

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672

1003 SCCOMM44: HOUSE POWER ALTERNATIVES STUDY COMM. 1979-80 003

SCOMM

#44:37

12/12/79

Enclosed is a Consultant report
on Susitna.

Brian is leaving town tonight on a
3-wk. combin. legisl. work & vacation in
lower 48.

Any questions of consultant, Larry Katkin,
can be directed to him at 456-3250.

Glenda Straube
A.A.



DYNAMIC RESEARCH CORPORATION

THE ALASKAN THINK TANK

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GEOTECHNICAL EVALUATION

THE SUSITNA HYDROELECTRIC PROJECT

Prepared by Lawrence Katkin

Dynamic Research Corporation

December 10, 1979

SCOPE OF THE REPORT

Originally, this report was to be an evaluation of the geotechnical portions of the three proposed feasibility studies for the Susitna Hydroelectric Project.

Since one of the three studies has already been decided upon by the Alaska Power Authority, the original intent of this report has been somewhat altered.

Because all of the proposed feasibility studies have based their procedures and conclusions on previous studies performed or contracted-out by the U.S. Army Corps of Engineers, this author has researched all of the current studies dealing with the Susitna Hydroelectric Project. He has, furthermore, evaluated the conclusions reached by the U.S. Army Corps of Engineers as well as the proposal introduced by Acres American Incorporated, focusing attention on how well they address the potential geologic hazards involved in this project.

GEOTECHNICAL OVERVIEW OF THE PROJECT

A geotechnical site evaluation of a project of this type is basically concerned with two things:

- 1) The suitability of the foundation
- 2) The existence of a sufficient quantity of suitable construction materials which are to be derived from the earth.

Some geotechnical parameters to be considered in the evaluation of the proposed foundation and reservoirs are:

- 1) The seismic activity of the area
- 2) The seismic stability of the rocks and soils
- 3) The porosity and permeability of the rocks and soils
- 4) Potentially hazardous geologic structures
- 5) Permafrost with thaw-unstable properties
- 6) Frost-Susceptible soil

The parameters involved with the construction materials to be derived from the earth are as follows:

- 1) Determine the existence of necessary quantities
- 2) Determine the quality of the material
- 3) Determine the amount of processing necessary to produce the quality needed
- 4) Determine potential problems involved with excavation of materials.

EARTHQUAKE EVALUATION OF THE SITE

The proposed sites lie in an area which has been determined to be of considerable seismic activity. In order to accurately calculate the hazards of earthquake potential in this area, a thorough seismic history is necessary.

In 1971 the USGS set up a network of seismic stations in southern Alaska which were effective in accurately determining the location and magnitude of the epicenters in the proposed dam sites.

The tectonics of the region are too poorly known at this time to make a reliable prediction for the distribution of events which may strongly shake the damsite (Kachadoorian, 1975). In addition, the Denali fault, which lies less than 80 km. North of the proposed damsite, is a major strike-slip fault with geologic evidence for a 3 cm./year average Holocene slip. This fault could sustain an event of 8.0 magnitude on the Richter Scale (Kachadoorian, 1979).

The most recent report issued by the U.S. Army Corps of Engineers (Supplemental Feasibility Report, Main Report 1979), quotes a recent United States Geological Survey Report as saying:

" Reconnaissance of the proposed Devil's Canyon and Watana Damsites and reservoirs did not uncover evidence of recent or active faulting along any of the known or inferred faults. Their studies did not find any evidence of the Susitna Fault which was previously thought to exist a short distance west of the Watana Damsite; therefore, they were not able to confirm the existence of such a fault. "

After reading the same USGS Report ("Reconnaissance of the Recent Geology of the Proposed Devil's Canyon and Watana Damsites

EARTHQUAKE EVALUATION OF THE SITE (Page 2)

Susitna River, Alaska"), I find that the conclusions drawn by the U.S. Army Corps of Engineers are out of context and misleading.

Under the section entitled "Procedures", the USGS authors state:

"Our criteria for designating a fault as active were constrained by the local geology. Much of the area around the Devil's Canyon and Watana Damsites is covered by late Wisconsin glacial sediments."

When the USGS authors made the statement that they could not find evidence of active faulting, they were making that statement in regards to the specific technique of ground and aerial observation, and based solely on that technique.

Although the potential hazard of earthquakes is somewhat understated by the U.S. Army Corps of Engineers, the Acres American proposal thoroughly addresses those potential hazards.

SEISMIC STABILITY OF THE SITE

The earthquake stability of the soil and rock in the damsite area is equally as important as the frequency of magnitude of earthquakes in the region.

On March 27, 1964, a major earthquake hit Alaska. This tragic event yielded a wealth of information regarding the earthquake susceptibility of soils.

Some of the major damage to the Anchorage area was caused by normally stable soils which liquefied, due to the severity of shocks caused by the earthquake. Many of those soils which were liquefied, caused stable soils above to float.

In Homer the vibrations of the earthquake caused large bodies of sand and gravel to consolidate, thus causing well pipes which were flush with the ground, to protrude several feet above the ground.

Inhabited places, however, which were located closer to the epicenter, felt little or no effect because of their location upon bedrock.

Thus, in order to properly evaluate the damsites, there should be an intensive investigation to determine the location and extent of any soil that is considered earthquake susceptible. Soils that either settle or liquefy when acted upon by earthquakes are considered earthquake susceptible.

The only discussion of earthquake hazards noted by the U.S. Army Corps of Engineers is in the report entitled "Earthquake

Assessment at the Susitna Project, Alaska" written by E.L. Krinitzky of the U.S. Army Engineering Waterways Experiment Station.

This report sufficiently addresses the problems that can be caused by earthquakes, such as the plastic properties of rock understrain, landslide activity along the fault, etc. But no mention is made of liquefaction.

The Acres American proposed study does intend to investigate liquefaction of areas along the transmission line and major access routes. Although their study is limited to those areas, just their mention is enough to note that they are aware of this potential geologic hazard.

Note: R. Migliaccio, founder of the R & M Consultants, which is the geotechnical subcontractor for Acres American, is an expert in the field of earthquake susceptibility. Mr. Migliaccio was instrumental in documenting and evaluating the damage which occurred in the 1964 Alaska Earthquake.

GEOLOGIC STRUCTURES

The one potentially hazardous geologic structure is the existence of faults.

As previously stated, the study area lies in an area of considerable seismic activity. Many of the previous studies of the area have tried to correlate the relationship of seismic activity to the faults.

According to Kachadoorian and Moore 1978, E.L. Krinitzkey 1978, it is difficult to correlate the relationship of seismic activity to the faults due to a lack of accurate data.

Although there has not been any definite correlation between the local faults and seismic activity, it is important to note that there are a good number of faults. Table 1 on the following page lists the faults in the study area.

Another potential problem could arise from the altitude of some of the bedding planes.

The right abutment of the proposed Devil's Canyon Site exhibits bedding planes that strike approximately N70°E and dip 60°E. The configuration of the bedding altitude and the canyon alignment may result in the bedding planes corresponding rather closely to the theoretical shearing plane formed by the arch thrust at the abutment (U.S. Army Corps of Engineers, 1976).

The left abutment of the Devil's Canyon Site exhibits southerly dipping beds on an overhanging cliff. In some cases southerly dipping beds have resulted in large blocks separating from adjacent bedrock. (U.S. Army Corps of Engineers, 1976).

EARTHQUAKE INDUCED BY THE PRESENCE
OF THE DAM ITSELF

In addition to the naturally occurring earthquake activity in the region, there is also the hazard that filling a reservoir may trigger a potentially dangerous earthquake (with as large a magnitude as 6.0 on the Richter Scale) in the immediate vicinity of the damsites (Lahr and Kachadoorian, 1975).

In a recent USGS Report ("Reconnaissance of the Recent Geology of the Proposed Devil's Canyon and Watana Damsites, Susitna River, Alaska"), it is highly recommended by authors Kachadoorian and Moore that continuous monitoring by a local network of seismic stations in the region begin well in advance of the filling of the reservoirs. Unless the natural seismic level is established, an important opportunity to study induced seismicity will be lost.

Both the U.S. Army Corps of Engineers and Acres American have thoroughly addressed this potential problem.

TABLE 1.* Inferred faults in the general area of the Devil's Canyon and Watana damsites, Susitna River, Alaska

Number	Designation	Type	Remarks
1.	Zone of intense shearing	Thrust	Evidence is stratigraphic and petrographic.
2.	Talkeetna Thrust	Thrust	Evidence is stratigraphic.
3.	Near Watana Creek	Thrust	Evidence is stratigraphic.
4.	Near Portage Creek	Thrust	Evidence is stratigraphic.
5.	Chulitna River	Thrust & Vertical	Evidence is stratigraphic.
6.	North of VABM Sheep	Strike Slip	Right lateral with some vertical displacement.
7.	West of VABM Sheep	Strike Slip	Two faults: left lateral & right lateral.
8.	Susitna Fault	Strike Slip	Evidence is topographic lineament; inferred to be right lateral from seismic data.
9.	Near Clarence Lake	High Angle	Displacement apparently vert.
10.	Near VABM Windus	High Angle	Displacement apparently vert.
11.	North of VABMs Grebe-Mt. Watana	Thrust	Evidence is apparently strat.
12.	East of VABM Sumartidason	Strike Slip	Evidence is questioned.
13.	Watana Creek	Normal	Evidence is stratigraphic.
14.	Along Portage Creek	Thrust	Alternate trace for number 4.
15.	North of Denali	Thrust	Evidence is apparently strat.
16.	Cretaceous to recent shearing	Complex	Evidence partly stratigraphic

*Abridged from "Reconnaissance of the Recent Geology of the Proposed Devil's Canyon and Watana Damsites, Susitna R., Alaska" (Kachadoorian & Moore, 1979).

