

# MEMORANDUM

State of Alaska



TO: Robert Mohn  
Director of Engineering  
Alaska Power Authority  
Anchorage

DATE: April 4, 1980

FILE NO:

6

~~A~~  
~~B~~

FROM: Thomas W. Trent *TWT*  
Regional Supervisor  
Habitat Protection Section  
Department of Fish and Game  
Anchorage

TELEPHONE NO:

SUBJECT: Su Hydro  
Fish and Wildlife  
Studies

In accordance with the discussions between your agency and Acres-American Inc. the Alaska Department of Fish and Game will participate in the Susitna Hydro Project Feasibility Studies pursuant to the finalization of the following agreement:

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

1. that the fish and wildlife studies are a 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, 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, 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 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
- 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. 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 and 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 will 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.
- b) provide cartographic and drafting services for required technical and scientific reports and documents
- c) provide the full time assistance of a hydraulic engineer to the ADF&G to aid in the planning, implementation and evaluation of seasonal and spatial habitat studies.
- d) 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.

### Field Program

ADF&G agrees to implement the fisheries-aquatic studies program as shown in Attachment III.

### Equipment

APA and Acres-American have agreed that Acres-American will provide the equipment shown in Attachment IV for use in the ADF&G fisheries program. 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 ADF&G's proposals of October 31, 1979, with modifications as requested in our November 30, 1979 memorandum to APA, and assuming the one year delay in implementation of fisheries field studies to CY 81 from that proposed budget.

### 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 study proposals and modified to the timeframes below:

4/4/80

	<u>CY 81</u>	<u>Phase II CY 82</u>
Resident & Juvenile Anadromous Study	88 hrs.	46 hrs.
Spatial & Seasonal Habitat Study	<u>20 hrs.</u>	<u>20 hrs.</u>
Total	108 hrs.	66 hrs.

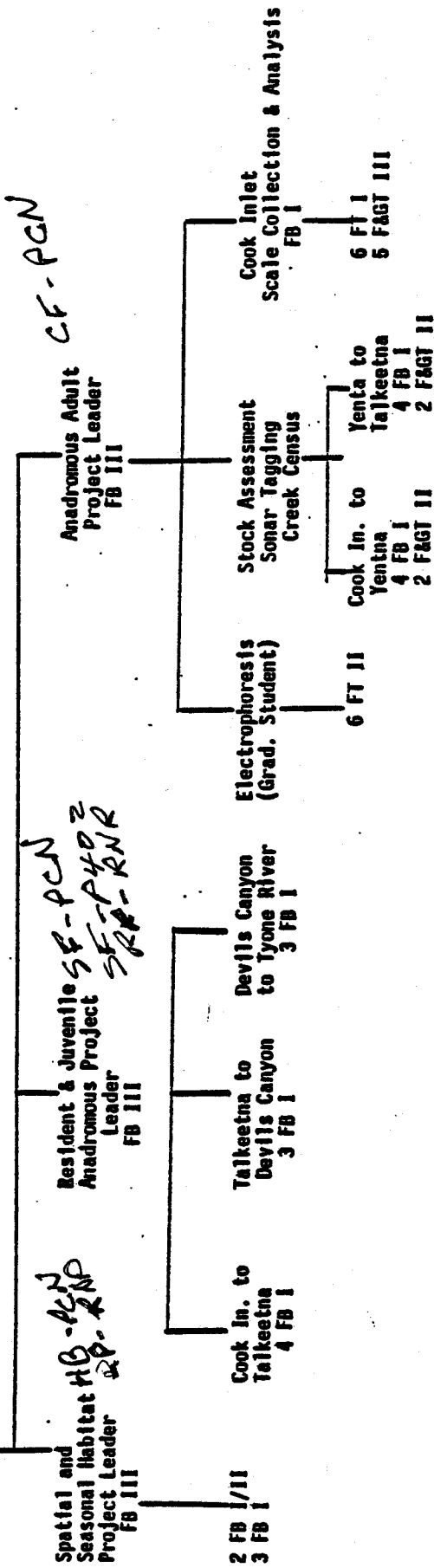
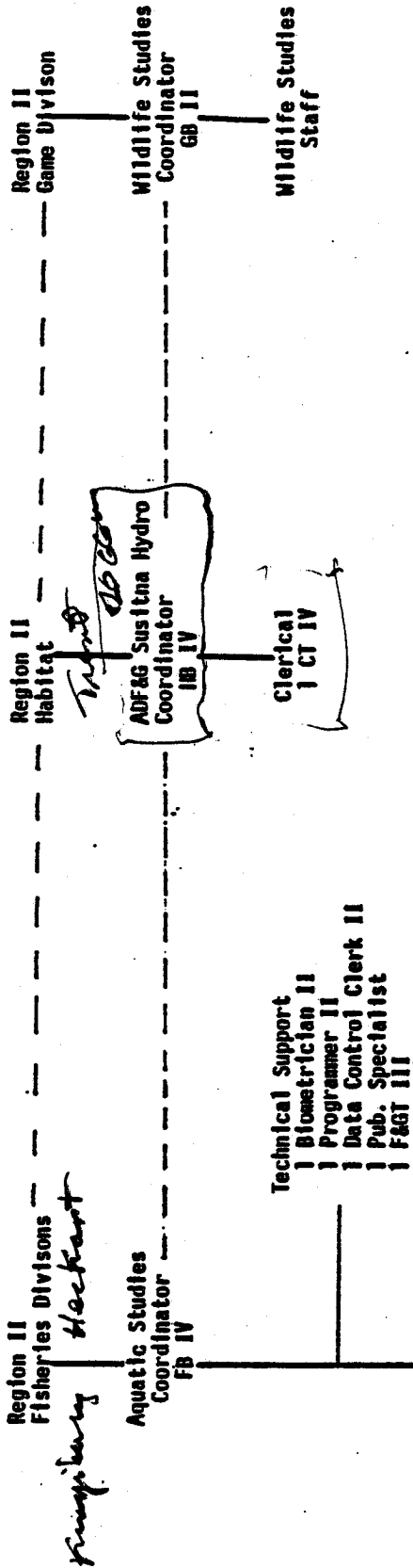
### Reporting Requirements

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.

### 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.

Attachment I



1. Hiring of Project

2. Give notice of when need.

RD - request for info permission

## Administrative support provided by Acres for the Fishery Program during Phase I:

<u>Line 100</u>	1980	1981	1982
Secretary	9,816.00	19,632.00	19,632.00
Cartographer	--	6,567.00	6,567.00
Hydrologist		provided as part of Acres Task 3 - Hydrology	

Line 300

Office space 2,000 ft. <sup>2</sup>	12,000.00	24,000.00	24,000.00
storage space 1,000 ft. <sup>2</sup>	--	9,000.00	9,000.00
Communications	2,400.00	4,800.00	4,800.00
Office equipment	3,600.00	7,200.00	7,200.00

Line 400 - Commodities

Office Supplies	3,600.00	3,600.00	3,600.00
-----------------	----------	----------	----------

Line 500 - Equipment

Office units (10)	4,000.00		
Equipment Insurance		<u>9,000.00</u>	<u>9,000.00</u>
Total	35,416.00	83,793.00	83,793.00



The overall goals of the ADF&G Study are to:

1. Determine the relative abundance and distribution of adult anadromous fish populations within the drainage.
2. Determine the distribution and abundance of selected resident and juvenile anadromous fish populations.
3. Determine the spatial and seasonal habitat requirements of anadromous and resident fish species during each stage of their life histories.
4. Determine the economic, recreational, social, and aesthetic values of the existing resident and anadromous fish stocks and habitat.

The Department has not developed a specific work plan for this objective but the studies conducted under this RSA will contribute from the standpoint of providing information which will have value to the socioeconomic studies that will be developed by Acres-American and their subcontractor.

5. Determine the impact the Devil Canyon project will have on the aquatic ecosystems and any required mitigation prior to construction approval decision. This is the primary objective of both Phase I and II studies. This will be discussed in detail in the Phase II work when it is written.

6. Determine a long-term plan of study, if the project is authorized, to monitor the impacts during and after project completion.

This is also an objective of Phase II.

