct field observations and measurements identify the physical and chemical conditions which appear to be influencing the suitability of various habitat types for the species and life history stages of interest.

2. Through direct field observations and measurements characterize the physical and chemical parameters of the various habitat types found in the study area.

Work Plan

Open Water Season

One full time and one part time AH biologist will work with RJ biologists in conducting the Access and Corridor studies. These studies will be conducted during the open water field season only, beginning approximately July 1, 1982 to October 15, 1982; resuming approximately May 15, 1983 to July 30, 1983. AH and RJ data will be collected concurrently while in the field. AH data will include conductivity, ph, dissolved oxygen and temperature. Depth, velocity, and substrate data will be collected at selected sites to characterize spawning and rearing habitat of species of interest. RJ data collection plans are discussed in the RJ study plan section. Operations will be conducted out of Gold Creek and Watana Camps utilizing Acres helicopter support. A more detailed description of objectives and tasks related to this study is presented in the RJ Access and Corridor Plan Of Study (POS). Budgetary items not included in the RJ POS are attached.

ATTACHMENT E-1

AQUATIC HABITAT AND INSTREAM FLOW

Line 100 - Personal Services

PCN	Class	Grade	MM	Cost
4208	FB I-II	14/16	12	40.5
4196	FB II	16	12	42.6
4195	FB II	16	12	42.3
4211	FB II	16	12	41.6
4126	FB I-II	14/16	12	37.2
4209	FB I-II	14/16	9	28.3
4210	FB I	14	10	31.0
4207	FB II	16	12	42.3
*NEW	FB I	14	12	35.8
*NEW	FB I	14	9	26.9
*NEW	FB I	14	9	26.9
*NEW	FB I	14	9	26.9
*NEW	FB I	14	12	35.8
*NEW	FB I	14	10	29.8
*NEW	FB I	14	10	29.8
*NEW	FB I	14	9	26.9
*NEW	FB I	14	10	30.8
*NEW	FB I	14	10	29.8
*NEW	Hyd-II	16	10	34.0
*NEW	Hyd-II	16	12	40.8
*NEW	FT-II-III	11	12	28.0
				708.0

Line 100 - Personal Services by Subelement

Subelement	Cost
Data / Lab / Logistics	68.5
Selected Habitat	233.9
Point Specific	302.7
Upper River / Impoundment / A&T Corridor	42.3
Impoundment Study	30.8
Access and Transmission (A&T) Corridor	29.8
	708.0

Line 200 - Travel

AH Administration	5.0
Data / Lab / Logistics	1.5
Selected Habitat	15.5
Point Specific	12.3
Impoundment	3.7
A&T Corridor	0.5
	38.5

ATTACHMENT E-1 CONTINUED

Line 300 - Contractual Services

AH Administration	8.0
Data / Lab / Logistics	11.3
Selected Habitat	36.7
Point Specific	31.6
Impoundment	5.3
A & T Corridor	3.9
	96.8

Line 400 - Commodities

AH Administration	2.8
Data / Lab / Logistics	8.5
Selected Habitat	38.6
Point Specific	58.7
Impoundment	7.7
A & T Corridor	1.9
	118.2

Grand Total (Line 100 - 400)	961.5

ATTACHMENT E-2

AQUATIC HABITAT AND INSTREAM FLOW PROJECT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	8	Hydrolab & accessories	4.0	32.0
2	7	Barometer	--	1.1
3	13	Thermograph - Ryan	5.0	6.5
4	1	Marsh-McBirney meter	2.5	2.5
5	8	Price AA meter	--	7.4
6	7	Wading rod, topsetting	0.5	3.5
7	7	Wading rod, conventional	0.3	2.1
8	4	Propane stoves	--	0.7
9	2	Tagline	--	0.5
10	150	Staff Gage	--	2.7
11	2	Level	2.0	4.0
12	1	Rod	0.2	0.2
13	1	Tripod	0.2	0.2
14	2	Camera, compact 35 mm RF	--	0.3
15	180	Trap	--	1.3
16	15	Net	--	1.8
17	1	Electroshocker, backpack	1.6	1.6
18	3	Tagging gear set	0.2	0.6

ATTACHMENT E-2

AQUATIC HABITAT AND INSTREAM FLOW PROJECT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	8	Hydrolab & accessories	4.0	32.0
2	7	Barometer	--	1.1
3	13	Thermograph - Ryan	5.0	6.5
4	1	Marsh-McBirney meter	2.5	2.5
5	8	Price AA meter	--	7.4
6	7	Wading rod, topsetting	0.5	3.5
7	7	Wading rod, conventional	0.3	2.1
8	4	Propane stoves	--	0.7
9	2	Tagline	--	0.5
10	150	Staff Gage	--	2.7
11	2	Level	2.0	4.0
12	1	Rod	0.2	0.2
13	1	Tripod	0.2	0.2
14	2	Camera, compact 35 mm RF	--	0.3
15	180	Trap	--	1.3
16	15	Net	--	1.8
17	1	Electroshocker, backpack	1.6	1.6
18	3	Tagging gear set	0.2	0.6