POROSITY AND PERMEABILITY

A potentially serious hazard for any dam is its failure due to uncontrolled seepage. Porosity (the volume of air space in a rock or soil) and Permeability (which deals with the interconnections between these small airspaces) are two engineering properties of soil and rock that cannot be overlooked.

In addition, the ponding of water (which could thaw permanently frozen soils) could highly affect the permeability of rocks and soils in the area.

Since permafrost does exist in the reservoir area of the Watana site, these potential hazards should be carefully studied.

It has been mentioned that a deeply buried channel striking east-west has been located on the Left Abutment Saddle Dam at the proposed Devil's Canyon Site. This feature has higher permeability than the surrounding rocks. It could be necessary to either seal this channel or else excavate and backfill with non-pervious materials.

PERMAFROST

The subject of potential hazards due to permafrost has previously been mentioned in the section dealing with porosity and permeability.

It should also be noted that many soils which are permanently frozen are earthquake susceptible when in the thawed state.

Permafrost has been a subject of an intensive amount of research. Both the U.S. Army Corps of Engineers and Acres American are well aware of its characteristics and effects.

MATERIALS

Recent investigations by the U.S. Army Corps of Engineers have indicated that the gravel necessary to build the earthfill dam at the proposed Watana Damsite does not exist in sufficient quantities for the construction of the dam.

The Watana Dam design has been altered accordingly by changing the gravel shell to a rock shell and by widening the semipervious core.

Table 2 lists the types and quantities of materials necessary to construct the proposed Watana and Devil's Canyon Dams. Although it is reasonable to substitute crushed rock for gravel fill, a question arises as to whether the designers plan to use processed rock to replace the aggregate in the concrete, if sufficient quantities of gravel are not to be found. '

This is an important question as regards the quality and cost of the proposed project and one which will eventually have to be addressed.

TABLE 2 *

Type of Material	Devil's Canyon Dam (cu/yds)	Watana Dam (cu/yds)
Concrete Requirements	2,600,000	2,000,000
Impervious Core		7,373,000
Semipervious Core		6,077,000
Fine Filters		5,621,000
Coarse Filters		2,201,000
Pervious Rock Shell		36,297,000
Riprap		223,000

*Data supplied by the U.S. Army Corps of Engineers, 1979

CONCLUSIONS

This report has illustrated that the proposed Susitna Hydroelectric Project poses several geotechnical problems as to its feasibility. Most of the problems should be answered by the study to be performed by Acres American Incorporated.

However, with the amount of data which has been collected to date, it seems difficult to say whether the project is or is not feasible. A more logical assessment of the situation could be made upon gathering and compiling more extensive data.

REFERENCES CITED

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3. Anon., 1979, Southcentral Railbelt Area, Alaska
U.S. Army Corps of Engineers. Supplemental Feasibility
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4. Kachadoorian and Moore, 1979, "Reconnaissance of the
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Watana Damsites, Susitna River, Alaska".
5. Katchadoorian, Reuben, 1974, Geology of the Devil's Canyon
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74-40, 17 p.
6. Lahr, John C. and Kachadoorian, Reuben, 1975, "Preliminary
geologic and seismic evaluation of the proposed Devil's
Canyon and Watana Reservoir areas, Susitna River, Alaska:
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7. Krinitzky, E.L., 1978, "Earthquake Assessment at the Susitna
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Vicksburg, Mississippi)
8. Krinitzky and Chang, 1977, "Specifiying Peak Motions for
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Waterways Experiment Station, Vicksburg, Mississippi, 34 p.
9. Anon., 1979, "Susitna Hydroelectric Project: Plan of Study",
Acres American Incorporated.

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STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

Cons
JAY S. HAMMOND, GOVERNOR

333 RASPBERRY ROAD
ANCHORAGE 99512

September 28, 1979

Mr. Eric Yould, Director
Alaska Power Authority
333 W. 4th Avenue
Anchorage, Alaska 99510

Dear Mr. Yould:

In accordance with the request in your letter of August 28, the Department of Fish and Game has reviewed the plans of study prepared by Harza Engineering, Acres-American Inc., and International Engineering Inc. to evaluate the sufficiency of the environmental studies they propose. The emphasis of our review focused on those programs and interdisciplinary tasks related to determining project feasibility and impacts with respect to fish and wildlife. We appreciate the opportunity to make this Department's recommendations with regard to the selection of a private sector consultant to conduct the Susitna Hydro engineering and environmental feasibility studies and to advise you of related issues.

In earlier correspondence to you on August 10th, the Department of Fish and Game described our expectations with regard to the development of the three consultant plans of study and the specific points we would address in a review of their products and which are summarized as follows:

1. Scope of studies - that is, the degree to which the study objectives meet biological data needs and integrate biological studies into a multi-disciplinary effort which can provide an assessment of project impacts.
2. Statutory and regulatory requirements - that is, the degree to which Federal, State and local statutory and regulatory requirements are recognized in the planning process so there are no surprises resulting in delay of the environmental assessment process to determine the project feasibility.
3. Study time frames - that is, first, the degree to which biological studies must follow the natural events of biological cycles and the physical factors of habitat and environment influencing them, to arrive at a point where our best and most

timely judgement of project impacts and mitigation requirements can be made. And second, the degree to which project and task scheduling accomodates the development of the field staff and administrative organization to carry out studies, coordinate studies, and make logistic and equipment arrangements to maximize the results of these studies.

4. Funding - that is, the degree to which a commitment is made to guarantee equal consideration of fish and wildlife resources through all phases of the project from initial planning to construction (if the project is approved) and thereafter. Monitoring of the impacts and operation of mitigation and enhancement programs is also essential.

In reality, this Department had five plans of study before it in this review. They are:

1. Alaska Department of Fish and Game, December 1977.
2. U.S. Army Corps of Engineers, June 1978.
3. Acres-American, September 1979.
4. Harza Engineering, September 1979.
5. International Engineering, September 1979.

Overall, it is our opinion that each of these plans of study is inadequate for the reasons we discuss hereafter for each.

Alaska Department of Fish and Game December 1977

1. Scope of Studies - The scope of studies by the Department of Fish and Game basically covers the objectives for fish and wildlife investigations as viewed solely by this Department. While we did our best to cover multi-disciplinary aspects of an environmental program related to fish and wildlife resources, vegetation analysis, water quality, hydrology, recreation and socio-economics that could be conducted by the Department, the study does not display the advantages of the integration of a true multi-disciplinary effort by other specialists representing the engineering and other non-fish and wildlife disciplines.
2. Statutory and Regulatory Requirements - The current status of the National Environmental Policy Act, Fish and Wildlife Coordination Act, Coastal Zone Management Regulations, and the applicability of Alaska Statute 16.05.870, the Anadromous Fish Act, to this project are not clearly addressed.
3. Study Time Frames - The time frames fit those required to meet the fish and wildlife investigations goal of providing our best judgement of project impacts in relation to the cycles and life histories of fish and wildlife in this basin. Further, they provide the time which is essential for organizing

and administering these investigations. Important mileposts in coordination of possible alternatives for license application or EIS development are not detailed, however.

4. Funding - The budgets developed by ADF&G reflect the first steps toward a cost saving and minimization of duplication of effort that a coordinated multi-disciplinary effort could potentially provide (based upon limited data provided in the Corps of Engineers draft POS of October 1977). Interdisciplinary studies however, can and should be refined further. The budgets are the costs projected by ADF&G in 1977 dollars and don't reflect current and possibly inflationary values or costs of fish and wildlife investigations proposed by the U.S. Fish and Wildlife Service. I'd like to reiterate Commissioner Ronald O. Skoog's comment in his December 21, 1977 letter to Robert Ward, Chairman of the Alaska Power Authority, Board of Directors, transmitting this proposal, that is, "We believe from our extensive experience that we have excellent insight into what it actually costs to do business in the State."

U.S. Army Corps of Engineers, June 1978

1. Scope of Study - The biological investigations of this plan of study are the result of a limited coordination effort between the Corps and the Department of Fish and Game. Narratively, this plan of study covers the scope of task areas of the biological investigations in a manner satisfactory to the Department of Fish and Game. The plan of study also provides for the shift of certain tasks exclusively from the biological investigations to other task descriptions in hydrology and water quality, making this a better effort at an inter-disciplinary study than found in the Corps' original draft of October 1977.
2. Statutory and Regulatory Requirements - The Corps' June 1978 POS does not in our view reflect the current status or consideration of impacts of this project on fish and wildlife and mitigation in accordance with the Fish and Wildlife Coordination Act and the National Environmental Policy Act. It also does not consider the application of AS 16.05.870, the new Federal Energy Regulatory Commission and Coastal Zone Management Regulations to this project.
3. Study Time Frames - The Corps' studies were scoped into a 46 month time frame, which we believed to be inadequate. The Corps did allow, however, that continuation studies beyond the 46 month period to 60 months may be required. However, the wording in their POS implies that the construction decision will occur before completing portions of the 5 year biological studies we consider essential.
4. Funding - The Corps's attachment of a 4.3 million dollar budget to biological investigations was inadequate in this Department's view. For the 46 month time frame, we proposed a 7.9 million dollar budget in 1977 dollars.