The study areas are generally categorized within the following locations:

- A. Cook Inlet area
- B. Cook Inlet to the Yentna River confluence
- C. Yentna River to the Talkeetna River confluence
- D. Talkeetna River confluence to the Devils Canyon dam site
- E. Devil Canyon dam site to the Tyone River confluence

Scaling of the proposed studies with respect to timing, geographic locations, and intensity has been done with consideration of the resource knowledge available for each of the geographic locations identified above.

#### Title

Stock Assessment of Adult Anadromous Fish Populations

#### Background

The Susitna River salmon stocks are major contributors to the Cook Inlet area recreational and commercial fisheries. Determining total escapement into this system is complicated by the glacial conditions of the major streams and the enormity of the area. Management of the northern Cook Inlet salmon stocks has been difficult due to the mixed stock commercial fishery in Cook Inlet and the lack of adequate tools to provide accurate in-season escapement estimates for the drainage.

The major hydroelectric project impacts on the anadromous fish species are expected to be due to changes in habitat. Alteration of the normal flow regimes and the physical and chemical water characteristics will probably be the most critical impacts. It is difficult at this time to determine the distance downstream from the proposed dams that changes will occur. Studies conducted by Townsend (1975) in the Peace River demonstrate that effects were observed 730 miles downstream from the Bennett Dam.

Baseline fisheries inventories were conducted by the Alaska Department of Fish and Game in the upper Susitna River during the 1974-1977 field seasons. Emphasis has been on the inventory of adult and juvenile salmon stocks and habitat assessment. Ongoing Alaska Department of Fish and Game research investigations have concentrated on determining salmon escapement into the Susitna River and the distribution of these escapements. Emphasis has, however, been primarily on sockeye salmon. Successful tag and recovery projects were operated in the lower river during 1975 and 1977 and the feasibility of sonar operation was tested in the mainstem Susitna River approximately 25 miles upstream from Cook Inlet during 1976. Side-scan sonar counters have been utilized to determine escapements into the river since 1977 and are considered the state-of-the-art equipment for determining escapements in glacial river systems in Alaska.

Only through total stock assessment will it be possible to determine what portion of the Susitna River salmon stocks will be affected by the project and determine the level of mitigative measures which will ultimately be required. It is essential to know what portion the affected stocks

contribute to the total Susitna River salmon escapement in order to determine potential changes in fish populations and numbers. An evaluation of the contribution of the Susitna River salmon runs to the Cook Inlet fisheries is essential to establishing the importance of the Susitna River salmon to the economy of the Cook Inlet area as a whole.

### Study Approach

Adult anadromous fisheries studies will be divided into five major geographical areas. All studies, however, will be interrelated. The following outlines baseline studies required for each area and general work plans.

1. Cook Inlet Area. Contribution of the Susitna River Salmon Stocks to the Cook Inlet Fisheries - Quantitative Separation of Stocks

### Objectives

The objectives in this study are to:

1. identify the proportion of the Susitna River salmon stocks harvested by the commercial and recreational fisheries; and
2. determine quantitatively that portion of the total catch produced in the Susitna River drainage.

### Background

The major area of salmon resource competition is within the Upper Cook Inlet area, i.e., that area north of the latitude of Anchor Point. The

Susitna River salmon stocks are intermixed with other large salmon stocks produced from the Kenai Peninsula and west side of Cook Inlet.

All five species of Pacific salmon are harvested in Upper Cook Inlet. The majority of these salmon pass through the area at the same time, thus creating a mixed species and mixed stock fishery. Any feasibility study of the Susitna River project will require an assessment of the contribution of the Susitna River salmon populations to the commercial and recreational fisheries.

#### Work Plan

Commercial catch data is available through the Alaska Department of Fish and Game. Final statistical runs are available through 1976 and preliminary data is available through the current years harvest.

Identification and separation of the various stocks of salmon will be by scale pattern analysis and/or electrophoresis. Differences in scale patterns have already been found to exist in sockeye and coho salmon populations in Cook Inlet and the Susitna River stocks have been statistically separated from the other major Cook Inlet stocks. Data is, however, only available for one age class. Chum and pink salmon stocks have not successfully been separated on the basis of scale pattern analysis in other areas, due to the absence of freshwater growth. Electrophoretic techniques would be employed for stock identification of these species. An analysis of length-weight relationships may provide sufficient data for these two species.

The program requires the regular collection of scales and tissue samples from the commercial catch and from the major salmon producing areas (i.e., known escapement samples). Expansion of the on-going Alaska Department of Fish and Game Stock Separation Program would provide the necessary data base for stock assessment of sockeye, coho, and chinook salmon. Cost estimates and design of this program are based on incorporating these studies with ADF&G programs. If a separate program is designed additional funding would be required for sampling crews and laboratory equipment and analysis.

Sampling design would be divided into two major components: collection of scales and laboratory and computer analysis of scale patterns.

A minimum of 250 scales per species and age class will be obtained during each fishing period. Known escapement samples would be obtained from existing research and management programs. Three additional cannery sampling crews (2 people each) will be required to obtain scale samples. Staff time will be required to design a program for chinook salmon. Existing crews should, however, be adequate to conduct sampling.

The ADF&G scale laboratory would be used to process samples. A supervisor and a second shift would be added to the staff to maximize the use of existing equipment. A digitizing station would have to be added to the existing microcomputer. Additional computer time would be required.

The feasibility of separating pink and chum salmon stocks by electrophoretic techniques probably could be determined after one sampling season. If this technique is unsuccessful it would be discontinued and

other methods would be evaluated. Analysis could best be done by the University of Alaska. A minimum of 1,000 fish samples per fishery should be obtained for each species. Known escapement samples will also have to be collected. Three sampling crews would be required.

2. Cook Inlet/Susitna river confluence to the Yentna River confluence.  
Stock assessment of the adult salmon populations

### Objectives

The objectives of these studies are to provide:

1. escapement data, by salmon species, into the lower Susitna River;
2. differentiation of the Susitna and Yentna river stock contribution;
3. timing of the salmon migrations;
4. movements as related to stream flow and water quality; and
5. utilization of the mainstem river for spawning.

### Background

Total escapement information for the Susitna River drainage is generally lacking. Various methods have been utilized by the Alaska Department of Fish and Game since 1974. Recent developments in side-scan sonar have provided the most valuable tool, to date, for evaluating in-season

escapement by species. Emphasis has, however, been on sockeye salmon.

### Work Plan

Commercial Fisheries Division of the Alaska Department of Fish and Game currently operates an escapement project in the vicinity of Susitna Station as a part of their on-going sockeye salmon research program. Expansion of this program would provide the necessary escapement data required for the Susitna Hydro-Project baseline studies. Sonar counters and fishwheels would be operated from May through mid-October to determine escapement by species. This would require funding of the existing project beyond its normal operating dates. Data from this program would be correlated to the Stock Separation program within Cook Inlet and additional escapement studies in the upper Susitna River.

A sonar escapement enumeration program would be required in the lower Yentna River to differentiate between Yentna and Susitna river production. Comparative analysis of the Yentna River escapement data and the mainstem Susitna River sonar data would be made to determine stock contribution of each system. Two side-scan sonar counters and two fishwheels (for species apportionment) would be deployed on the Yentna River.

Migrational timing data would be obtained from fishwheel catch data at the sonar site.

Scale samples will be obtained from the fishwheel catch to provide a



known data base for Cook Inlet stock separation studies. A minimum of 440 samples per day will be required for each species.

Eulachon, an anadromous smelt, utilize the lower mainstem Susitna and Yentna rivers for spawning. The extent of utilization of the mainstem river will be documented and a review of the population status will be made.

### 3. Yentna River confluence to Talkeetna. Stock Assessment of Adult Salmon Populations

#### Objectives

The objectives of these stock assessment studies are to determine the:

1. numbers of adult salmon utilizing this area for migration and spawning;
2. migrational timing of the adult salmon;
3. recreational utilization of these stocks; and
4. movement of salmon as related to stream flow and water quality.

#### Background

Many of the important recreational use areas occur within this area of the river. These areas have road access on the east side of the river and receive high use via aircraft transportation on the west side. All five species of adult salmon utilize this area for spawning and migration. Due to the braided nature of the Susitna River in this area many impacts are expected to be seen due to alterations of stream flow.

## Work Plan

One side-scan sonar projects will be established within this area of the river. Seasonal apportioned counts by species will be compared to the lower Susitna and Yentna river sonar projects to determine importance of this area to the entire drainage. Fishwheels and possibly other sampling gear will be used to apportion sonar counts.