ATTACHMENT E-2 CONTINUED

Item	Quantity	Description	Unit Cost	Total Cost
19	2	Egg pump	1.5	3.0
20	6	Riverboat (console and controls)	3.0	18.0
21	6	Outboard engine, 75 h.p.	2.5	15.0
22	6	Jet unit	1.0	6.0
23	6	Outboard engine, 15 h.p.	1.5	9.0
24	5	Boat trailer	1.7	8.5
25	4	Snow machine	2.0	8.0
26	3	Snow machine trailer	0.9	2.7
27	3	Sled	--	0.6
28	5	Truck (new or used)	10.5	52.5
29	3	Ice auger	0.6	1.8
30	6	Shotgun	0.4	2.4
31	4	Chainsaw	0.5	2.0
32	6	Walkie Talkie	--	0.9
33	11	Wall tent	--	2.6
34	9	Pack tent	--	3.2
35	5	Camera, 35 mm SLR with lenses	0.6	3.0
36	1	Substrate camera	0.5	0.5
37	2	Backpack	--	0.3
38	2	Ice meter	0.4	0.8
39	2	Ice rod	0.5	1.0
40	2	Lenses, for 1981 35 mm Camera(SLR)	0.5	1.0

ATTACHMENT E-2 CONTINUED

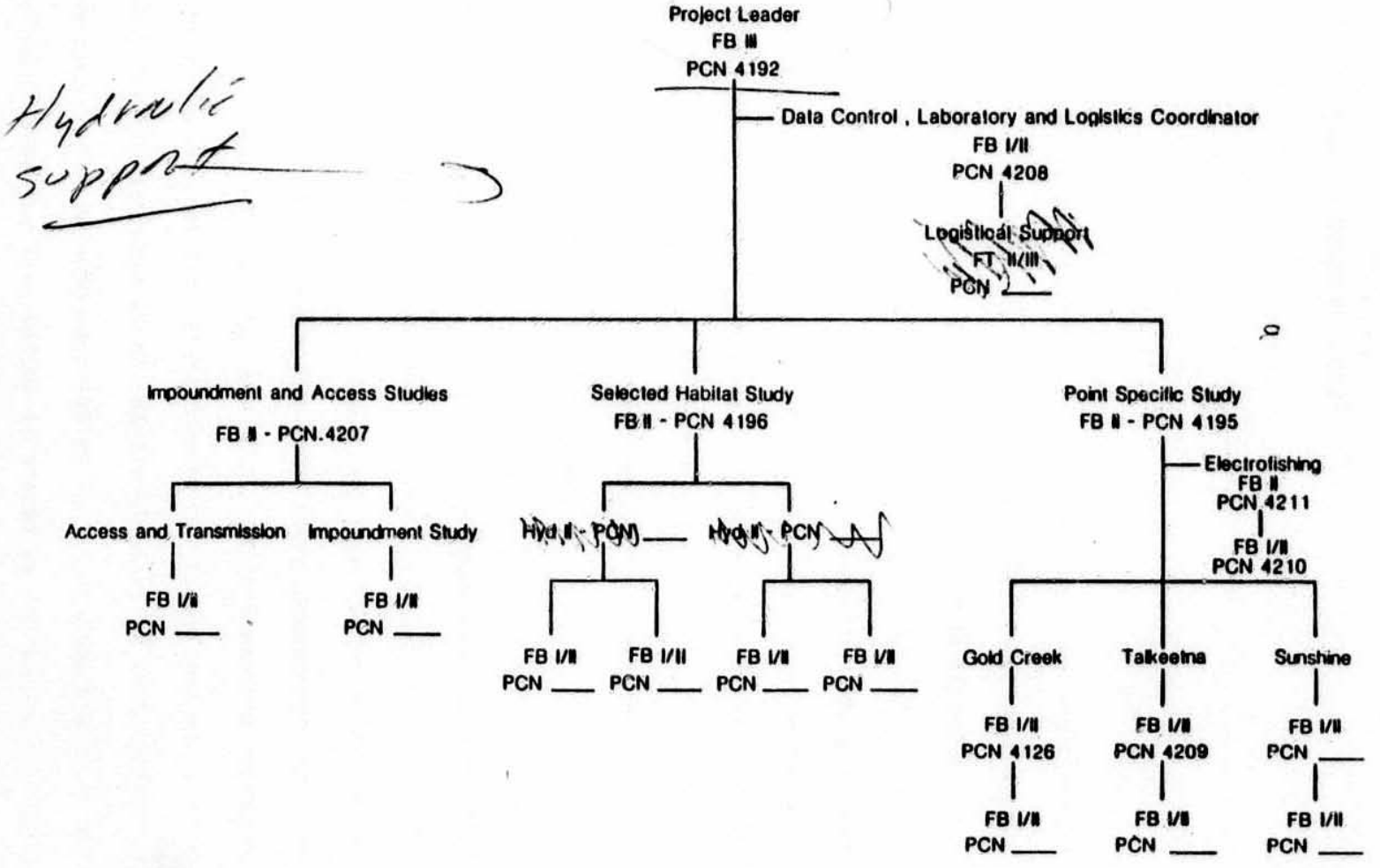
Item	Quantity	Description	Unit Cost	Total Cost
41	10	Thermograph - Datapod	1.5	15.0
42	1	Boom, aluminum for	2.5	2.5
43	1	Refrigerator	0.8	0.8
44	1	Freezer	0.6	0.6
45	1	Slide projector and accessories	0.6	0.6
46	2	Spillsbury radio	2.3	4.6
47	9	Cot	0.1	0.9
48	10	Sleeping Bag	--	2.5
				239.3