Acres American (Acres) - September, 1979

Harza Engineering (Harza) - September, 1979

International Engineering (IECO) - September, 1979

Scopes of Study - The present consultant plans of study are scoped in varying degrees of adequacy by the three firms. IECO's proposal is deficient in both the aquatic and terrestrial segments. Acres' proposal does not have a satisfactory aquatic studies proposal but has a stronger description the terrestrial studies tasks. Harza's proposal contains the best aquatic studies presentation and has done a fair job on the terrestrial wildlife tasks also. In balance, Harza's biological investigations proposals provide for a better state-of-the-art application of study techniques and methodologies, such as radio telemetry, sonar application, and instream flow. I must point out, that although all three firms have adopted portions of the Department of Fish and Game's ideas or suggestions; the focus and results of their proposed activities are not totally in accord with the Department.

Statutory and Regulatory Requirements

All three consultant firms address FERC licensing and exhibit preparation requirements, but there is no specific discussion of the impact of the requirements of AS 16.05.870, the Fish and Wildlife Coordination Act, and Coastal Zone Management Act regulatory requirements regarding coordination, planning, and environmental protection in relation to this project.

Study Time Frames - All three firms were constrained to a 30 month time frame to FERC license application in accord with the APA contract specifications. IECO does emphasize a three-year study on anadromous species and a two-year study on large mammals but this is inconsistent with this Department's view of a required five-year study on some populations and habitats. Both Acres and Harza more strongly emphasize the continuation of fish and wildlife investigations. We believe that APA must give the contractor for the final POS stronger direction to provide for the review of pre-FERC license studies, and provide a mechanism for the review, redirection and continuation of selected projects post-FERC license application.

Budgets - Because of the relatively short review time afforded this Department, we could not make an adequate assessment of the merits of the three consultant firms' POS budgets. Their interdisciplinary study plans and scoping of fish and wildlife tasks were not specifically budgeted in all cases. The numbers of personnel dedicated to fish and wildlife tasks detailed by two of the consultants (Acres and Harza) is also difficult to breakdown. We can only leave our final evaluation on the adequacy of the fish and wildlife investigations budgets to the one submitted in the final POS.

At this juncture, we recognize that the selection of a consultant to prepare a final POS and to implement the studies involved must be based on factors involving not only the fish and wildlife investigations. This Department desires to assure that the best final POS is developed. To accomplish this, we believe the fish and wildlife agencies must be the key participants in the development of the final POS. The consultant

firm selected should be one which has developed the best overall plan of study. That firm and the APA will have to make a commitment to synthesize a new final plan of study incorporating the concerns of the fish and wildlife agencies which meets our special statutory mandates for the protection of fish and wildlife resources. Funding for this planning and coordination will be required by ADF&G.

I would like to advise you here of some of the requirements of the Fish and Wildlife Coordination Act, Fish and Game Code, (Title 16), and Coastal Zone Management Act which can influence this project.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, draft Uniform Procedures for compliance, May 1979 further standardizes procedures and interagency relationships to insure, "that wildlife conservation is fully considered and weighed equally with other project features in agency decision-making processes by integrating such considerations into project planning, National Environmental Policy Act (NEPA) compliance procedures, financial and economic analyses, authorization documents, and project implementation."

Subpart B-FWCA Compliance Procedures

Sec. 410.21 Equal consideration.

Equal consideration of wildlife resource values in project planning and approval is the essence of the FWCA compliance process. It requires action agencies to involve wildlife agencies throughout their planning, approval, and implementation process for a project and highlights the need to utilize a systematic approach to analyzing and establishing planning objectives for wildlife resource needs and problems and developing and evaluating alternative plans.

Sec. 410.22 Consultation

(a) Initiation. The FWCA compliance process may be initiated by a potential applicant, an action agency, or a wildlife agency.

(b) Potential Applicants. Implementing procedures of action agencies shall provide that applicants for those non-federal project approvals which require a water-dependent power project approval from the Federal Energy Regulatory Commission (FERC) (also applies to preliminary FERC permit) contain written evidence that they initiated the FWCA compliance process with both Regional Directors and the head of the State wildlife agency exercising administration over the fish and wildlife resources of the state(s) wherein the project is to be constructed and early site review (NRC) applicants. The intent of this paragraph (a)(1) of this section is to assist applicants in designing environmentally sound projects without waste of their planning resources and to minimize the potential for delay in the processing of applications. Action agency implementing procedures shall advise that consultation should be initiated by the applicant at the earliest stages of its project planning, and that its submissions to wildlife agencies shall indicate the general work or activity being considered, its purpose(s), and the general area in which it is contemplated.

In order to comply with these procedures, APA should initiate the process of consultation with the fish and wildlife agencies.

Title 16

Title 16, independently of Federal laws, mandates the Alaska Department of Fish and Game to manage, protect, maintain, enhance, and extend the fish, game, and aquatic plant resources and the habitat that sustains them including assisting the U.S. Fish and Wildlife Service in the enforcement of federal laws and regulations pertaining to fish and wildlife.

Sec. 16.05.870 also states that:

b) If a person or governmental agency desires to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake or stream, or to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream, the person or governmental agency shall notify the commissioner of this intention before the beginning of the construction or use.

c) If the commissioner determines to do so, he shall, in the letter of acknowledgement, require the person or governmental agency to submit to him full plans and specifications of the proposed construction or work, complete plans and specifications for the proper protection of fish and game in connection with the construction or work, or in connection with the use, and the approximate date the construction, work, or use will begin, and shall require the person or governmental agency to obtain written approval from him as to the sufficiency of the plans or specifications before the proposed construction or use is begun.

Purpose. - The purpose of this section is to protect and conserve fish and game and other natural resources. 1964. Att'y Gen., No. 10.

Alaska Coastal Management Program

The recently approved Alaska Coastal Management Program (ACMP) mandates that all State, Federal and Local government agencies must coordinate all planning and development activities in the State's coastal zone to ensure adequate consideration and protection of Alaska's coastal waters and resources. As the proposed Susitna Hydropower project will occur within Alaska's coastal zone and certainly will directly influence coastal waters all planning and development plans must be consistent with the Coastal Standards and the Mat-Su Borough's District Coastal Plan once it is completed and approved. The Coastal Standards are presently in effect and all State and Federal actions must be consistent with them. Section 6 AA C 80.130 states that:

(a) habitats in the coastal area which are subject to the Alaska Coastal Management Program include:

- (1) offshore areas
- (2) estuaries
- (3) wetlands and tidal flats
- (4) rocky islands and sea cliffs

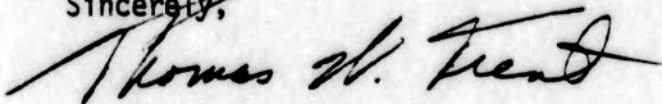
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- (5) barrier islands and lagoons
- (6) exposed high energy coasts
- (7) rivers, streams and lakes
- (8) important upland habitat

These habitats which are specifically defined in the Standards must be identified within the Susitna Hydro Study area during the feasibility studies. In addition, Section (b) states that habitats contained in (a) of this section shall be managed so as to maintain or enhance the biological, physical and chemical characteristics of the habitat which contributes to their capacity to support living resources. Specific guidelines are also provided for each coastal habitat. The Coastal Zone Management consistency requirements are mandated in both the Alaskan and Federal CZM Acts and the Fish and Wildlife Coordination Act. The question of consistency with CZM standards goes well beyond the FERC licensing requirements and should be treated as a separate step in determining the feasibility of Hydro Power alternatives.

Thank you for the opportunity to comment, we expect to provide more information to you during the next weeks regarding the development of a final POS.

Sincerely,



Thomas W. Trent
Regional Supervisor
Habitat Protection Section

cc: Commissioner R.O. Skoog, Juneau
Directors, ADF&G, Juneau
Murray Walsh, OCM, Juneau
Keith Schreiner, USFWS, Anchorage
Rep. Brian Rodgers, Fairbanks
Rep. Rick Halford, Chugiak

Susitna

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

November 19, 1979

Mr. Thomas Trent
Susitna Coordinator
Alaska Department of Fish
and Game
333 Raspberry Road
Anchorage, Alaska 99502

Dear Tom:

Thank you for your efforts last week in helping to formulate an efficient, thorough and realizable fish and game study program for the initial years of the Susitna investigations.

The Power Authority accepts the scope and budget of the big game studies as presented in your October 31, 1979 proposal and as discussed with Carl Schnieder on November 16, 1979. The total cost of the presently envisioned studies will not exceed \$1,312,000, not counting the effects of inflation. Based on this understanding and pending release of appropriated funds, the Power Authority intends to request that ADF&G join in a reimbursable services agreement for the performance of these pre-license application studies in the area of big game.

Attached you will find a revised budget for fishery studies that reflects my understanding of the agreed upon program resulting from our November 15, 1979 meeting. I realize that there may be a few minor unresolved issues and therefore request that you review the figures. The only major component of the program about which there remains disagreement is the installation of a weir on Iron Creek. The opinion of our consultants is that the proposed program on Iron Creek will not provide useful information appropriate to analysis of the Susitna project. I hope that this issue will not prevent the acceptance of the remainder of the program.