The sonar project will be located in the vicinity of Sunshine. These programs will provide information on: 1) the importance of this area of the river for spawning; 2) the extent to which this area is used for migration to spawning areas upstream of Talkeetna; and 3) the contribution of these salmon stocks to the total Susitna River drainage. A total of 2 side-scan sonar counters and 4 fishwheels will be required.

All salmon captured in the fishwheels at the "Sunshine site" will be marked with a color- and number-coded Peterson disc tag. Marked fish will be recaptured upstream to provide an assessment of stocks utilizing this area.

Migrational timing will be determined by fishwheel catches at the sonar projects and survey crews.

Recreational utilization of these salmon stocks will be determined partially by on-going ADF&G creel census programs. Expansion of these programs will be required to adequately monitor all species. The creel-census programs will also provide data on migrational timing and tag recoveries.

Movement of salmon through this geographic area will be monitored by remote sensing devices for radio tagged fish. Sonar counters may also provide horizontal distribution data for that particular area.

Alaska Department of Fish and Game survey data will be used to determine chinook salmon escapements into major tributaries. These surveys may have to be expanded to assure adequate coverage of major tributaries.

4. Talkeetna to Devil Canyon Dam Site. Stock Assessment of Adult Salmon Populations

Objectives

The objectives within this study area are to determine the:

1. abundance of adult salmon;
2. stock assessment of the Susitna-Chulitna-Talkeetna stocks;
3. migrational timing of the salmon stocks;
4. recreational utilization;
5. movement of salmon stocks through this area as related to stream flow and water quality.

Background

Population estimates of salmon species utilizing the Susitna River above the Chulitna River confluence were estimated during the 1974, 1975, and 1977 field seasons based on tagging and subsequent recovery of fish.

These studies indicate a portion of the salmon tagged are not destined to spawn above the tagging site, but rather below it. The importance

and extent of this milling behavior in the upper river areas requires definition. The alterations in flow and water quality in the mainstem river after project completion could significantly affect this behavior and consequently spawning success.

Observations of spawning areas between the Chulitna and Susitna river confluence upstream to Portage Creek during fall surveys indicate that a reduction in flow to proposed post-construction levels would prevent access to many important spawning areas.

#### Work Plan

Salmon escapement estimates will be determined by a tag and recovery program in this area. Fish marked at the "Sunshine site" will be recovered by ground survey crews upstream from the Chulitna River confluence.

Surveys of major spawning areas between Talkeetna and the Devil Canyon dam site will be conducted in conjunction with juvenile studies to determine distribution.

Escapement estimates will be compared to sonar project located in the lower river, primarily the "Sunshine site," and will provide information on importance of the upper river for spawning and also contribution of the Talkeetna and Chulitna river salmon stocks to the entire drainage.

Migrational timing of salmon stocks utilizing this area will be determined by stream surveys.

Recreational use within this area will be determined by a creel-census program.

Movement of salmon stocks through this area will be determined by the radio tagging program. Radio tags may be implanted in adults at the Sunshine site and movements monitored upstream. Data will be used to determine areas where habitat utilization studies should concentrate (i.e., stream flow and water quality monitoring).

5. Devil Canyon dam site to the Tyone River confluence. Stock Assessment of Adult Salmon Populations

Objective

To determine if salmon utilize that area of the Susitna River above Devil Canyon.

Background

Studies conducted during the late 1950's indicate that Cook Inlet salmon stocks are unable to ascend the Susitna River beyond Devil Canyon, the latter being a natural water velocity barrier to migration (U.S. Department of the Interior, 1957). Reports from local residents of salmon observations above Devil Canyon indicate that this should be investigated further.

Work Plan

Surveys and escapement sampling will be conducted in the proposed impoundment areas between the Denali Highway and Devil Canyon during

periods of peak adult salmon abundance. Initial observations will be conducted by aerial surveys to document the presence or absence of adult salmon. Surveys will be done in conjunction with resident fish investigations. Data obtained will be utilized to determine necessary mitigation measures.

### Title

Stock Assessment of Adult Resident Fish and Juvenile Resident and Anadromous Fish Populations

### Study Approach

Adult and juvenile resident fisheries studies will be divided into three major geographical areas. All studies, however, will be interrelated.

The following outlines baselines studies required for each area and general work plans.

1. Cook Inlet/Susitna River confluence to the Talkeetna River confluence.

Stock Assessment of the Resident and Juvenile Anadromous Fish Populations.

### Objectives

The objectives of these studies are to:

1. Determine specific occurrence and species composition of resident and juvenile anadromous stocks throughout the year within the Susitna River mainstem and within the reaches of tributary streams regularly influenced by the Susitna River.

of particular importance to this study are the Alexander Creek, Flat Horn Lake, Deshka River and Willow Creek;

2. Define any apparent seasonal changes in occurrence and relative abundance of resident and juvenile anadromous species at the confluence of tributary systems and the Susitna mainstem;
3. Develop suitable sampling techniques for the collection and determination of relative abundance of resident and juvenile anadromous species in the Susitna mainstem throughout the year;
4. Define and describe habitat type utilization by resident and juvenile anadromous species throughout the year and at varying hydrologic conditions;

#### Background

This reach of the Susitna River encompasses many important fish producing and recreational fishing tributaries and is an area of critical environmental concern because of the possible seasonal use and migration between clearwater tributaries and the Susitna River. Studies of these seasonal migrations and the distribution of resident and juvenile anadromous fish in and to habitats in the Susitna River are essential. The studies would be initiated for selected streams and for a prescribed distance: upstream throughout the year. Expansion or retirement of these studies would depend on confirmation for migration and habitat use by resident

and juvenile anadromous fish in the Susitna River. If confirmation of these movements and distribution to the Susitna is positive, the basic inventory will, in conjunction with the study task on habitat evaluation, identify specific year to year study locations for ongoing programs required to determine fishery impacts on the fish populations.

### Work Plan

The initial year of this study, 1981 will be comprised of two field operations, a summer and a winter program on the Susitna River

A crew of three biologists, utilizing a riverboat as their primary means of transportation, will operate in the Susitna mainstem and tributary systems during the ice free months, May through October. Their responsibilities will include:

1. Sampling using established techniques and their adaptations including gill nets, minnow traps, adult traps, angling, seines, and electrofishing.
2. Developing suitable techniques for sampling the Susitna mainstem. Particular emphasis will be placed on the design of an effective stationary fish trap.
3. Classifying in terms of depth, velocity, turbidity, and substrate types in conjunction with the sampling of resident populations. It is essential that close cooperation is maintained between hydrologic and fisheries research.



4. Tag adult resident fish and note species, size, date and location of capture.

A crew of four biologists will carry out fisheries research during the winter months. This facet of the field operations will be based on road access until such time as the mainstem Susitna ice condition has stabilized sufficiently to provide safe transportation via snowmachine. This crew will:

1. Survey in the proximity of areas surveyed during the previous summer using established sampling techniques such as gill nets and minnow traps. As ice conditions improve and data is analyzed this effort will be expanded to include as much of the study area as possible.
2. Design an effective resident species adult trap for use in this study area as established sampling techniques meet with limited success when applied under a cover of ice in the river environment.
3. Classify habitat in terms of ice cover, depth, velocity turbidity, and substrate in conjunction with sampling of resident populations.

Following the first season's determination of resident and juvenile anadromous fish occurrence, areas of greatest availability and suitable methods of capture, the 1982 program will be directed to largely the same areas and intensified with respect to relative abundance and preferred

habitat utilization. The 1982 study plan will again consist of two segments, summer field operations, and winter field operations.

A crew of three biologists utilizing a riverboat as their primary means of transportation will operate in the Susitna mainstem and tributary systems during the ice free months to:

1. Confirm previous seasons data base with regard to occurrence and species composition.
2. Determine relative abundance of resident stocks in predetermined locations by seasonal period and further establish patterns of intrasystem migration.
3. Further define preferred habitat parameters.
4. Continue to tag adult resident fish and note any recaptures from previous year.