ATTACHMENT E-2 CONTINUED

Item	Quantity	Description	Unit Cost	Total Cost
41	10	Thermograph - Datapod	1.5	15.0
42	1	Boom, aluminum for	2.5	2.5
43	1	Refrigerator	0.8	0.8
44	1	Freezer	0.6	0.6
45	1	Slide projector and accessories	0.6	0.6
46	2	Spillsbury radio	2.3	4.6
47	9	Cot	0.1	0.9
48	10	Sleeping Bag	--	2.5
				239.3

AQUATIC HABITAT AND INSTREAM FLOW STUDY

Table of Organization



ATTACHMENT F - ADULT ANADROMOUS PROJECT

Background

Under Phase I studies, intensive monitoring of one adult salmon escapement year in the Susitna River was completed. Recognizing that an escapement cycle encompasses a multiple year period (Example: pink salmon are two year old fish; chum, sockeye, coho and chinook salmon are predominately four, five, four and four year old fish, respectively) it is essential that at minimum, a complete life cycle be evaluated. Baseline, pre-project data on anadromous fish distribution, abundance, timing and migration characteristics is vital in assessing the resource and related impact of development and operation of a hydroelectric facility on the Susitna River.

In addition to salmon, there are two other anadromous species that inhabit the Susitna River. They are: Bering cisco and eulachon. The former species was documented for the first time in the Susitna River during Phase I investigations. The 1981 cisco escapement was comprised predominately of four year old fish. It is therefore warranted to monitor escapement distribution, abundance, timing and migrational characteristics for at least three additional years on this species to cover one cycle. The eulachon population in the Susitna River has not been studied . Baseline information is needed on the timing, relative

abundance, and spawning areas of this species to define probable impacts of hydroelectric development.

Prior to Phase I studies, population estimates were obtained for pink salmon in 1974, 1975 and 1977. Chum and sockeye salmon escapement estimates were obtained in 1974 and 1975. Coho salmon escapement estimates were not obtained prior to 1981 Phase I studies. Several years of pre Phase I chinook salmon escapement data is available on tributary spawning streams but no mainstem Susitna River estimates have been obtained either prior to or under Phase I studies.

Phase I investigations successfully characterized 1981 escapement for pink, sockeye, chum and coho salmon. Additionally, this study defined for the first time mainstem spawning and notable milling activity by chinook, sockeye, chum and coho salmon at the entrance to Devil Canyon. Several new salmon spawning sloughs and streams were also located.

Phase I escapement levels were characterized at three locations: Susitna Station, Yentna Station and Sunshine Station. The base line data collected during the 1981 escapement season can not be used alone to characterize Susitna River production. To accurately ascertain Susitna River production trends, escapement monitoring should continue through at least one complete life cycle.

Slough areas, side channels and tributary confluence areas should be surveyed concurrently with escapement monitoring to provide a reliable pre-project data base on use of these habitats. Radio telemetry investigations on adult anadromous and selected resident fish should continue for at least four consecutive years to monitor and milling patterns under variable environmental conditions and migration strength.

Objective

The overall objective of the FY 83, Phase II Anadromous Adult Project will be to:

1. Determine annual distribution and relative abundance of adult anadromous fish populations within the study area.

Tasks under this objective are as follows:

Task 1.1 Enumerate and characterize the adult anadromous fish migration.

Task 1.2 Determine the timing and nature of migration, milling and spawning activities.

Task 1.3 Identify spawning locations within the study

area likely to be affected by post project conditions (i.e. mainstem, side channels, sloughs and tributary confluences), and estimate their comparative importance.

All adult anadromous fisheries studies will be interrelated. However, the program proposed is divided into two major geographical areas:

1) Cook Inlet Estuary to Talkeetna
2) Talkeetna to Devil Canyon

A summary of the proposed program by geographical area follows:

I. Cook Inlet Estuary to Talkeetna

A. Subtasks

- ascertain escapement abundance by species
- escapement timing by species
- determine Yentna River contribution
- define migrational preferences and movements
- evaluate stock characteristics
- evaluate mainstem spawning

B. Work Plan by Species

1. Eulachon - A eulachon study defining

timing, relative abundance, stock characteristics and spawning distribution Susitna River mainstem should be initiated. Gill netting will be conducted in the marine estuary and a representative sample will be collected for age, length and sex analysis. An electroshocker equipped boat will be operated on the Susitna River mainstem to define spawning locations and range. Operating period will be from 7 May to 15 June.

2. Bering Cisco - Escapement monitoring on this species will be conducted at Susitna, Yentna and Sunshine stations in conjuction with salmon monitoring operations. Gear used for sampling will be SSS counters and fishwheels. Additionally, the lower east bank fishwheel at Sunshine Station will be operated beyond the close of salmon escapement monitoring program through 25 September to insure full coverage of the cisco migration.

3. Chinook Salmon - A tagging operation through the use of fishwheels, will be conducted from 7 June to 20 July at Sunshine Station. All chinook salmon intercepted in the fishwheels will be tagged with Petersen disc tags and released. A population estimate will be made based on the number of

upstream recoveries at upriver sampling stations and by grounds surveys of selected, upstream spawning tributaries conducted from late July through mid August.