If we can achieve a mutually agreeable fishery program in scope and budget, it is my intent to request that ADF&G conduct this program, also under a reimbursable services agreement. The agreement would cover pre-license application activities, with the understanding that required work would continue during license processing and beyond.

Mr. Thomas Trent
November 19, 1979
Page Two

Please advise me as to the acceptability of the revised fishery budget at your earliest convenience. Thank you.

Sincerely,

Original Signed
by
Eric P. Yould
Eric P. Yould
Executive Director

Attachment:

1. Proposed fishery budget

CC:

Rep. R. Halford
Rep. B. Rogers
Comm. Skoog, ADF&G
Comm. Mueller, ADEC
Comm. LeResche, ADNR
John Lawrence, ACRES
R. Bowker, USFWS
E.R. Logan, Chief Habitat Protection
Section, ADF&G

ALASKA POWER AUTHORITY
Proposed Fishery Budget

November 16, 1979

Administration	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase 1982</u>
<u>Line 100 - Personal Services</u>				
Bio III - 6 mo @ 4,053	\$12,159.00	\$ 24,318.00	\$ 12,159.00	\$12,159.
Programer - 6 mo @ 3,035 (3 mo)		18,200.00	9,200.00	9,200.
Data Handler - 6 mo @ 2,100		12,600.00	6,300.00	6,300.
CLT IV - 12 mo @ 2,100	12,600.00	25,200.00	25,200.00	
Publications Spec - 3 mo @ 2,841 (6 mo)		8,523.00		8,523.
Maintenance Mech - 12 mo @ 2,730		32,760.00	32,760.00	
Total	<u>24,759.00</u>	<u>121,601.00</u>	<u>85,619.00</u>	<u>36,182.</u>
<u>Line 200 - Travel</u>				
Travel and per diem		<u>7,500.00</u>	<u>7,500.00</u>	
Total	<u>0.00</u>	<u>7,500.00</u>	<u>7,500.00</u>	<u>0.</u>
<u>Line 300 - Contractual Services</u>				
Equipment repair, freight and transportation - including air charter and vehicle rental (1)		<u>11,100.00</u>	<u>11,100.00</u>	
Total	<u>0.00</u>	<u>11,100.00</u>	<u>11,100.00</u>	<u>0.</u>
<u>Line 400 - Commodities</u>				
Clothing, materials, parts, professional and scientific supplies, office and library supplies		<u>13,500.00</u>	<u>13,500.00</u>	
Total	<u>0.00</u>	<u>13,500.00</u>	<u>13,500.00</u>	<u>0.</u>
<u>Line 500 - Equipment</u>				
Cameras (6) and shop equipment		<u>5,900.00</u>	<u>2,000.00</u>	
Total	<u>0.00</u>	<u>5,900.00</u>	<u>2,000.00</u>	<u>0.</u>
GRAND TOTAL	\$24,759.00	\$159,601.00	\$119,719.00	\$36,182.

NOTE: Phase I (per-license application activities) include CY 80, CY 81 and Phase I 1982. CY 82 represents the first year of Phase II (license processing activities).

Anadromous Adult - Stock Assessment

Task #1. Cook Inlet Stock Assessment

<u>Scale Pattern Analysis</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</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	0.00	88,295.00	88,295.00	0.00
<u>Line 200 - Travel</u>				
Travel/per diem		1,000.00	1,000.00	
Total	0.00	1,000.00	1,000.00	0.00
<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 miles)		2,040.00	2,040.00	
Total	0.00	8,540.00	8,540.00	0.00
<u>Line 400 - Commodities</u>				
Scientific supplies (500/field crew)		1,500.00	1,500.00	
Food (312 days @ 10/day)		3,120.00	3,120.00	
Gill nets		1,000.00		
Housing (650/mo)		1,300.00	1,300.00	
Clothing (200/person)		1,200.00	1,200.00	
Total	0.00	8,120.00	7,120.00	0.00
<u>Line 500 - Equipment</u>				
Digitizer (Omega computer)		8,200.00		
Total	0.00	8,200.00	0.00	0.00
Total for Scale Pattern Analysis	0.00	\$114,155.00	\$104,955.00	0.00

Anadromous Adult - Stock Assessment (cont.)

Task #1. Cook Inlet Stock Separation

<u>Electrophoresis</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
<u>Line 100 - Personal Services</u>				
8 mm FT II @ 1,826		\$14,608.00		
Total	0.00	14,608.00	0.00	0.00
<u>Line 200 - Travel</u>				
Travel/per diem		1,000.00		
Total	0.00	1,000.00	0.00	0.00
<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 miles)		1,360.00		
Total	0.00	17,860.00	0.00	0.00
<u>Line 400 - Commodities</u>				
Scientific supplies		1,000.00		
Food (208 days @ 10/day)		2,080.00		
Housing (650/mo)		1,300.00		
Clothing		800.00		
Total	0.00	5,180.00	0.00	0.00
<u>Line 500 - Equipment</u>				
	0.00	0.00	0.00	0.00
Total for Electrophoresis	0.00	\$38,648.00	0.00	0.00

Anadromous Adult - Stock Assessment

Task #2. Susitna River Mouth to Yentna River

<u>Susitna Station (May 15 - October 15)</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</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	49,420.00	0.00
<u>Line 200 - Travel</u>				
Travel/per diem		200.00	200.00	
Total	0.00	200.00	200.00	0.00
<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	
Repairs of maintenance		1,200.00	1,200.00	
Total	0.00	4,400.00	4,400.00	0.00
<u>Line 400 - Commodities</u>				
Fish Tags (10,000)		7,000.00	7,000.00	
Food (552 days @ 10/day)		5,520.00	5,520.00	
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	14,845.00	14,645.00	0.00
<u>Line 500 - Equipment</u>				
2 side scan sonar counters		78,000.00		
2 recorders		600.00		
Oscilloscope		1,800.00		
Total	0.00	80,400.00	0.00	0.00
Total for Susitna Station	0.00	\$149,265.00	\$68,665.00	0.00
<u>Yentna Sonar</u>				
<u>Line 100 - Personal Services</u>				
10 mm FB I @ 2,471		\$ 24,710.00	\$ 24,710.00	
10 mm FT II @ 1,826		18,260.00	18,260.00	
600 hrs overtime @ 18.25/hr		10,950.00	10,950.00	
Total	0.00	53,920.00	53,920.00	0.00

Anadromous Adult - Stock Assessment

<u>Yentna Sonar (cont.)</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
<u>Line 200 - Travel</u>		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>7,350.00</u>	<u>7,350.00</u>	<u>0.00</u>
<u>Line 400 - Commodities</u>				
Food (616 days @ 10/day)		6,160.00	6,160.00	
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	
Fishwheels (2 - parts and labor)		2,400.00	500.00	
Clothing		800.00	800.00	
Total		<u>16,535.00</u>	<u>13,935.00</u>	<u>0.00</u>
<u>Line 500 - Equipment</u>				
2 boats		4,000.00		
Four 25 hp outboards		2,976.00		
2 side scan sonar counters		78,000.00		
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		
Total		<u>90,076.00</u>	<u>0.00</u>	<u>0.00</u>
Total for Yentna Sonar		\$167,881.00	\$75,205.00	0.00

Anadromous Adult - Stock Assessment

Task #3. Yentna River to Talkeetna

<u>Sunshine Sonar Site</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
<u>Line 100 - Personal Services</u>				
10 mm FB 1 @ 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		83,130.00	83,130.00	0.00
<u>Line 200 - Travel</u>				
		0.00	0.00	0.00
<u>Line 300 - Contractual Services</u>				
Vehicle rental (250/mo and 2,500 miles)		1,700.00	1,700.00	
Repairs and maintenance		1,500.00	1,500.00	0.00
Total		3,200.00	3,200.00	0.00
<u>Line 400 - Commodities</u>				
Food (924 days @ 10/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	300.00	
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		29,415.00	24,415.00	0.00
<u>Line 500 - Equipment</u>				
2 boats		4,000.00		
4 outboards		2,976.00		
2 side scan sonar counters		78,000.00		
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		
Total		91,776.00	0.00	0.00
Total for Sunshine Sonar Site	0.00	207,521.00	110,745.00	0.00

Anadromous Adult - Stock Assessment

<u>Creel Census</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
<u>Line 100 - Personal Services</u>				
9 mm FT II @ 1,826	16,434.00	16,434.00		
Overtime 450 hrs @ 18.25	8,213.00	8,213.00		
Total	24,647.00	24,647.00	0.00	
<u>Line 200 - Travel</u>	0.00	0.00	0.00	
<u>Line 300 - Contractual Services</u>				
Vehicles (2 @ 250/mo and 2,000 miles)	860.00	860.00		
Total	860.00	860.00	0.00	
<u>Line 400 - Commodities</u>				
Food (276 days @ 10/day)	2,760.00	2,760.00		
Housing (500/mo)	750.00	750.00		
Gas and O/B oil	1,000.00	1,000.00		
Total	4,510.00	4,510.00	0.00	
<u>Line 500 - Equipment</u>				
	0.00	0.00	0.00	
Total for Creel Census	30,017.00	30,017.00	0.00	
Task #4. Budget is included in juvenile studies.				
Task #5. Budget included in resident fisheries studies.				
<u>Program Supervisors</u>				
Anadromous Fisheries Studies Supervisor	19,476.00	38,952.00	35,706.00	3,246.00
FB III @ 3,246/mo				
Total	19,476.00	38,952.00	35,706.00	3,246.00
Grand Total	88,141.00	707,791.00	395,285.00	3,246.00