A crew of four biologists will carry on the initial year's study from January through April. This four man crew will begin the second field season in December of 1982 and following the first season's determinations the program will:

1. be expanded to include additional areas;
2. be intensified at one or two predetermined locations; and

3. continue to determine habitat requirements.
2. Talkeetna River confluence to Devil Canyon. Stock Assessment of the Resident and Juvenile Anadromous Fish Populations.

### Objectives

The objectives of programs within this study area are to:

1. Determine specific occurrence and species composition of resident and anadromous stocks utilizing the mainstem Susitna River and it's major tributaries;
2. Define seasonal changes in occurrence and abundance of resident and anadromous species within the mainstem Susitna River and it's tributaries;
3. Define habitat types utilized by resident anadromous fish species, seasonally throughout this year, at varying hydrologic conditions, both within the mainstem Susitna River and the major tributaries; and
4. Establish the impacts of flow regulation upon the habitat which currently meets seasonal requirements of resident and anadromous fish stocks within the study area.

### Background

This study area includes the mainstem Susitna River and a number of important clearwater tributaries which have indigenous populations of

resident game fish and provide spawning and rearing habitat for anadromous species. Several of the more important lateral tributaries are Portage Creek, Indian River, Gold Creek, and Fourth of July Creek. All are located in the upper reaches of the study area and in the general vicinity of the railroad crossing at Gold Creek.

Five species of Pacific salmon, chinook, coho, sockeye, pink and chum are native to this portion of the study area. The most important resident fish species within this area are Arctic grayling and rainbow trout, however, burbot, whitefish Dolly Varden and various other species are also present.

While a higher degree of reliability in knowledge of possible flow, water quality, and stream morphology changes exists in this reach because of previously collected baseline data, baseline studies on resident and juvenile anadromous fish must be initiated to better detail specific occurrence, distribution, and seasonal migration and habitat use of the Susitna River as well as document the population sizes of resident fish.

#### Work Plan

Due to limited access to much of the Susitna River upstream of Talkeetna, and related high cost of transportation, work proposed for 1981 is limited to the Indian River - Portage Creek - Gold Creek area. This area is accessible by railroad and can be investigated by a single field

crew located in the Gold Creek area. These investigations will be extended downstream into other areas in the second and third years of study.

A four man crew will be located in the Gold Creek or Indian River area housed in a local cabin or tent camp, and provided with a river boat and Zodiac type raft to conduct the following activities:

1. Establish the occurrence and species composition of resident and anadromous fish stocks utilizing the mainstem Susitna River during the period May through October of 1981. This work will entail intensive netting, electro-shocking, trapping, or use of set lines or other suitable collection methods within the mainstem reach from Fourth-of-July Creek upstream to Portage Creek. Some of these collection devices are expected to require modification and/or development as the season progresses.
2. Perform similar sampling by net, electro-shock, trap or angling within the Indian River, Portage Creek, Gold Creek, and Fourth-of-July Creek tributaries. A program of fish tagging will be implemented to define intra-system movement.
3. Creel census anglers utilizing these four streams to determine harvest of resident fish by: a) species, b) age class, c) size, d) seasonal period, and e) area of availability. The creel census will also help with recovery of tagged fish.

4. Conduct the adult anadromous studies in this area in cooperation with the anadromous program.

Following the first seasons determinations of resident and anadromous fish occurrence, areas of greatest availability, and suitable methods of capture, the 1982 program will be directed to largely the same areas and intensified to include population estimations and preferred habitat utilization.

A similar two man crew will be located in the Indian River or Gold Creek area, depending upon which seems more appropriate as a result of the first year study. The same equipment will be utilized. Study objectives for 1981 will be as follows:

1. Determine relative abundance of resident and anadromous fish stocks in Indian River and Portage Creek, at predetermined locations, by seasonal period, and further define intra-system movements and migrations. These studies will necessitate an intensified tag and recovery program to provide instantaneous population estimates at specific seasonal periods and also numerous aerial surveys. While the methods with which to accomplish this work may be more apparent after the first years efforts, it is at this time considered likely that trapping devices or a statistically designed angling scheme may be most appropriate.

2. Conduct similar studies in appropriate sections of the mainstem river and side channels during spring, summer, and fall.

Techniques for this work segment will be similar to objective No. 1.

3. Define habitat utilization of resident and anadromous species both within the mainstem and the Gold Creek, Fourth-of-July Creek, Indian River, and Portage Creek tributaries as related to hydrologic conditions.

Areas of resident and anadromous fish preference will be surveyed in terms of flow, substrate, turbidity, depth, etc. to determine if these parameters are responsible for instream movements and distribution. These data will be correlated with historical climatological data and mainstem flows. Particular emphasis will be placed upon this facet during periods when mainstem flows approach the proposed regulated flow.

4. Determine mid-winter occurrence and distribution of resident and juvenile anadromous fish species both in Indian River and the mainstem Susitna River.

As Indian River is the only major accessible upper tributary stream during mid-winter, these studies will be limited to it.

The mainstem river is characterized as being extremely dangerous to work in mid-winter due to poor ice conditions. As deemed

possible, netting, trapping, and set lines will be utilized to determine occurrence and distribution of resident species during the winter months and to recapture fish tagged earlier in the year.

Winter sampling of both the tributary and mainstem will be conducted during November and December on a field trip basis, on a monthly schedule. No permanent camp is contemplated.

3. Devil Canyon to the Tyone River confluence. Stock Assessment of Resident and Anadromous Fish Populations

Objectives

The objectives in this study area are to:

1. determine specific occurrence and species composition of fish stocks utilizing the mainstem Susitna River and its major tributaries;
2. define seasonal changes in occurrence and abundance of fish species within the mainstem Susitna River and tributaries;
3. define habitat types utilized by fish species, seasonally throughout the year, at varying hydrologic conditions; both within the mainstem Susitna River and major tributaries;
4. establish the impacts of inundation upon the aquatic habitat



of the clearwater tributaries, necessary to sustain the indigenous fish species; and

5. conduct complete hydrological surveys at the tributary mouths and at predetermined locations on each tributary.

### Background

This area of study includes the more than fifty miles of the mainstem Susitna River and tributary streams, which will be either totally or partially inundated by construction of the Devil/Watana Hydroelectric Complex.

This portion of the Susitna River drainage lies in a truly wilderness setting, is roadless, is inaccessible except by boat or light aircraft, and is only moderately utilized by recreational anglers at this time. Angling in this reach of the Susitna River system can be termed a "quality experience."

This area has obvious identifiable habitat and biological impacts due to eventual inundation of segments of the clearwater tributaries feeding the impoundment. Critical habitat needs, as well as recreational fishing opportunities, are provided primarily at the mouths of these respective tributaries.

### Workplan

A three man crew will work in the proposed impoundment area during the

ice free months, utilizing helicopter and light aircraft for transportation throughout the study area. The study crew will be housed in a temporary/protable field camp. Investigations will be directed to:

1. Conduct extensive on-the-ground surveys of Goose, Jay, Kosina, Watana, Deadman, Tsusena, and Fog creeks, and the Oshetna River. These investigations will include hydrological surveys and will determine the types of aquatic habitat currently available to resident species.
2. Determine the types, magnitude of, and location of aquatic habitats which will be lost upon inundation, by respective stream. Geographical features blocking upstream migration will be noted. Conversely, stream areas which will benefit in terms of improved access to fish stocks, upon impoundment, will be recorded.
3. Extensive netting, trapping, and fish collection will be conducted to determine the specific occurrence, and composition of resident species occupying these eight tributarial waters. As possible, efforts will be directed to determine the extent of seasonal intra-seasonal migrations.
4. To tag any and all adult fish captured for determination of intra-system movement and migrations.

Upon completion of the first year's (CY-81) assessment of aquatic habitats, and biological distribution of fish species within the impoundment area

tributaries, investigations will be directed to the upland lake areas and the mainstem Susitna proper.

A two man field crew will again operate with a transportable field camp, utilizing helicopter and light aircraft for transportation. Investigations will begin as soon as "ice-out" occurs in the spring and continue until freeze up in the fall.

Studies in CY-1982 will be directed to:

1. Surveys of fish utilizing selected tributarial stream mouths throughout the season to determine intra-system movements of resident fish, and their reliance upon the mainstem river during the critical winter months. Tentative stream selections are Kosina, Jay, and Watana creeks.

A semi-permanent camp will be located in the vicinity of these stream mouths, and the individual streams sampled for fish occurrence on an established sampling schedule throughout the season.