4. Sockeye, Pink, Chum and Coho Salmon

a. Mainstem Escapement Monitoring - Escapement monitoring will be conducted at Susitna, Yentna and Sunshine stations. Side scan sonar (SSS) counters will be used to assess abundance and timing. Fishwheels will be employed to provide a representative sample for age, length and sex analysis. Susitna and Yentna stations will be operated from 1 July through 5 September approximately. Side Scan Sonar counters will operate at Sunshine Station from 1 July to 15 September.

b. Mainstem Spawning Surveys - Two mobile electrofishing crews will survey the mainstem for spawning activity from 1 August to early October, and collect habitat and resident fish data.

C. Electrofishing surveys to determine mainstem spawning by anadromous adults will be coordinated by the Anadromous Adult Prcject Leader during the salmon spawning period.

II. Talkeetna to Devil Canyon

A. Subtasks

- assess escapement abundance by species
- escapement timing by species
- define migrational behavior
- evaluate milling activity
- determine extent of mainstem spawning
- locate and survey spawning areas such as sloughs, side channels, and tributary confluence areas that may be impacted by hydro-electric development.

B. Work Plan by Species

1. Chinook Salmon

a. Escapement Monitoring - Chinook salmon will be intercepted by fishwheels at Talkeetna and Curry stations from 7 June to 15 July. These fish will be tagged with Petersen disc tags and released for population estimate sampling. Tag recoveries will be made on spawning ground surveys conducted on known chinook salmon spawning tributaries from late July through mid August.

The AA Project Leader will conduct aerial surveys of chinook salmon spawning areas in tributaries of the Susitna River between Devil Canyon and the Chulitna-Susitna-Talkeetna river confluence beginning in July and

II. Talkeetna to Devil Canyon

A. Subtasks

- assess escapement abundance by species
- escapement timing by species
- define migrational behavior
- evaluate milling activity
- determine extent of mainstem spawning
- locate and survey spawning areas such as sloughs, side channels, and tributary confluence areas that may be impacted by hydro-electric development.

B. Work Plan by Species

1. Chinook Salmon

a. Escapement Monitoring - Chinook salmon will be intercepted by fishwheels at Talkeetna and Curry stations from 7 June to 15 July. These fish will be tagged with Petersen disc tags and released for population estimate sampling. Tag recoveries will be made on spawning ground surveys conducted on known chinook salmon spawning tributaries from late July through mid August.

The AA Project Leader will conduct aerial surveys of chinook salmon spawning areas in tributaries of the Susitna River between Devil Canyon and the Chulitna-Susitna-Talkeetna river confluence beginning in July and

extending through mid August. Acres American, Inc. helicopter support will be utilized and sufficient hours will be requested to survey selected tributaries between Cook Inlet and the Talkeetna River if survey data normally collected by the Region II ADF&G Sport Fish Division and shared with the Su Hydro project is not collected. A helicopter with adequate visibility for survey work will be required.

b. Migrational Movements - Approximately sixteen chinook salmon will be radio tagged with internal transmitters at Talkeetna and Curry stations and their movements monitored throughout their use of the Susitna River mainstem.

2. Sockeye, Pink, Chum and Coho Salmon

a. Mainstem Escapement Monitoring - Population estimates will be secured by SSS counters and tag/release operations. Talkeetna Station crew will operate SSS counters from 7 July to 15 September. Fishwheels will be operated from 7 June to 15 September. Curry Station will use two fishwheels to monitor escapement from 10 June to 21 September.

b. Migrational Movements - Approximately sixteen chum and sixteen coho salmon will be radio tagged at Talkeetna and Curry stations. The movements of these fish will be monitored nearly daily during their migration time in the mainstem.

c. Mainstem Spawning Surveys - One crew will electroshock the Susitna River mainstem from Talkeetna to Devil Canyon for mainstem salmon spawning from 1 August to early October, and collect habitat and resident fish data.

d. Spawning Ground Surveys - One crew will be stationed at Gold Creek from 1 August to 7 October and will survey all sloughs and tributary confluence areas for spawning activity and tag recovery of fish tagged at Talkeetna and Curry stations. This crew will also deploy set nets weekly at the entrance to Devil Canyon for the purpose of ascertaining adult salmon milling activity from 7 August to 7 September.

3. Resident Fish

a. Activities related to the radio tagging of resident fish are covered by the AA Project budget excluding personal services. Personal services are provided by the RJ electrofishing crew. Resident tagging and tracking activities will be conducted in the fall, winter and spring seasons of FY-83.

ATTACHMENT F-1

ADULT ANADROMOUS

Line 100 - Personal Services by Subelement

Subelement	Staffing (MM & Class)	Cost
Eulachon	4 mm FB I	12.6
Bering Cisco	1 mm FB I	3.2
Su Station	3 mm FB I	9.5
	2 mm FT II (w/o OT)	4.7
Yentna Station	7 mm FB I	22.4
	2.5 mm FT II	8.0
Sunshine Station (Sonar)	8 mm FB I	25.2
	3 mm FT II	9.6
Sunshine Station (T/R)	3 mm FB I	9.5
	4 mm FT II	12.8
Mainstem Spawning Survey	7 mm FB I	22.1
Talkeetna Station (Sonar)	10.5 mm FB I	33.1
Talkeetna Station (T/R)	5 mm FB I	15.8
	8 mm FT II	25.6
Curry (T/R)	4.5 mm FB I	14.2
	4 mm FT II	12.8
Gold Creek Survey	3.5 mm FB I	11.1
	3 mm FT II	9.6
Mainstem Spawning Survey	3.5 mm FB I	11.1
Radio Telemetry (Adult Salmon	10 mm FB I	31.5
Radio Telemetry (Resident Fish)	0	0
AA Administration	11 mm FB II	34.7
	10 mm FB I	31.5
	9 mm FT II	28.8
Stock Separation	12 mm FB II	44.2
	6 mm FB I	19.3
	6 mm FT II	22.4
		485.3