Resident and Juvenile Anadromous Fishery Study

	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</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		44,478.00	44,478.00	0.00
<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		1,700.00	1,725.00	0.00
<u>Line 300 - Contractual Services</u>				
Communications		200.00	200.00	
Professional Services		300.00	200.00	
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		7,000.00	14,600.00	0.00
<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		7,905.00	8,150.00	0.00
<u>Line 500 - Equipment</u>				
Inflatable boat		2,000.00		
Outboard		1,000.00		
Radio		1,600.00		

Resident and Juvenile Anadromous Fishery Study

	CY 80	CY 81	CY 82	Phase I 1982
<u>Devil Canyon to Tyone River Impoundment(cont)</u>				
Electroshocker		1,200.00		
Guns (2)		500.00		
Thermographs @ 300 each		3,600.00		
DO Meter		600.00		
Conductivity meter		600.00		
ph meter		200.00		
Total		<u>11,200.00</u>	<u>0.00</u>	<u>0.00</u>
Total for Devil Canyon to Tyone River	0.00	72,283.00	68,953.00	0.00
<u>Talkeetna River to Devils Canyon</u>				
<u>Line 100 - Personal Services</u>				
4 FB i's @ 2,471 x 6 mos.		<u>59,304.00</u>	<u>59,304.00</u>	<u>0.00</u>
Total		59,304.00	59,304.00	0.00
<u>Line 200 - Travel</u>				
Transportation (train)		1,600.00	2,000.00	
Private vehicle mileage		300.00	500.00	
Per diem @ 55/day		<u>1,100.00</u>	<u>1,100.00</u>	
Total		3,000.00	3,600.00	0.00
<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		<u>500.00</u>	<u>400.00</u>	
Total		8,050.00	7,025.00	0.00
<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

	CY 80	CY 81	CY 82	Phase I 1982
<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 @ 1.10/gal		2,200.00	2,400.00	
Marine oils, lubes, etc.		200.00	250.00	
Building materials		500.00	500.00	
Trap materials, net frames, bouys, etc.		500.00	500.00	
Miscellaneous		600.00		
Camp gear, stove, lantern, etc.		300.00	600.00	
Total		12,800.00	13,300.00	0.00
<u>Line 500 - Equipment</u>				
Riverboat		2,500.00		
Thermographs @ 300 each		3,000.00	1,200.00	
DO meter		600.00		
Conductivity meter		600.00		
ph meter		200.00		
Outboard motor, 85 hp.		3,800.00		
Jet unit @ 600 each		600.00		
Rubber raft		3,500.00		
Outboard 25 hp - 2		2,400.00		
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		
Total		20,700.00	4,550.00	0.00
Total for Talkeetna River to Devils Canyon	0.00	103,854.00	87,779.00	0.00
<u>Cook Inlet to Talkeetna</u>				
<u>Line 100 - Personal Services</u>				
4 FB I's for 26/mo. for CY 80		64,246.00	103,782.00	
4 FB I's for 42/mos for CY 81				
Resident Fisheries Study Supervisor				
FB III @ 3,246/mo	19,476.00	38,952.00	35,706.00	3,246.00
Total	19,476.00	103,198.00	139,488.00	3,246.00
<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		6,650.00	7,050.00	0.00

Resident and Juvenile Anadromous Fishery Study

				Phase I
<u>Cook Inlet to Talkeetna</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>1982</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		16,950.00	21,850.00	0.00
<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	
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		26,900.00	34,990.00	0.00
<u>Line 500 - Equipment</u>				
Riverboat		1,600.00		
75 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		
Total		18,300.00	0.00	0.00
Total for Cook Inlet to Talkeetna	19,476.00	171,998.00	203,378.00	3,246.00
GRAND TOTAL	19,476.00	348,135.00	360,110.00	3,246.00

Spacial and Seasonal Habitat Studies

<u>Cook Inlet to Portage Creek</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
<u>Line 100 - Personal Services</u>				
Habitat Study Supervisor				
FB III @ 3,359	20,154	40,308.00	36,949.00	
FB I @ 2,471 (44 mm in 1981, 60 mm in 1982)		108,724.00	148,260.00	
Total	20,154.00	149,032.00	185,209.00	3,359.00
<u>Line 200 - Travel</u>				
120 days per diem @ 55/day		6,600.00	6,600.00	
Miscellaneous				
Total		6,600.00	6,600.00	0.00
<u>Line 300 - Contractual Services</u>				
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	
Boeing computer analysis		10,000.00	25,000.00	
Miscellaneous		500.00	500.00	
Total		30,550.00	45,550.00	0.00
<u>Line 400 - Commodities</u>				
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	0.00
Total		22,200.00	24,900.00	0.00
<u>Line 500 - Equipment</u>				
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		
3 current meters (AA) @ 350		1,050.00		
3 current meters (pygmy) @ 400		1,200.00		
3 Marsh McBirney flow meters				
digital readout @ 1,600 each		4,800.00		
9 top setting wading rods @ 200 each		1,800.00		
Suspended flow support system		400.00		
2 boat mounted flow metering systems @ 1,600		3,200.00		

Spacial and Seasonal Habitat Studies

<u>Cook Inlet to Portage Creek (cont)</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase I 1982</u>
Sonar narrow beam system		3,000.00		
4 headsets @ 50/each		200.00		
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' Wooldridge 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 conductivity meters @ 600 each		3,000.00		
5 ph meters @ 200 each		1,000.00		
15 thermometers @ 25 each		375.00		
20 thermographs @ 350 each		7,000.00		
400 Leupold staff gages @ 11 each		4,400.00		
Total		<u>53,305.00</u>	<u>0.00</u>	<u>0.00</u>
Total for Cook Inlet to Portage Creek				
	20,154.00	261,687.00	262,259.00	3,359.00

Spatial and Seasonal Habitat Studies

<u>Portage Creek to Tyone River</u>	<u>CY 80</u>	<u>CY 81</u>	<u>CY 82</u>	<u>Phase 1982</u>
<u>Line 100 - Personal Services</u>				
See resident studies				
<u>Line 200 - Travel</u>				
See resident studies				
<u>Line 300 - Contractual Services</u>				
Air charter				
6 hrs/mo for 6 mos @ 150/hr		\$ 5,400.00	\$ 5,400.00	
Total	0.00	5,400.00	5,400.00	0
<u>Line 400 - Commodities</u>				
See resident studies				
<u>Line 500 - Equipment</u>				
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 Leupold staff gages @ 11.00		275.00		
Total	0.00	5,250.00	0.00	0
GRAND TOTAL	\$20,154.00	\$272,337.00	\$267,659.00	\$3,359

ADF&G SUMMARY BUDGET

	<u>CY 1980</u>	<u>CY 1981</u>	<u>Phase I 1982</u>	<u>CY 1982</u>
Administration	\$ 24,759.00	\$ 159,601.00	\$36,182.00	\$ 119,719.00
<u>Adult Stock Assessment</u>				
Scale Pattern Analysis		114,155.00		104,955.00
Electrophoresis	38,648.00			
Susitna Station		149,265.00		68,665.00
Yeutna Station		167,881.00		75,205.00
Sunshine Station		207,521.00		110,754.00
Creel Census	30,017.00	30,017.00		
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	88,141.00	707,791.00	3,246.00	395,285.00
<u>Resident & Juvenile</u>				
Impoundment Area		72,283.00		68,953.00
Talkeetna-Devil Canyon		103,854.00		87,779.00
Cook Inlet-Talkeetna	19,476.00	171,998.00	3,246.00	203,378.00
<u>Habitat</u>	20,154.00	261,687.00	3,359.00	262,259.00
Above Portage Creek	<u> </u>	<u>10,650.00</u>	<u> </u>	<u>5,400.00</u>
Subtotal	39,630.00	620,472.00	6,605.00	627,769.00
<u>GRAND TOTAL</u>	<u>\$152,530.00</u>	<u>\$1,487,864.00</u>	<u>\$46,033.00</u>	<u>\$1,142,773.00</u>

NOTE: The office and administrative support to be provided by ACRES is not included in the above.



*Susitna
Consult*

UNIVERSITY OF ALASKA

October 18, 1979

Mr. Mark Wittow
c/o Representative Hugh Malone
and Representative Brian Rogers
Alaska State Legislature
727 N Street
Anchorage, Alaska 99501

Dear Mr. Wittow:

In response to your request, this letter describes the report AEIDC would submit to Representatives Malone and Rogers on the long-range socio-cultural impacts of the proposed Susitna Hydropower project.

SCOPE OF WORK

AEIDC will submit a report to Representatives Hugh Malone and Brian Rogers on the long-range socio-cultural factors which should be considered in connection with the Susitna hydropower project as presently proposed. The report will analytically survey, within the constraints of time and funding, the policy and planning issues which should be taken into account.