2. Conduct surveys of upland lakes associated with mainstem Susitna River tributary streams for fish population and related biological data. Habitat information will also be collected from inlet and outlet streams, and be used later in determining the impacts to seasonal migrations and biological requirements of resident fish as a result of impoundment, road construction, and transmission corridor placement.

3. To determine resident fish occurrence and distribution within the mainstem Susitna River throughout the spring-summer-fall periods. This work will be accomplished by the same field crew utilizing a chartered boat for transportation on a pre-determined sampling schedule. Nets, trot lines, traps, etc. will be used to determine fish presence.
  
4. To continue to collect complete hydrological data.

It is anticipated the single two man crew will be capable of performing all the above tasks. Determination of mainstem fish occurrence and distribution (#3) will be accomplished by two or three scheduled week long trips through the impoundment area.

The upland lake surveys will be accomplished during "non-sample" periods at the tributary mouths. Close coordination will be necessary, as will helicopter support at frequent intervals.

### Title

Seasonal and Spatial Habitat Study

### Study Approach

Spatial and seasonal habitat studies will be divided into three major geographical areas. Sampling upstream of the Susitna-Talkeetna river confluence will be conducted primarily by fisheries study groups. Design of sampling programs will be done by the habitat studies supervisor. These studies will be performed in addition to work proposed by DNR, but

will be done in close cooperation and coordination with that agency and other tasks performed by consultants as a part of the overall Susitna Hydro-feasibility study. It is anticipated that other agencies such as the USGS and USFWS will also provide support for these instream flow studies.

The following outlines baseline studies required for each study area:

1. Cook Inlet to the Talkeetna-Susitna river confluence.\* Spatial and Seasonal Habitat Requirements of Fish Populations.

#### Objectives

The objectives within this study area are to:

1. define essential seasonal habitat requirements for incubation, rearing, spawning, and passage of anadromous and resident fish populations;
2. define the seasonal relationships between flow regimes and essential physical and biological habitat characteristics;
3. define the relationships between the tributary and slough physiochemical and biological habitats with the mainstem Susitna River at various flow regimes;
4. develop state-of-the-art capabilities to evaluate habitat characteristics in this difficult reach of river; and

\* Habitat study plans for the estuarine area will be based upon the findings of Phase I studies and initiated in the Phase II biological

5. generate data essential for evaluating the effects of various flow regimes on terrestrial and riparian habitat.

### Background

This reach of the Susitna River provides important habitat for rearing, incubating, spawning, and migrating resident and anadromous fish species. Unfortunately, its physical characteristics also make it one of the most difficult to evaluate. Studies of seasonal habitat characteristics will be coordinated on an annual basis with the life history and distribution fish studies (both anadromous and resident).

Expansion or termination of these studies will depend upon determination and confirmation of:

1. The seasonal habitat requirements between various life history stages of the resident and anadromous fish.
2. The relationship of seasonal habitat to various discharges.

If positive confirmation is provided by the habitat study in conjunction with other biological studies, specific year to year study locations should be identified for ongoing programs to determine the effects of the project on the fish and wildlife resources in this portion of the basin.

## Work Plan

The initial year of this study will be comprised of essentially three field operations:

1. mainstem seasonal instream flow measurements;
2. tributary seasonal instream flow measurements; and
3. collection of other physiochemical and biological habitat data.

A crew of two biologists utilizing a customized riverboat as their primary means of transportation will operate in the mainstem and selected tributary systems during the ice-free months May through October to:

1. Procure equipment.
2. Establish and refine large river instream flow measurement techniques.
3. Collect instream flow data in terms of depth, velocity, wetted perimeter, and substrate.
4. Collect water quality data as related to discharge.

It is essential that items 2 and 3 be coordinated with other fishery related and hydrological studies.

The Alaska Department of Natural Resources has submitted an instream flow proposal which will generate other required essential data. If their proposal is rejected the ADF&G will need to increase its budget requirements by \$187,861 the first year and \$110,000 each year after that to collect the data DNR was not funded to collect.

2. Talkeetna River confluence upstream to Devil canyon. Spatial and Seasonal Habitat Requirements of Fish Populations.

See Resident Fish Study Proposal.

3. Devil Canyon damsite upstream to the Tyone River confluence. Spatial and Seasonal Habitat Requirements of Fish Populations.

See the Resident Fish Study Proposal for this area.



## COST OF SERVICES TO BE PROVIDED

## BY ADF&amp;G FOR FISHERY STUDIES

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 100-Personal Services</u>				
HB IV Susitna Hydro Coordinator 6/80-12/81 @ 3716/mo.	22,296.00	44,592.00	22,296.00	22,296.00
FB IV Aquatic Studies Coord. @ 3716/mo.	22,296.00	44,592.00	22,296.00	22,296.00
Biometrician II @ 3475/mo.	20,850.00	41,700.00	10,425.00	31,275.00
EDP Programmer II @ 3035/mo.		36,420.00	9,105.00	27,315.00
Data Control Clerk II @ 2056/mo.		24,672.00	6,168.00	18,504.00
CLT IV - @ 1825/mo.	10,950.00	21,900.00		21,900.00
Account. Clk. III @ 1934/mo.	11,604.00	23,208.00	11,604.00	11,604.00
Publications Spec. II @ 2841/mo.		8,523.00	8,523.00	
Maintenance Mech II @ 2730/mo.		32,760.00		32,760.00
FT III @ 2055/mo.		8,224.00		8,224.00
	<u>87,996.00</u>	<u>286,591.00</u>	<u>90,417.00</u>	<u>196,174.00</u>
<u>Line 200 - Travel</u>				
Travel and per diem	<u>9,200.00</u>	<u>12,000.00</u>	<u>1,250.00</u>	<u>12,000.00</u>
Total	<u>9,200.00</u>	<u>12,000.00</u>	<u>1,250.00</u>	<u>12,000.00</u>
<u>Line 300 - Contractual Services</u>				
Data Processing	1,000.00	12,000.00		12,000.00
Equipment repair, freight and transportation - including air charter and vehicle rental (1)	5,500.00	13,100.00	500.00	14,000.00
Total	<u>6,500.00</u>	<u>25,100.00</u>	<u>500.00</u>	<u>26,000.00</u>
<u>Line 400 - Commodities</u>				
Clothing, materials, parts, professional and scientific supplies, office and library supplies	4,600.00	14,500.00	500.00	14,500.00
Total	<u>4,600.00</u>	<u>14,500.00</u>	<u>500.00</u>	<u>14,500.00</u>
 GRAND TOTAL ADMINISTRATION	 108,296.00	 338,191.00	 92,667.00	 248,674.00

Anadromous Adult - Stock Assessment

Task #1. Cook Inlet Stock Assessment

<u>Scale Pattern Analysis</u>	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 100 - Personal Services</u>				
10.5 mm FT II @ 1,826		19,173.00		19,173.00
21.0 mm FT III @ 2,056		43,176.00		43,176.00
10.5 mm FB I @ 2,471		25,946.00		25,946.00
Total	<u>0.00</u>	<u>88,295.00</u>	<u>0.00</u>	<u>88,295.00</u>
<u>Line 200 - Travel</u>				
Travel/per diem		1,000.00		1,000.00
Total	<u>0.00</u>	<u>1,000.00</u>	<u>0.00</u>	<u>1,000.00</u>
<u>Line 300 - Contractual Services</u>				
Contractual services (computer time)		5,000.00		5,000.00
Aircraft charter (10 hrs C185 @ 150/hr)		1,500.00		1,500.00
Vehicle rental (3 @ 250/mo and 3,000 mi.)		2,040.00		2,040.00
Total	<u>0.00</u>	<u>8,540.00</u>	<u>0.00</u>	<u>8,540.00</u>
<u>Line 400 - Commodities</u>				
Scientific supplies (500/field crew)		1,500.00		1,500.00
Food (312 days @ 15/day)		4,680.00		4,680.00
Gill nets		1,000.00		
Housing (650/mo)		1,300.00		1,300.00
Clothing (200/person)		1,200.00		1,200.00
Total	<u>0.00</u>	<u>9,680.00</u>	<u>0.00</u>	<u>8,680.00</u>
 Total for Scale Pattern Analysis	 <u>0.00</u>	 <u>107,515.00</u>	 <u>0.00</u>	 <u>106,515.00</u>

Anadromous Adult - Stock Assessment (cont.)