Line 200 - Travel

Eulachon	0.4
Bering Cisco	0.1
Su Station	0.3
Yentna Station	0.4
Susnhine Station Sonar (SS)	0.5
Sunshine Station Tag & Recovery (T/R)	0.4
Mainstem Spawning Survey	0.5
Talkeetna Station (SS)	0.4
Talkeetna Station (T/R)	0.5
Curry (T/R)	0.2
Gold Creek Survey	0.3
Mainstem Spawning Survey	0.3
Radio Telemetry (Adult Salmon)	0.7
Radio Telemetry (Resident fish)	0.1
AA Administration	7.0
Stock Separation	5.8
	17.9

ATTACHMENT F-1 CONTINUED

Line 300 - Contractual Services

Eulachon	1.7
Bering Cisco	0.0
Su Station	0.9
Yentna Station	6.0
Sunshine Station (SS)	5.4
Sunshine Station (T/R)	7.2
Mainstem Spawning Survey	1.8
Talkeetna Station (SS)	5.1
Talkeetna Station (T/R)	3.3
Curry (T/R)	1.8
Gold Creek Survey	1.1
Mainsteam Spawning Survey	1.0
Radio Telemetry (Adult Salmon)	12.2
Radio Telemetry (Resident Fish)	4.5
AA Administration	8.0
Stock Separation	31.4
	91.4

Line 400 - Commodities

Eulachon	6.1
Bering Cisco	1.1
Su Station	3.9
Yentna Station	9.8
Sunshine Station (SS)	7.9
Sunshine Station (T/R)	7.8
Mainstem Spawning Survey	10.3
Talkeetna Station (SS)	7.7
Talkeetna Station (T/R)	10.3
Curry (T/R)	7.8
Gold Creek Survey	9.9
Mainstem Spawning Survey	5.2
Radio Telemetry (Adult Salmon)	12.6
Radio Telemetry (Resident Fish)	0.8
AA Administration	8.6
Stock Separation	12.7
	122.5