Relevant considerations include, but need not be limited to, the impacts on:

Human occupancy patterns in the affected region:

- Population trends
- Housing and attendant services
- Land ownership patterns

Infrastructure:

- Energy
- Transportation
- Communication
- Other public facilities

Employment opportunity patterns
Government, corporate, private

Economic developments in:

- Manufacturing and commerce
- Mining and real estate
- Recreation and tourism
- Agriculture and fishing
- Other

Mr. Mark Wittow
Page 2
October 18, 1979

Political developments in:

- Governmental jurisdictions
- Regional voting patterns and political strength
- Land use planning and regulation
- Taxation

Environmental impacts and cultural change

The cultural past

Attitudinal developments:

- Value framework
- The cultural mix: way of life/lifestyle

While the focus of this report will be on the long-term, appropriate attention will be paid to developments and trends in all phases of the proposed project: pre-construction, construction, post-construction. The underlying emphasis of the study will be on the effort to portray the interacting interrelationships between developments in the above noted areas which come together to form the cultural whole.

Time and funding permitting, an attempt will be made to find and research experiences with similar hydropower projects in other northern regions of the United States, Canada and Scandinavia.

It is anticipated that the costs of this study will amount to \$8,500, with the report to be submitted by March 1, 1980.

Sincerely,

Charles Konigsberg
Charles Konigsberg
Research Associate

CK/bsm



UNIVERSITY OF ALASKA

September 24, 1979

Mr. Brian Rogers
Alaska State Legislature
Juneau, Alaska

Dear Brian:

During the late 1950's environmental studies of the Susitna project were begun. From that time to today a good deal of scientific and resource information has been gathered which permits some understanding of impacts to be experienced around the project site and upstream within and adjacent to the planned impoundment. With the new project plans being developed by the state, further work will be done on assessment of effects on fish and wildlife. Plans for such studies are now being developed. The purpose of this letter is to emphasize the need for studies of downstream environmental and social impacts.

Even without undertaking a series of project plans, it appears certain that downstream flow regimes will be altered significantly. Among the changes we anticipate are a reduction in turbidity and silt load reduction in summer flows, increased winter flows, and changes in water temperature and timing of ice formation. Such changes could have profound effects on fish and wildlife habitat. Such changes give rise to a few questions I should like to flag for the committee's attention:

1. What effect will flow regulation and reduced silt load have on marsh and riparian habitats downstream, specifically for moose, waterfowl, and fur animals? Generally speaking, seasonal flooding by silt laden waters tends to create and maintain the productivity of these habitats.
2. What effect will flow regulation have on seasonally flooded aquatic habitats downstream? Similar processes to that mentioned in Number 1 above may also be important to some aquatic habitats.
3. Would changes in flow regimes affect fish migration into the Susitna River system? Chemical composition of riverine waters has been shown to be important to fish homing into similar river systems. Some tributaries of the Susitna are important salmon habitat.
4. How would changes in flow rates and turbidity affect riparian and marine habitats of Cook Inlet adjacent to the Susitna River mouth? The Susitna River may be an important source of nutrients for these varied habitats.

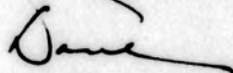
UNIVERSITY OF ALASKA

Brian Rogers
September 24, 1979
Page two

5. What type of sport fishing might develop downstream from the project and what would be the value of this fishery? There is a high demand for sport fishing throughout the area.
6. Would changes in ice regimes affect fish and wildlife habitat? Seasonal aspects of temperature and flow regimes will be altered and should be evaluated.
7. How would the project affect human occupancy and transportation on the lower river? Changes in flow regimes will alter water depths and flows within river channels and will affect human occupancy and facility patterns along the river.

These examples open several lines of inquiry which may shed some light on other value systems associated with the Susitna project. I hope they are of help.

Sincerely,



David M. Hickok,
Director

DMH/bsm



UNIVERSITY OF ALASKA

September 24, 1979

Mr. Brian Rogers
Alaska State Legislature
Juneau, Alaska

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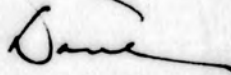
UNIVERSITY OF ALASKA

Brian Rogers
September 24, 1979
Page two

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Sincerely,



David M. Hickok,
Director

DMH/bsm

Climatological
impacts
of evaporation?

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

JAY S. HAMMOND, GOVERNOR

SUPPORT BUILDING
JUNEAU 99801

March 9, 1979

The Honorable Brian Rogers
Alaska State Legislature
Pouch V, State Capitol
Juneau, Alaska 99811

Dear Mr. Rogers:

Thank you for the opportunity to provide background information on the Susitna Hydroelectric Project. In keeping with a request from your aide, Mark Wittow, we have included a general summary of moose and caribou movement patterns in the Devil's Canyon area, and a general summary of the historical significance of moose and caribou harvests in the Nelchina Basin.

The impacts of a hydroelectric project of this scale on moose and caribou are difficult to assess, since the literature is deficient in providing detailed comparative information. Potential impacts on moose may be more easily estimated than caribou, however, as moose seasonal migrations and habits are more "fixed".

Major impacts on moose will occur through inundation of wintering areas on gravel bars above the dam, and also from diminution and "evening out" of the downstream pattern of seasonal flooding and the generation of new sandbars and river braids. New gravel bars are important in setting back succession and providing young and tender willow shoots for winter moose food.

Obviously additional impacts will arise from the practical barrier to traditional movements that the lake will provide, particularly for post calving caribou. Secondary impacts in the form of increased human access to these areas will also accrue.

Our Department has proposed a series of research projects designed to evaluate more precisely the environmental impacts of the dam. I have enclosed a copy of these proposals for your consideration. Our philosophy is that if funding is reduced much below the amount required, we

will perform only those projects we consider most critical. I am sure you agree that it is dollar foolish to attempt only a cursory examination of such complex biological problems.

We have compiled a table illustrating the recent use patterns of the Nelchina moose and caribou herds. I believe this will answer your questions regarding the relative importance of the moose and caribou take in the area.

Background knowledge of the Susitna River fisheries is limited. The Susitna River basin is an important habitat for a wide variety of fish species, both resident and anadromous. Five species of salmon (chinook, coho, chum, pink, and sockeye) utilize the Susitna River drainage for spawning and rearing. The majority of the chinook, coho, chum, and pink salmon in the Cook Inlet area are produced in this drainage. Grayling, rainbow trout, Dolly Varden, burbot, lake trout, whitefish, and sculpins are the more common resident fish species.

Baseline environmental fisheries studies have been conducted by ADF&G intermittently since 1974. These projects were financed with Federal funding averaging \$29,000 per year in 1974, 1975 and 1976, and an allocation of \$100,000 in 1977. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) first contracted ADF&G to conduct a one-year assessment of salmon populations utilizing the Susitna River in the vicinity of the proposed Devils Canyon dam site during 1974. The objectives of these studies were to determine the adult salmon distribution, relative abundance, and migrational timing and to identify juvenile rearing areas (Barrett, 1974). Funding was received in 1975, 1976, and 1977 from USFWS to continue and expand these studies and to monitor the physical and chemical parameters associated with the mainstem Susitna (USFWS, 1976; and Riis, 1977). Additional baseline studies were not initiated during 1978 due to lack of funding.

The construction and subsequent operation of the Devils Canyon and Watana dams will result in long-term ecological changes. The two dams will inundate an estimated 50,550 acres of aquatic and terrestrial habitat of the Susitna River Basin upstream of Devils Canyon. Regulation of the mainstem river will substantially alter the natural downstream flow regimes and temperature gradients. Secondary impacts such as improved road, water, and floatplane access may create some additional problems in regulating hunter and fishermen harvest.

Our preliminary studies have concluded that the effects of impoundment and construction activities will include alteration of the natural flow regimes, water temperatures, water chemistry, and transport of materials.

March 9, 1979

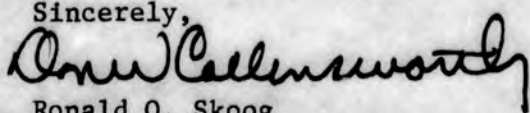
Habitat requirements of the critical life history phases for passage, spawning, egg incubation, and juvenile rearing of the Susitna salmon species studied are quite specific. The USFWS Cooperative Instream Flow Service Group has developed criteria which demonstrate the narrow tolerances of certain salmonid and resident species to the hydraulic parameters of velocity, depth, substrate, and temperature (Bovee, 1978). The seasonally wide fluctuations of water velocity, depth, temperature, substrate and sediment of the free flowing mainstem Susitna, its sloughs and tributaries determine the availability and accessability of salmon habitat. Thus, any alterations to the existing Susitna aquatic ecosystem which restrict or reduce the availability of required habitat, will also reduce fish production in the Susitna Basin and Cook Inlet estuary.

For example, it is important to note that although the Susitna River is glacial and turbid more than half of the year, the river clears during the winter months and becomes the major winter rearing area for salmonids, replacing its clearwater tributaries and sloughs which freeze and dewater. Chinook and coho salmon, which are of high interest to both commercial harvesters and sport anglers in the Cook Inlet area, are dependent on these freshwater rearing areas of the Susitna for a period of one to two years before migrating to saltwater. These important rearing areas will be lost downstream of the dams because the river will be turbid year-round and have a higher water velocity due to a reversal of the natural seasonal flow and stage conditions after construction. Although total salmon escapement estimates have not been derived for this system, it is probably the second or third largest sockeye salmon production area within Cook Inlet. Economically, the estimated average annual commercial value of the sockeye, king, pink, chum, and coho Susitna salmon stocks was \$8,721,780 in 1975. This does not include the 1975 estimated value of \$3,701,745 for the additional salmon in the Susitna River Basin necessary for producing this estimated potential catch (Friese, 1975). Although figures for subsequent years are unavailable because of insufficient data, it can be assumed the value of this fishery has greatly increased.