Task #1. Cook Inlet Stock Separation

<u>Electrophoresis</u>	<u>CY 80</u>	<u>Costs 1981</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 100 - Personal Services</u>				
8 mm FT II @ 1,826		14,608.00		
Total	<u>0.00</u>	<u>14,608.00</u>	<u>0.00</u>	<u>0.00</u>
<u>Line 200 - Travel</u>				
Travel/per diem		1,000.00		
Total	<u>0.00</u>	<u>1,000.00</u>	<u>0.00</u>	<u>0.00</u>
<u>Line 300 - Contractual Services</u>				
Contractual services (graduate student) includes all analysis of samples		15,000.00		
Aircraft charter (10 hrs C185 @ 150/hr)		1,500.00		
Vehicle rental (2 @ 250/mo and 2,000 mi.)		1,360.00		
Total	<u>0.00</u>	<u>17,860.00</u>	<u>0.00</u>	<u>0.00</u>
<u>Line 400 - Commodities</u>				
Scientific supplies		1,000.00		
Food (208 days @ 15/day)		3,120.00		
Housing (650/mo)		1,300.00		
Clothing		800.00		
Total	<u>0.00</u>	<u>6,220.00</u>	<u>0.00</u>	<u>0.00</u>
 Total for Electrophoresis	 <u>0.00</u>	 <u>39,688.00</u>	 <u>0.00</u>	 <u>0.00</u>

Anadromous Adult - Stock Assessment

Task #2. Susitna River Mouth to Yentna River

Susitna Station (May 15 - October 15)

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 100 - Personal Services</u>				
20 mm FB I @ 2,471		49,420.00		49,420.00
Total	0.00	49,420.00	0.00	49,420.00
<u>Line 200 - Travel</u>				
Travel/per diem		200.00		200.00
Total	0.00	200.00		200.00
<u>Line 300 - Contractual Services</u>				
Aircraft charter (18 hrs C185 @ 150)		2,700.00		2,700.00
Freight (barge charter)		500.00		500.00
pairs of maintenance		1,200.00		1,200.00
Total	0.00	4,400.00	0.00	4,400.00
<u>Line 400 - Commodities</u>				
Fish Tags (10,000)		7,000.00		7,000.00
Food (552 days @ 15/day)		8,280.00		8,280.00
Scientific supplies		300.00		300.00
Gas and O/B oil (15 barrels @ 75)		1,125.00		1,125.00
Camp supplies		500.00		300.00
Clothing		400.00		400.00
Total	0.00	17,605.00	0.00	17,405.00
Total for Susitna Station	0.00	71,625.00	0.00	71,425.00

Yentna Sonar

Line 100 - Personal Services

10 mm FB I @ 2,471		24,710.00		24,710.00
mm FT II @ 1,826		18,260.00		18,260.00
000 hrs overtime @ 18.25/hr		10,950.00		10,950.00
Total	0.00	53,920.00	0.00	53,920.00

Anadromous Adult - Stock Assessment

<u>Yentna Sonar (cont.)</u>	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 200 - Travel</u>	0.00	0.00	0.00	0.00
<u>Line 300 - Contractual Services</u>				
Freight (barge charter)		600.00		600.00
Aircraft charter (35 hrs @ 150/hr)		5,250.00		5,250.00
Repairs and maintenance		1,500.00		1,500.00
Total	<u>0.00</u>	<u>7,350.00</u>	<u>0.00</u>	<u>7,350.00</u>
<u>Line 400 - Commodities</u>				
Food (552 days @ 15/day)		8,280.00		8,280.00
Camp supplies		1,500.00		1,000.00
Parts		1,500.00		1,500.00
Tools		500.00		300.00
Gas and O/B oil (45 barrels @ 75)		3,375.00		3,375.00
Scientific supplies		300.00		300.00
Flashwheels (2 - parts and labor)		2,400.00		500.00
Clothing		800.00		800.00
Total	<u>18,655.00</u>	<u>18,655.00</u>	<u>0.00</u>	<u>16,055.00</u>
Total for Yentna Sonar	79,925.00			77,325.00

Anadromous Adult - Stock Assessment

Task #3. Yentna River to Talkeetna

<u>Sunshine Sonar Site</u>	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Line 100 - Personal Services</u>				
10 mm FB I @ 2,471		24,710.00		24,710.00
20 mm FT II @ 1,826		36,520.00		36,520.00
Overtime 1,200 hrs @ 18.25		21,900.00		21,900.00
Total	0.00	83,130.00	0.00	83,130.00
<u>Line 200 - Travel</u>				
	0.00	0.00	0.00	0.00
<u>Line 300 - Contractual Services</u>				
Vehicle rental (250/mo and 2,500 mi.)	0.00	1,700.00	0.00	1,700.00
Repairs and maintenance	0.00	1,500.00	0.00	1,500.00
Total	0.00	3,200.00	0.00	3,200.00
<u>Line 400 - Commodities</u>				
Food (616 days @ 15/day)		9,240.00		9,240.00
Camp supplies		1,500.00		1,000.00
Parts		1,500.00		1,500.00
Tools		500.00		500.00
Gas and O/B oil (45 barrels @75		3,375.00		3,375.00
Scientific supplies		300.00		300.00
Fishwheels (4- parts and labor)		4,800.00		500.00
Fish tags (10,000)		7,000.00		7,000.00
Clothing		1,200.00		1,200.00
Total	0.00	29,415.00	0.00	24,415.00
Total for Sunshine Sonar Site	0.00	115,745.00	0.00	110,745.00

Anadromous Adult - Stock Assessment

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II 1982</u>
<u>Line 100 - Personal Services</u>				
9 mm Ft II @ 1,826	0.00	16,434.00	0.00	16,434.00
Overtime 450 hrs \$ 18.25	0.00	8,213.00	0.00	8,213.00
Total	<u>0.00</u>	<u>24,647.00</u>	<u>0.00</u>	<u>24,267.00</u>
Line 200 - Travel	0.00	0.00	0.00	0.00
<u>Line 300 - Contractual Services</u>				
Vehicles (2 @ 250/mo and 2,000 miles)	0.00	860.00	0.00	860.00
	<u>0.00</u>	<u>86.00</u>	<u>0.00</u>	<u>860.00</u>
<u>Line 400 - Commodities</u>				
Food (276 days @ 15/day)	0.00	4,140.00	0.00	4,140.00
Housing (500/mo)	0.00	750.00	0.00	750.00
Gas and O/B oil	0.00	1,000.00	0.00	1,000.00
Total	<u>0.00</u>	<u>5,890.00</u>	<u>0.00</u>	<u>5,890.00</u>
Total for Creel Census	0.00	31,397.00	0.00	31,397.00
Task #4. Budget is included in juvenile studies.				
Task #5. Budget included in resident fisheries studies.				
<u>Program Supervisor</u>				
Anadromous Fisheries Studies Supervisor, HB III @ 3246/mo.	19,476.00	38,952.00	3,246.00	35,706.00
	<u>19,476.00</u>	<u>38,952.00</u>	<u>3,246.00</u>	<u>35,706.00</u>
Grand Total Anadromous Adult Fishery Study	19,476.00	461,478.00	3,246.00	409,845.00

Resident and Juvenile Anadromous Fishery Study

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Devil Canyon to Tyone River Impoundment</u>				
<u>Line 100 - Personal Services</u>				
3 FB I's @ 2,471 x 6 mo.		44,478.00		44,478.00
Total	<u>0.00</u>	<u>44,478.00</u>	<u>0.00</u>	<u>44,478.00</u>
<u>Line 200 - Travel</u>				
Transportation (train)		750.00		750.00
Private vehicle mileage @.25/mile		125.00		150.00
Per diem 15 days @ 55		825.00		825.00
Total	<u>0.00</u>	<u>1,700.00</u>	<u>0.00</u>	<u>1,725.00</u>
<u>Line 300 - Contractual Services</u>				
Communications		200.00		200.00
Professional Services		300.00		300.00
Repairs		500.00		500.00
Freight & Transportation		500.00		200.00
Air Charter				
Fixed wing @ 150/hr		3,000.00		6,000.00
Watercraft charter @ 300/day		1,000.00		6,000.00
Vehicle lease @ 200/mo		1,000.00		1,000.00
Miscellaneous		500.00		500.00
Total	<u>0.00</u>	<u>7,000.00</u>	<u>0.00</u>	<u>14,600.00</u>
<u>Line 400 - Commodities</u>				
Clothing		750.00		750.00
Subsistence @ 15/day (300 days)		4,500.00		4,500.00
Outboard fuels @ 1.10/gal		55.00		200.00
Camp materials, supplies, tents, stoves, heaters, etc.		700.00		500.00
Trap and net materials		1,400.00		1,200.00
Miscellaneous		500.00		1,000.00
Total	<u>0.00</u>	<u>7,905.00</u>	<u>0.00</u>	<u>8,150.00</u>