Grand Total (Line 100 - 400)	717.1

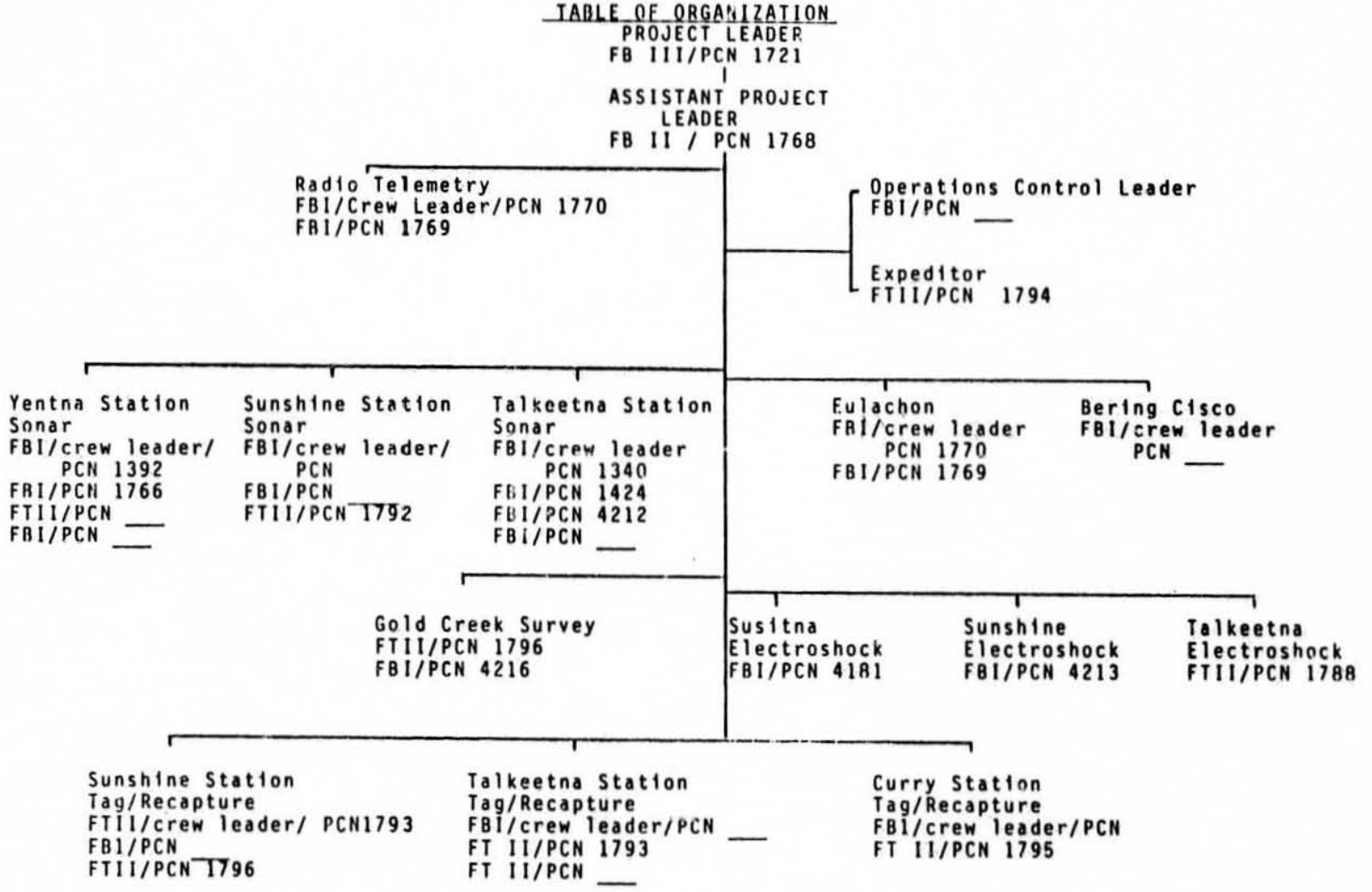
ATTACHMENT F-2

ADULT ANADROMOUS FISHERIES PROJECT

Line 500 - Equipment to be purchased through Acres American, Inc.

Item	Quantity	Description	Unit Cost	Total Cost
1	7	Tent	0.3	2.1
2	1	Spillsbury base radio	2.1	2.1
3	6	Outboard engine, 25 h.p.	1.2	7.2
4	4	Refrigerator, propane	0.6	2.4
5	2	Compressor, air	0.5	1.0
6	3	Outboard lift	0.5	1.5
7	2	Chainsaw	0.4	0.8
8	2	Riverboat (20') w/console	3.0	6.0
9	1	Boat trailer	1.2	1.2
10	3	Outboard engines, 75 h.p.	3.0	9.0
11	3	Jet unit	1.0	3.0
12	1	Generator, electric	0.9	0.9
13	1	Refrigerator	0.5	0.5
14	1	Radio, communication	2.0	2.0
15	20	Radio fish tags	0.1	2.0
16	1	Trucks, 4 X 4 (used)	8.0	8.0
17	4	Firearm	0.3	1.2
18	2	Egg pump, gas	0.4	0.8
19	1	Electroshocker	3.0	3.0
20	2	Avon rafts, 12'	1.7	3.4
21	2	Outboard engines, 7.5 h.p.	0.7	1.4
				59.5

ATTACHMENT F-3
ADULT ANADROMOUS PROJECT



ATTACHMENT F-4

STOCK SEPARATION BUDGET PROPOSAL - FY83
ADULT ANADROMOUS FISHERIES PROJECT
ALASKA DEPARTMENT OF FISH AND GAME
SUSITNA HYDRO AQUATIC STUDIES

Submitted by
Katherine Rowell

PROBLEM STATEMENT AND JUSTIFICATION

The Susitna River drainage is the largest watershed in the Cook Inlet basin and is considered the greatest salmon producing system in the Upper Inlet area. Therefore, the effect of the proposed Susitna River dam upon the Upper Cook Inlet fishery resource is of concern. With the exception of sockeye and chinook salmon, quantitative assessment of the Susitna River contribution to the commercial fishery is unknown, due to the high number of intradrainage spawning and rearing areas, deficiency of data concerning other known and suspected salmon producing systems in Upper Cook Inlet and the overlap in migration timing of mixed stocks and species in Cook Inlet harvest areas. The Adult Anadromous Program of the Susitna Hydroelectric Assessment project has been examining abundance and spawning areas of salmon within the Susitna River drainage. However, the importance of Susitna River chum, coho and pink salmon to the commercial fishery, relative to other Upper Cook Inlet river systems needs to be addressed.

The Upper Cook Inlet commercial fishery harvests five species of Pacific salmon migrating to freshwater systems north of Anchor Point. The economically most important species is sockeye salmon followed in ranking order by chum, coho, pink and chinook salmon. About 747 set net and 547 drift net permit holders participate in the commercial fishery and harvest an average of 2.8 million fish, annually worth approximately 17.9 million dollars.

Susitna River chinook salmon usually pass through the fishing area prior to the season's opening date, resulting in low commercial exploitation. As a result, stock contribution of Susitna River chinook to the commercial fishery

is not a concern at this time. Contribution of Susitna River sockeye salmon to the commercial fishery is currently being assessed through a stock separation program which was implemented in Upper Cook Inlet in 1978. The purpose of the sockeye program has been to estimate the stock composition of the commercial harvest and the season's return to each major river system. Estimates for the 1979 and 1980 seasons show contribution of the Susitna River at 29.7% and 19.2% respectively.

The success of a stock identification program requires identification of major producing river systems, knowledge of biological characteristics of adult returns (abundance, timing, age structure), and a feasibility analysis regarding use of stock identification techniques which will identify a fish to its river of origin. This baseline data is limited or nonexistent for coho, pink and chum salmon stocks in Upper Cook Inlet and is necessary to determine the scope and developement of programs to identify the contribution of Susitna River stocks to the Upper Cook Inlet fishery.

The objectives of this proposal are to:

1. Identify major coho, chum, and pink salmon producing systems in Upper Cook Inlet;
2. Determine biological characteristics (age, size, timing) of adult returns to major producing systems;
3. Examine the feasibility of utilizing stock identification techniques to identify stock specific characteristics for each species.