Economic values related to recreation are unavailable but are assumed to be high due to high concentration of the population adjacent to the Susitna River. Non-consumptive economic values are also unavailable.

We will be sending under separate cover copies of the above cited reports. I hope this in large part answers your questions. Please feel free to contact us for more information.

Sincerely,


Ronald O. Skoog
Commissioner

December 14, 1978

The Honorable Mike Gravel
United States Senate
3121 Dirksen Senate Office Bldg.
Washington, D.C. 20510

Re: Susitna Hydro Project

Dear Senator Gravel:

Thank you for your letter of October 11 requesting further information on the budgets required for fisheries investigations relative to the Susitna Hydro Project. Although you requested information related only to fisheries, I would like to take this opportunity to familiarize you with all of the biological investigations and inform you of our concerns regarding these fish and wildlife studies.

You asked: "How much money is required to conduct the required fishery impact study in the Upper and Lower Susitna River drainages?" Enclosed are the pages of the June 1978 Phase I Plan of Study (POS) prepared by the Corps of Engineers (Attachment 1) which address all proposed biological investigations. The information contained in these pages outlines the proposed biological studies which should be a part of work performed to aid in the determination of the feasibility of this Susitna Hydro Project. Studies B-2 through B-7 are required to assess the impact of the proposed project on the Susitna River's fisheries resources. Using the Corps projected cost the fisheries portion of these studies would amount to \$2,264,000. The Department estimates that \$5,153,000 would be required to adequately perform these studies.

Secondly, you requested: "Of the total amount of money that is needed, what is the breakdown on amounts and sources from which it can be obtained? Specifically how much can be made available for such a study from ADF&G, how much can be counted on from National Marine Fisheries Service, and finally,

December 14, 1978

how much must come from the Corps of Engineers?" The table in Attachment 2 shows the Phase I budgets proposed by the Corps (4.3 million dollars) and by the Department (7.9 million dollars) and the differences between the budgets in dollars and percent. As you will note, there is a 3.6 million dollar difference between the Corps and ADF&G budget proposals. A recent letter to Eric Yould, Executive Director of the Alaska Power Authority (Attachment 3), further expresses our concerns of the inadequacy of funding for the Phase I biological investigations.

We believe the money for the Phase I investigations should come from the federal government through the Corps of Engineers or through State appropriations for the full term (46 months) of the proposed studies. Funding may be available this year if the State of Alaska appropriates between 7 and 8 million dollars to initiate the first year of Phase I studies. However, there is no assurance that the remainder of the investigations will be funded.

This Department does not have the funds to divert into the study of the Susitna Hydro Project. Diversion of Federal Aid in Wildlife Restoration (P-R) or Federal Aid in Fisheries Restoration (D-J) funds and projects to study fish and wildlife impacts would result in sport hunters and fishermen subsidizing investigations of a project affecting not only these user groups but the broad spectrum of the public. Also, all of the Department's D-J and P-R funds are currently dedicated to ongoing studies.

The third question you asked: "What is the time frame involved in this type of fishery impact study?" is critical to our success in maintaining the fishery. As we stated in the attached letter to the APA, we believe a strong indication of the feasibility of this project with respect to fish and wildlife can be stated if the proposed Phase I studies in the POS are carried out. There are effectively three full field years possible in the 46 month Phase I time frame. The time frames are basically laid out in the enclosed biological investigations section of the POS (Attachment 1, pages 229-302). All salmon species have in excess of two year life cycles and certain studies, to accommodate the investigation of species with life cycles up to five years, should be extended beyond that three years to a full five year time frame. Earlier proposals by this Department for five years of study would have cost ten million dollars. Until the feasibility investigations are complete and the potential fish and wildlife impacts identified, projection on time and cost of fish and wildlife mitigation studies are not presently possible.

I hope that the material enclosed, and our discussion will point out that alternatives for providing the budgets for biological investigations must be explored. We seek your assistance in determining if the Susitna Hydro Project is feasible from a biological standpoint. If the decision is made

Mike Gravel

-3-

December 14, 1978

to proceed with construction, we also seek your assistance in seeing that the project is done in a manner which mitigates fish and wildlife resource losses. Please contact this Department if you need more information.

Sincerely,

Ronald O. Skoog
Commissioner

Attachments (4)

cc: R. Logan
T. Trent

Abcc: K. Schneider ✓
B. Haganan/N. Triese
L. Hechart

ROS:EL:er

STATE OF ALASKA

JAY S. HAMMOND, GOVERNOR

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

SUPPORT BUILDING
JUNEAU, ALASKA 99901

December 5, 1978

Eric P. Yould
Executive Director
Alaska Power Authority
313 West 4th Avenue, Suite 31
Anchorage, Alaska 99501

Dear Mr. Yould:

The Alaska Department of Fish and Game conducted a detailed review of the proposed biological studies in the Susitna Hydro Plan of Study (POS) during April of this year to assist the Corps of Engineers in POS revision. Subsequently, the results of this effort were printed in the June 1978 POS document.

In his June 28 letter transmitting the revised POS to the Alaska Power Authority, Colonel Robertson of the Corps stated, "the activities defined in this document have been developed to adequately address determination of project feasibility." This statement is only partially correct. Although the study objectives are adequate, the funding is totally inadequate to meet those objectives.

On page 40, paragraph 2 of the revised POS, it is stated that "The biological studies outlined in the Plan of Study are of sufficient depth to provide, at the end of Step 2, a strong indication of the probable magnitude of the impacts of the project and to evaluate project feasibility, but may be unable to define the magnitude of mitigation." We agree that the proposed range of the biological studies discussed in these narratives, if performed, should give a strong indication of the feasibility of the Susitna Hydro Project. The budget levels as presently apportioned by the Corps will, however, sorely impair the level of technical and professional sophistication needed to determine feasibility. On April 25, 1978, a letter (attached) by Tom Trent, the Susitna Hydro Studies Coordinator for the Department, forwarded to the Corps of Engineers this Department's basic agreement to the thrust of the biological studies and also included our recommended budget. The budgets proposed by the Department of Fish and

December 5, 1978

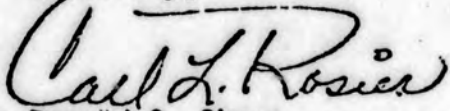
Game are those we believe necessary to provide the necessary information to provide project feasibility.

Although there is an aggressive effort to get the Phase I studies moving along the schedule proposed in the Susitna Hydro POS, both the private and governmental sectors must recognize that the Susitna Hydro Project will still be subject to the requirements of Federal environmental law, particularly the National Environmental Policy Act and the Fish and Wildlife Coordination Act. Inadequate Phase I studies and failure to meet the standards of these laws and regulations for project feasibility can, and probably will, result in delays from litigation by preservationist and anti-development interests.

The constraints placed on the Corps by the 25 million dollar figure in proposed Federal guarantee legislation for support of the Phase I investigations is unfortunate. It has resulted in reverse budgeting from the top down rather than from the bottom, and consequently, we believe a reduced concern for the adequacy of environmental study programs and their priorities. This Department believes the budgeting situation is poor at best, and every effort should be made by the State of Alaska and our congressional delegation to correct it by reviewing and revising the dollar figure for Federal guarantee legislation to reflect our Department's and other agencies' budget proposals.

Your support and leadership in addressing a solution to our concerns would be greatly appreciated.

Sincerely,



Ronald O. Skoug
Commissioner

Attachment

cc: R. Logan
T. Trent

Susitna Hydro Biological Investigations

I. Background

The Alaska Department of Fish and Game (ADF&G) has been actively involved in coordinating, proposing, and conducting biological studies related to the Susitna Hydropower Project since 1974. From that time to today, we have had many problems in attaining the scope of study and funding the Department believes is necessary to adequately assess the biological impacts of this proposed hydropower development.

Initially our concerns were not only limited to funding of adequate studies, but also included geographic areas which would be studied. Early on in the Susitna Hydro environmental assessment, the Corps of Engineers (COE) restricted our work to the immediate impoundment area and downstream to the confluence of the Chulitna River. One gain we feel we have made is the consideration of the impacts of this project, the largest hydro development in North America, on the downstream environment below the Susitna dams and the area above the impoundment.

The Department of Fish and Game, through its data review of possible fish, wildlife and other environmental impacts of the Susitna Hydro project have identified a number of concerns. As a data base we have only a

limited amount of environmental assessment work the Department has done to date. We believe the assessment of fish and wildlife resources impacts in Phase I of the Susitna Hydro studies are fundamental to the determination of this project's feasibility. If the project proves feasible, these biological studies are basic to the mitigation of fish and wildlife impacts when the project is constructed.

A. Fisheries Studies Background

Background knowledge of the Susitna River basin is limited. The proposed hydroelectric development necessitates gaining a thorough knowledge of its natural characteristics and fish and wildlife populations prior to final dam design approval and construction authorization to enable protection of the aquatic and terrestrial communities from unnecessary losses.