Resident and Juvenile Anadromous Fishery Study

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Devil Canyon to Tyone River Impoundment (cont.)</u>				
Total for Devil Canyon to Tyone River	0.00	61,083.00	0.00	68,953.00
<u>Talkeetna River to Devil Canyon</u>				
<u>Line 100 - Personal Services</u>				
1 FB II @ 2,841 x 12 months		34,092.00		34,092.00
3 FB I's @ 2,471 for 24 months	0.00	59,304.00	0.00	59,304.00
Total	0.00	93,396.00	0.00	93,396.00
<u>Line 200 - Travel</u>				
Transportation (train)		1,600.00		2,000.00
Private vehicle mileage		300.00		500.00
Per diem @ 55/day		1,100.00		1,100.00
Total	0.00	3,000.00	0.00	3,600.00
<u>Line 300 - Contractual Services</u>				
Communications		250.00		300.00
Professional services		150.00		150.00
Repairs		750.00		1,000.00
Freight & Transportation (train)		1,000.00		1,100.00
Air charter				
Fixed wing @ 150/hr		1,350.00		900.00
Helicopter @ 350/hr		2,800.00		2,100.00
Watercraft Charter		500.00		
Cabin rental @ 150/mo		750.00		975.00
Miscellaneous		500.00		400.00
Total	0.00	8,050.00	0.00	7,025.00
<u>Line 400 - Commodities</u>				
Clothing (boots, waders, etc.)		1,000.00		1,200.00
Gill nets @ 150 each		1,200.00		1,200.00

Resident and Juvenile Anadromous Fishery Study

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
<u>Talkeetna River to Devils Canyon (cont.)</u>				
Seines 2 @ 150 each for CY 80				
CY 81 includes minnow traps		300.00		650.00
Subsistence food @ 15/day		6,000.00		6,000.00
Outboard fuel @ 15/day		2,200.00		2,400.00
Marine oils, lubes, etc.		200.00		250.00
Building materials		500.00		500.00
Trap materials, net frames, buoys, etc.		500.00		500.00
Miscellaneous		600.00		
Camp gear, stove, lantern, etc.		300.00		600.00
Total	<u>0.00</u>	<u>12,800.00</u>	<u>0.00</u>	<u>13,300.00</u>
 Total for Talkeetna River to Devil Canyon	 0.00	 117,246.00	 0.00	 117,321.00
<u>Cook Inlet to Talkeetna</u>				
<u>Line 100 - Personal Services</u>				
4 FB I's for 26/mos. for CY 81		64,246.00		103,782.00
4 FB I's for 42/mos. for CY 82				
Resident Fisheries Study Supervisor				
FB III @ 3,246/mo.	<u>19,476.00</u>	<u>38,952.00</u>	<u>3,246.00</u>	<u>35,706.00</u>
	19,476.00	103,198.00	3,246.00	139,488.00
<u>Line 200 - Travel</u>				
110 days per diem @ 55/day		6,050.00		6,050.00
Miscellaneous (pickup mileage)		600.00		1,000.00
Total	<u>0.00</u>	<u>6,650.00</u>	<u>0.00</u>	<u>7,050.00</u>
<u>Line 300 - Contractual Services</u>				
Air charter @ 150/hr		9,600.00		12,000.00
Vehicle @ 250/mo		5,250.00		5,250.00
Engine repair		700.00		2,600.00
Equipment rental		700.00		1,000.00
Communications		700.00		1,000.00
Total	<u>0.00</u>	<u>16,950.00</u>	<u>0.00</u>	<u>21,850.00</u>
<u>Line 400 - Commodities</u>				
Food @ 15/day		9,750.00		15,750.00
Clothing		2,000.00		2,000.00
Building materials		1,900.00		1,900.00

Line 400 - Commodities (cont.)

Camp gear	600.00		
Net gear	4,300.00		4,000.00
Fuel	4,700.00		7,540.00
Oil	650.00		1,000.00
Marine supplies	500.00		500.00
Snowmachine supplies	500.00		400.00
Miscellaneous	2,000.00		1,900.00
Total	<u>26,900.00</u>	0.00	<u>34,990.00</u>

Resident and Juvenile Anadromous Fishery Study

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
Total for Cook Inlet to Talkeetna	19,476.00	153,698.00	3,246.00	203,378.00
GRAND TOTAL RESIDENT AND JUVENILE FISHERY STUDY	19,476.00	332,027.00	3,246.00	389,652.00

Spacial and Seasonal Habitat Studies

Cook Inlet to Devil Canyon

Line 100 - Personal Services

Habitat Study Supervisor

FB III @ 3,359				
2 FB II's @ 2,841 (21 mm in 1981, 24 mm in 1982)	20,154.00	40,308.00	3,359.00	36,949.00
3 FB I's @ 2,471 (27 mm in 1981, 36 mm in 1982)		59,661.00		68,184.00
Total	<u>20,154.00</u>	<u>66,717.00</u>	<u>3,359.00</u>	<u>88,956.00</u>
	20,154.00	166,686.00	3,359.00	194,089.00

Line 200 - Travel

120 days per diem @ 55/day		6,600.00		6,600.00
Miscellaneous				
Total	<u>0.00</u>	<u>6,600.00</u>	<u>0.00</u>	<u>6,600.00</u>

Line 300 - Contractual Services

Air charter

15 hrs/mo for 7 mo @ 150/hr		15,750.00		15,750.00
Vehicle 12 mo @ 250/mo		3,000.00		3,000.00
Engine repair and maintenance		1,000.00		1,000.00
Equipment rental		300.00		300.00
USGS, Instream flow Group Consultation		12,000.00	2,000.00	16,000.00
Boeing computer analysis		10,000.00		25,000.00
Miscellaneous		500.00		500.00
Total	<u>0.00</u>	<u>42,550.00</u>	<u>2,000.00</u>	<u>61,550.00</u>

Line 400 - Commodities

Food: CY 81 700 days @ 15/day				
CY 82 980 days @ 15/day		10,500.00		14,700.00
Clothing: boots, life jackets, tents, sleeping bags, etc.		2,500.00		1,000.00
Fuel: 20 wks 200 gal/wk @ 1.25 gal.		5,000.00		5,000.00
Oil, lube, etc.		700.00		700.00
Marine supplies		1,500.00		1,500.00
Snowmachine supplies		200.00		200.00
Miscellaneous		1,800.00		1,800.00
Total	<u>0.00</u>	<u>22,200.00</u>	<u>0.00</u>	<u>24,900.00</u>

Spacial and Seasonal Habitat Studies

	<u>CY 80</u>	<u>CY 81</u>	<u>Phase I 1982</u>	<u>Phase II CY 82</u>
Total for Cook Inlet to Devil Canyon	20,154.00	238,036.00	5,359.00	287,139.00

Devil Canyon to Tyone River

All Costs Included in Resident Studies Except Air Charter		5,400.00		5,400.00
GRAND TOTAL FOR SPACIAL AND SEASONAL HABITAT STUDIES	20,154.00	243,436.00	5,359.00	292,539.00