PROCEDURE

I. Identification of Major Production Areas by Aerial Survey.

To determine the importance of one river system upon a mixed stock fishery for a given species, all other major producing systems must be considered. Data regarding species presence and abundance for chum, coho and pink salmon in Upper Cook Inlet river systems is limited. Though the Susitna River is considered the primary producer of coho, chum and pink salmon in Upper Cook Inlet, these salmon species have been documented in several other large river systems. Run magnitude and timing of these systems is unknown particularly for several large systems on the Inlet's west side. It is possible that low abundance estimates or run timing may eliminate river systems from consideration. However, should production of these systems prove significant and not be considered in a stock identification program, then stock composition estimates for other river systems, including the Susitna River will be misinterpreted.

Sockeye, chinook and some coho salmon escapements are monitored in Upper Cook Inlet by weir, aerial or ground surveys, and sonar counters. Systems where chum, coho and pink salmon have been documented, but where escapements are presently not monitored will be surveyed by air beginning in July. In glacial systems, where visual assessment is impossible clearwater tributaries will be surveyed to determine species presence and if possible, relative abundance. This effort will emphasize west side Cook Inlet rivers and will encompass 10-15 systems as selected by size and previous documentation of species

presence. Effort will coordinated with projects directed by Alaska Department of Fish and Game, and other organizations conducting fish assessment studies in Upper Cook Inlet.

II. Escapement Sampling

To determine biological characteristics of chum, coho and pink runs into major producing systems, escapements will be sampled for weight, length and with the exception of pink salmon, age. Escapement sampling programs currently existing for sockeye salmon will be expanded where applicable to include other species. In river systems where an established sampling regime does not exist, three two-man crews stationed in Soldotna will be flown by fixed wing aircraft and in some cases helicopter, into areas where fish have been observed. Escapements will be sampled by beach seine and carcass surveys (foot or rubber raft). A minimum of 500 samples are needed for each species from each system. To obtain an adequate representation of age structure, river systems will be sampled twice during the season, where possible.

III. Stock Identification Feasibility Studies

When biological characteristics of salmon returns have been determined, necessity and feasibility of applying stock identification techniques to the runs should be examined. The applicability and success of these techniques

differs by species. Past studies indicate that coho stocks may be identified to river of origin by scale pattern analysis and by size. Chum salmon studies have been attempted with use of scale pattern analysis and electrophoresis. Effective pink salmon studies have been performed with electrophoresis and size data. Prior to implementing a stock identification program by species, the potential of a given technique must be tested to both identify a known sample to the river of origin and to detect differences between river systems. Run timing, size and with exception of pink salmon, scale measurement data will be examined for stock specific differences for each species. Scales will be digitized in the statewide stock separation lab and analyzed with size and age data using the University of Alaska computer system and Vectorgraphics minicomputer.

Electrophoresis studies of pink salmon will require 100 tissue samples (eye, heart, liver and white muscle from each fish) from each system and two sets of 100 samples each from two distant tributaries on the Susitna River. These samples may be collected during escapement sampling for age, weight and length. Tissue samples will be frozen and transported to the University of Alaska, Southeast for processing by the Fisheries Department (proposal attached).

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STOCK SEPARATION
PROGRAM COSTS - FY83

I.	Aerial Surveys	
	Line 100	$ 0.0
	Line 200	$ 0.0
	Line 300	
	Aircharter 80 hrs. @ 165/hr	$13.2
	Subtotal	$13.2
	Line 400	0.0
	Line 500 .	$ 0.0
	Total Sub-program	$13.2
II.	Escapement Sampling	
	Line 100	
	6 mm FBI (Soldotna scale)	$19.3
	6 mm FTII (Soldotna scale)	$22.4
	Subtotal	$41.7
	Line 200	$ 0.0
	Line 300	
	Aircharter 50 hrs. @ 165/hr.	$ 8.2
	Helicopter 10 hrs. @ 450/hr.	$ 4.5
	Equipment Maintenance	$ 1.0
	Contigency	$ 1.5
	Subtotal	$15.2
	Line 400	
	Food 200/day @ $15/day	$ 3.0
	Gas 10 barrels @ $150/barrell	$ 1.5
	Field Supplies, Equipment	$ 3.7
	Sampling Nets & Scales	$ 2.0
	Contigency	$ 1.0
	Subtotal	$11.2
	Line 500	
	Avon 12 ft. rafts - 2	$ 3.4
	Outboards 7.5 h.p. - 2	$ 1.5
	Shotguns - 3	$ 0.9
	Tents - 3	$ 0.9
	Subtotal	$ 6.7
	Total Sub-program	$74.8
III.	Data Analysis and Administration	
	Line 100	
	12 mm FBII	$44.2

Line 200		
Travel Per Diem		$ 5.8
Line 300		
Computer Lease 6 mo./180 mo.		$ 1.1
University of Ak. Computer charges		$ 1.0
Office Space (Soldotna)		$ 1.0
Electroploresis Contract		$ 9.6
Shipping		$ 0.5
Vehicle Rental		$ 1.0
Contigency		$ 2.0
	Subtotal	$16.2
Line 400		
Office & Computer Supplies		$ 1.5
	Subtotal	$ 1.5
	Total Sub-Program	$67.7
	Grand Total All Programs	$155.7

PRELIMINARY BIOCHEMICAL GENETIC STUDY OF COOK INLET

PINK SALMON (ONCORHYNCHUS GORBUSCHA)

A Proposal Submitted to: Susitna Hydroelectric Project, Anadromous Adult Studies
Commercial Fish Division
Alaska Department of Fish and Game
Anchorage, Alaska

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Juneau

Methods for determining the stream of orgin of salmonids caught in saltwater or even in the main stream of a large system are presently being developed. Scale pattern analysis has proven quite useful for several species, notably sockeye salmon (Oncorhynchus nerka) in Cook Inlet (Bethe and Krasnowski 1979). Starch gel electrophoresis is another approach to stock separation which has proved successful (see eg. Campton 1978; Grant et al. 1980, Milner et al. 1981).