ADF&G SUMMARY BUDGET

	<u>CY 1980</u>	<u>CY 1981</u>	<u>Phase I 1982</u>	<u>Phase II CY 1982</u>
Administration	108,296.00	338,191.00	92,667.00	248,674.00
 <u>Adult Stock Assessment</u>				
Scale Pattern Analysis		107,515.00		106,616.00
Electrophoresis		39,688.00		
Susitna Station		71,625.00		71,425.00
Yeutna Station		79,925.00		77,325.00
Sunshine Station		92,376.00		87,376.00
Creel Census		31,397.00		31,397.00
Anad Fish Supervisor	<u>19,476.00</u>	<u>38,952.00</u>	<u>3,246.00</u>	<u>35,706.00</u>
Subtotal				
Anadromous	19,476.00	461,478.00	3,246.00	409,845.00
 <u>Resident &amp; Juvenile</u>				
Impoundment Area		61,083.00		68,953.00
Talkeetna-Devil Canyon		117,246.00		117,321.00
Cook Inlet-Talkeetna	19,476.00	153,698.00	3,246.00	203,378.00
 <u>Habitat</u>				
Cook Inlet - Devil Canyon	20,154.00	238,036.00	5,359.00	287,139.00
Above Devil Canyon		<u>5,400.00</u>		<u>5,400.00</u>
Subtotal Resident, Juvenile and Habitat	<u>39,630.00</u>	<u>575,463.00</u>	<u>8,605.00</u>	<u>682,191.00</u>
 GRAND TOTAL ADF&G FISHERY STUDIES	 167,402.00	 1,375,132.00	 104,518.00	 1,340,710.00

Grand Total Equipment  
to be provided by Acres  
(see attached list)

414,857.00

## Equipment to be Provided by Acres

Cameras, calculators (HP97 and HP 67) and shop equipment	9,100.00
Digitizer (Omega computer)	8,200.00
2 slide scan sonar counters	78,000.00
2 recorders	600.00
Oscilloscope	1,800.00
2 boats	4,000.00
Four 25 hp outboards	2,976.00
2 side scan sonar counters & spare parts	86,200.00
Generator	350.00
Compressor	350.00
2 tape recorders (sonar)	600.00
Oscilloscope (sonar)	1,800.00
2 shotguns (bear protection)	400.00
SSB radio	1,600.00
2 boats	4,000.00
4 outboards	2,976.00
2 side scan sonar counters & spare parts	86,200.00
Generator	350.00
Compressor	350.00
2 tape recorders	600.00
Oscilloscope	1,800.00
2 shotguns	400.00
SSB radio	1,600.00
1 boat trailer	1,700.00
Inflatable boat	2,000.00
Outboard	1,000.00
Radio	1,600.00
Riverboat	2,500.00
Thermographs @ 450 each	5,400.00
DO meter	600.00
Conductivity meter	600.00
ph meter	200.00
Outboard motor 2 at 75 Hp	5,500.00
Jet units @ 600 each	1,200.00
Rubber raft	3,500.00
Outboard 25 hp	1,200.00
Radio	1,200.00
Snowshoes @ 25 each	300.00
Guns 2 @ 250	500.00
Snowmachines 2 @ 1,600	3,200.00
Snowmachine sleds (2)	150.00
Ice Auger	300.00
Electroshocker	1,200.00
Riverboat	1,600.00
25 hp outboard	2,700.00
25 hp outboard	1,200.00
Jet unit	600.00

Trailer boat	500.00
Radio	1,000.00
Rifle	300.00
4 snowmachines	6,400.00
2 trailers (SM)	1,000.00
2 ice augers	600.00
2 chainsaws	600.00
Canoe	600.00
Backpack shocker	1,200.00
Survey Stakes	300.00
2 measuring tapes & holders 300' @ 150	300.00
2 35 mm SLR cameras (macro lens and polarized filter) @ 350 each	700.00
2 rifles @ 250 each	500.00
5 current meters (AA) @ 350	1,750.00
3 current meters (pygmy) @400	1,200.00
3 Marsh McBirney flow meters digital readout @ 1,600 each	4,800.00
11 top setting wading rods @ 200 each	2,200.00
Suspended flow support system	400.00
2 boat mounted flow metering systems @ 1,600.00	3,200.00
Sonar narrow beam system	3,000.00
8 headsets @ 50/each	400.00
Two 2-way radio walkie talkie @ 1,000 ea.	2,000.00
2 compasses @ 50 each	100.00
Rebar	100.00
4 cable tagliners 300' @150	600.00
Tools for repair	175.00
20' Wooldrige boat (capable of performance in Portage area)	4,000.00
13' Avon riverboat	1,800.00
85 hp (jet foot )	3,800.00
25 hp (kicker)	1,200.00
25 hp (for Avon)	1,200.00
Boat trailer	2,000.00
3 field calculators @ 35 each	105.00
5 DO meters @ 600 each	3,000.00
5 ph meters @ 200 each	1,000.00
15 thermometers @ 25 each	375.00
20 thermographs @ 450 each	9,000.00
400 Leupold staff gages @ 1.1 each	4,400.00
DO meter	600.00
Conductivity meter	600.00
pH meter	200.00
3 thermometers @ 25 each	75.00
Marsh McBirney meter	1,600.00

AA meter	350.00
Pygmy meter	400.00
2 measuring tapes 300' @ 150 each	300.00
2 topsetting wading rods @ 200 each	400.00
2 headsets @ 50 each	100.00
35 mm camera, (macro lens and polarized filter) @ 350	350.00
25 Leupoid staff gages @ 11.00	275.00

GRAND TOTAL EQUIPMENT TO BE PROVIDED BY  
ACRES

414,857.00



## SUSITNA HYDROELECTRIC PROJECT

## ENVIRONMENTAL PROGRAM

## ALASKA DEPARTMENT OF FISH AND GAME

## REPORTING REQUIREMENTS

Monthly Progress Reports - Letter reports, due on the 10th of each month, summarizing program activities of the previous month, any problems encountered, and plans for the following month. Significant findings should also be identified.

Procedures Manual - Documentation of study design, sampling methodologies, and analysis procedures to be followed throughout the Phase I program. Can be amended as necessary, with approval of the TES Group Leader and QA Coordinator. Four copies due 90 days from start of program.

Quarterly Reports - Three quarterly reports will be required during each project year. Reports will include a summarization of data collected during the preceeding quarter and will include sampling dates and methods employed, data tables, and sufficient discussion to permit an understanding of reported data. Four copies will be due on the first day of May, August, and November of 1980 and 1981. These reports will be an important means of information exchange among disciplines.

Annual Report - A detailed account of the first year's program including literature review, methodology, results, discussion, conclusions, and summary. Four copies due 60 days following completion of the first year's program, and no

later than March 1, 1981. Written responses to comments by Group Leaders will be required, but complete revision of the annual report will be avoided, if at all possible.

Draft Phase I Report - A detailed, thorough account of the entire Phase I program, including methodology, results, discussion (including comparisons with pertinent literature), conclusions, and a summary. Four copies due 60 days after completion of the Phase I program, but no later than February 1, 1982.

Final Phase I Report - Incorporating the comments of the Group Leaders on the Draft Phase I Report. Four copies due 30 days following receipt of comments.

January 4, 1980

## SUSITNA HYDROELECTRIC PROJECT

## ENVIRONMENTAL STUDIES

## PROCEDURES MANUAL - GUIDELINES FOR DEVELOPMENT

The procedures manual will serve as detailed documentation of both study design and implementation. It will serve a dual function: as quality assurance and as a useful guide to project personnel. The procedures manual must contain sufficient detail to assure that the program can continue uninterrupted if unexpected changes of personnel or equipment malfunction occurs.

Improvements to the procedures are encouraged, but all changes must be documented in advance by authorized amendments to the procedures manual, approved by the TES Group Leader and Quality Assurance Coordinator. The procedures manual will be a controlled document, all copies being numbered to insure that all holders will receive copies of authorized amendments.

Following is a list of items that should be included in the procedures manual:

1. Introduction - describes the study and general objectives of each part of the program.
2. Technical procedures - includes rationale for each part of the program, methods of sampling, type and model of equipment, degree of accuracy of equipment, calibration procedures if any, references, etc.

3. Data procedures - includes copies of typical field recording sheets, data reduction procedures, expected statistical procedures and rationale, typical table and graph format, etc.
4. Quality control - includes procedures for routing quality control on all aspects of the program.
5. Schedule - includes schedule of expected field, lab and data events.
6. Personnel - descriptions of the qualifications required to perform the different tasks in the program. In addition, at least the top 4 people should be identified by name and experience (e.g. those in charge of each aspect of the fisheries program: adult anadromous fish studies, resident and juvenile anadromous fish studies, and habitat studies, as well as their supervisor).
7. Reporting - as in December 19, 1979 description of reporting requirements.