Scale pattern analysis depends on the pattern of scale deposition which reflects the environmental experiences of individuals. Those that have shared similar experiences, such as fish of the same age and stock, will have similar patterns. Starch gel electrophoresis, on the other hand, involves the examination of genetic characteristics of the stocks involved. Stocks between which little gene flow exists often diverge from one another in genetic composition over long periods of time. This divergence is a result of random (genetic drift) or other processes. The genetic compositions of stocks are inherited so are permanent characteristics. This has been demonstrated for six generations of pink salmon (McGregor, thesis in preparation). Stocks of pink salmon (Oncorhynchus gorbuscha) have not proved to be readily separable using scale pattern analysis because there is relatively little information available on scales of a two year old fish and the fish appear to share remarkably similar environmental experiences. There is no intent in this proposal to imply that biochemical genetic studies provide a panacea to stock separation problems. The technique can work in some instances and not in others. The kinds of situations where it will not work are ones in which considerable gene flow (straying) occurs among the population examined.

The work of McGregor (thesis in preparation) in this laboratory on pink salmon stocks of the Juneau locality, a relatively small area, exhibit only minimal genetic divergence not enough for stock separation use. An examination of samples collected from stocks from southern S.E. Alaska, both Ketchikan and S. Baranof Island, revealed significant differences from the northern (Juneau) samples.

Studies of pink salmon stocks of Kodiak Island (Johnson 1979) in and from Prince William Sound (Seeb and Wishard,1977) indicate some heterogeneity in the genetic compositions, but there is no obvious pattern to the variability that might be useful for stock separation. These studies do indicate that substantial variability does exist among pink salmon stocks over geographical areas larger than that examined by McGregor in the Juneau area. It is possible that upper Cook Inlet stocks are distributed over a large enough geographical area that enough genetic divergence has taken place among stocks, or at least systems, to be useful for stock identification.

The goal of this project is to determine whether or not sufficient genetic heterogeneity exists among upper Cook Inlet pink salmon stocks to be useful for distinguishing stocks of Susitna River pink salmon from stocks of other upper Cook Inlet systems. If sufficient heterogeneity exists, subsequent work can be done to establish baselines that may be used for determining the contribution of Susitna River pink salmon to the commercial fishery.

To do this, we propose to examine a limited number of samples collected from stocks of Cook Inlet that would indicate the extent of diversity in the upper Inlet.

These would be samples representing as broad a geographical range and time of return as possible. This project would only be a feasibility study, not a thorough baseline determination.

Goals

1. Using standard biochemical genetic techniques (eg. Harris and Hopkinson 1976), collections of tissues sampled from each of six different pink salmon stocks in Cook Inlet will be assayed.

2. Data from these collections will be analyzed to determine the feasibility of using electrophoresis as a stock indentification tool.

Research Plan

In summer of 1982, ADF and G will collect tissue samples (heart, muscle, eyes, and liver) from 100 adults on spawning grounds at each of six different locations around Cook Inlet. Although the exact location will depend where ADF and G personnel are deployed, we suggest one Kenai River stock, two Susitna River stocks (as far apart as possible), and three other collections from the west side of Cook Inlet (spread over the entire geographical range, say from Chinitna Bay north). Tissues

from one individual should be placed in a single ziploc bag or whirlpak and placed on ice immediately. They should be kept on ice no more than 18 hours before deep freezing. Length and sex information on each sample may be useful. The date and location of the sample should be recorded.

I have been informed that this kind of sampling effort may not again be possible; therefore, it would be advisable to make a much more thorough sampling effort in case the pilot study warrents a follow up. Of course, analysis of these samples would not be part of the scope of this project.

Upon delivery to our laboratory, we will perform electrophoretic assays of the tissue samples. For pink salmon we are presently collecting data on approximately 25 electrophoretic loci. Of these, eight exhibit substantial polymorphism in S.E. Alaskan stocks.

Reporting

At the time the samples will be provided, late summer and early fall of 1982, this lab has other obligations it must also meet. We can, however, complete the analysis and report on our findings by mid-February 1983, We will submit preliminary reports as data become available.

Justification of Budget for proposed research

It takes approximately 5 days for our laboratory technicians to thoroughly examine 100 samples. It will take approximately one week for the PI to enter and to analyze the data and prepare the final report.

Supply cost for running the gels and all the biochemical stains is about $4 per fish.

I will be able to store no more than the number of samples I will run. If other samples are collected in anticipation of a more through effort -should it be warrented - some additional arrangements will have to be made.

Budget

Personnel

PI (40 hours)	*1090.00*	
Technicians (240 hours)	*3230.00*	
Benefits (staff and fringe)	1698.00	
		6018.00
Supplies		*2400.00*
		8418.00
10% overhead		842.00
	TOTAL	9260.00

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