The Susitna River basin provides important habitat to a wide variety of fish species, both resident and anadromous. Five species of Pacific salmon (chinook, coho, chum, pink, and sockeye) utilize the Susitna River drainage for spawning and rearing. The majority of the chinook, coho, chum, and pink salmon production in the Cook Inlet area occurs within this drainage. Grayling, rainbow trout, Dolly Varden, burbot, lake trout, whitefish, and sculpins are some of the more common and important resident fish species.

Baseline environmental fisheries studies have been conducted by ADF&G intermittently since 1974. The projects were financed with

Federal funding averaging \$29,000 per year in 1974, 1975, and 1976, and an allocation of \$100,000 in 1977. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) first contracted ADF&G to conduct a one-year assessment of salmon populations utilizing the Susitna River in the vicinity of the proposed Devils Canyon dam site during 1974. The objectives of these studies were to determine the adult salmon distribution, relative abundance, and migrational timing and to determine juvenile rearing areas (Barrett, 1974). Funding was received in 1975, 1976, and 1977 from USFWS to continue and expand these studies and to monitor the physical and chemical parameters associated with the mainstem Susitna (USFWS, 1976; and Riis, 1977). Additional baseline studies were not initiated during 1978 due to lack of funding. A characteristic of ADF&G fish and wildlife studies to date on the Susitna Hydro Project area has been the discontinuity, uncertainty, and low levels of funding from several sources.

B. Wildlife Studies Background

The Susitna River basin has long been recognized as an extremely rugged wilderness area of high aesthetic appeal and as an important habitat to a wide variety of terrestrial wildlife species (ADF&G, unpubl. data). Most important to sport and subsistence users are moose and caribou, and to a lesser extent, grizzly bear and sheep. Hydroelectric development has been under consideration in this area for a number of years and some very general ungulate population

assessment work was begun in 1974 and completed in the spring of 1975 (USFWS, 1975). Additional studies were not conducted in the project area until March of 1977 when limited funds were made available to begin acquiring baseline information on moose and caribou populations within and adjacent to the project area. Funds received by Game Division for work to date were \$2,000, \$14,500, \$46,700, and \$16,500 for FY 74, FY 75, FY 77-78, and FY 78-79, respectively.

C. Evolution of the Proposed Phase I Susitna Hydro Biological Investigations

1. 1975 Proposal

The ADF&G entered its first comprehensive proposal for fish and wildlife investigations to the USFWS, and through that agency to the COE, on November 18, 1975. That proposal spread investigations over a five year period from FY 77 through FY 81, and indicated a cost of 3.62 million for ADF&G field work. To that figure should be added an additional cost for USFWS and NMFS coordination of \$525,000, and therefore a total cost of 4.145 million dollars for proposed fish and wildlife work.

Estimated cost of the Susitna Hydro Project construction in 1975 was 1.5 billion dollars.

2. 1977 Proposal

On December 15, 1977, the ADF&G completed a review of the COE

prepared draft Susitna Hydropower Plan of Study (POS) of September 1977. In our comments to that document, we included the Department's estimate of fish and wildlife and habitat investigation costs and our recommendation of needed studies. Total costs for ADF&G field investigations for a five year period totaled 10.5 million dollars. This increase over 1975 was due not only to inflationary factors, but also because our limited studies from 1974 through 1977 indicated new problem areas where impacts on fish and wildlife must be assessed.

Estimated construction cost for the Susitna Hydro Project in 1977 was 2.1 billion dollars.

3. 1978 Proposal

The Department revised its December 1977 proposal early in 1978 to fit the 46 month time frame for Phase I studies which the Alaska Power Authority (APA) and COE said would be imposed.

The Department objected then, and still does, to the compression of the time frame for biological investigations. My staff believes quite strongly that a minimum five year period is needed for an adequate biological study of the Susitna River Basin. The area encompassed is large and complex. Anadromous fish runs, for example, pose special problems of study because some salmon stocks have a five year life cycle.

In the June 1978 Susitna Hydropower Plan of Study, the COE gave some recognition to the need to complete fish and wildlife studies covering complete life cycles by stating in paragraph 2 on page 40 of the POS that: "some of the biological studies will require continuation through step 3 into construction to provide a base of life cycle, habitat, and other information needed to outline possible mitigation studies." However, we have no guarantee that funding to support these continuation studies will be made available. Furthermore, the preceding POS statement infers that the construction decision will occur before completing portions of the biological studies that are necessary for making the project feasibility decision. This clearly is in conflict with the Council on Environmental Quality Proposed Regulations under NEPA of June 9, 1978.

The Department's latest total budget recommendation of 7.9 million dollars for 46 months for Phase I feasibility investigations related to fish and wildlife was submitted to the Corps on April 19, 1978. The Corps and APA, over our objections, finally included a budget of 4.3 million dollars in the Susitna Hydro POS in June of 1978, a difference of 3.6 million dollars. This is a difference we find hard to resolve considering the job we must do to adequately assess the feasibility of this proposed project.

An independent analysis for Sport Fish Division by Milo Bell, a consulting engineer with extensive experience on Pacific Northwest hydro projects and fisheries related studies in Washington, indicated the fisheries feasibility investigations for a hydro project the size of Susitna Hydro would run to about 5.0 million dollars, a figure comparable with our own estimate of 5.1 million dollars.

Estimated construction cost of the Susitna Hydro Project at this time, March 1979, is 2.6 billion dollars.

Therefore, the Department has seen the cost of the Susitna Hydro Project rapidly escalate from 1.5 billion dollars in 1975 to 2.6 billion dollars in 1979, a 73 percent increase.

Meanwhile, the proposed budget for support of fish and wildlife studies has gone from 4.145 million dollars in 1975 to 4.3 million dollars (imposed by the Corps and APA), a 3.7 percent increase.

4. 1979 Proposed One Year Funding of Fish and Wildlife Biological Investigations Funding

On November 3, 1978, the Department was contacted by the Corps of Engineers with a request to provide our estimated budget for 1979 biological investigation adjusted from our prior fiscal year development to a calendar year and on a quarterly basis for the 1979 calendar year by November 4, 1978. These figures developed by ADF&G were:

<u>1979</u>	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Anadromous Fish Studies		\$115,000.00	\$115,000.00	\$ 43,000.00
Resident Fish Studies		80,000.00	250,000.00*	30,000.00
Aquatic Plants & Animals		5,000.00	99,000.00	
Economic Studies		10,000.00	15,000.00	
Support & Planning	\$10,000.00	32,000.00	90,000.00	
Wildlife Studies		20,000.00	80,000.00	150,000.00
	<u>\$10,000.00</u>	<u>\$262,000.00</u>	<u>\$649,000.00</u>	<u>\$223,000.00</u>
			*Sonar Development	

II. Constraints and Things to be Done

A. Planning and Coordination

The Department's involvement with Susitna River Hydro Project has, in the past, been characterized by the implementation of short term projects, hastily contrived out of necessity, without the opportunity for long term and ongoing planning.

Due to the nature, magnitude, and complexity of the biological investigations necessary to assess the impacts of this project, detailed and comprehensive planning is essential. Only following this period of preparation can we insure the adequacy of fiscally responsible biological studies designed to fully assess project impacts.

In the first two quarters of this Department's proposed work on the Susitna Hydro biological investigations, we have a great need to do more detailed planning of specific project activities, methodology, and development of the organization and of the expertise to effectively carry through our proposed investigations and assure their integrity.

We consider it essential the very best expertise in the field of hydro projects be utilized during this planning process. This may necessitate contracting various qualified personnel from the northwest where the "state of the art" is well developed. It will likely necessitate travel to these northwestern states by key personnel to consult with qualified individuals and organizations.

A good deal of interagency coordination will be necessary and mutual fielding of various projects will require planning and organization. For example, we know the U.S. Fish and Wildlife Service will conduct specific study segments and the U.S. Geological Survey yet others. In the interest of economy and obtaining the best results, these activities require coordination.

We feel strongly that suitable time must be allocated to the process of planning and coordination before any field staff are hired, or biological studies fielded if adequate professional level results are expected.

Outcomes of the planning effort should be:

1. a table of organization for the administrative support and field staff to direct and carry out the biological investigations

2. the development of job descriptions and specific work plans and subcontract work items for Department biological investigations
3. the timetables for training personnel, development of special equipment, and the state of the art methodologies, and subcontracts for field studies.

7. Personnel

A project of this magnitude will necessitate employing personnel who possess both experience and knowledge of specific disciplines. For example, we will need people who are experts in the field of hydrology as it relates to fish and wildlife, those with engineering background, those capable of performing complex water/wildlife computer modeling, etc. It is going to be necessary for this Department to go outside its own organization to recruit many of these individuals, as we, to date, have not experienced the need which creates experience in these disciplines.

It should be understood that this hydro evaluation is going to require a staff of experts who work solely on this project. We cannot expect a biologically sound study to occur with adequate, professional solutions and answers if it is conducted on a part time basis by existing Department staff, as in the past. Personnel

constraints are particularly binding for the fisheries related work, because the Department's fisheries division staff are totally dedicated to management and research problems in other areas. There simply has to be a staff of qualified individuals, with the employment guarantees necessary to provide continuity to long term studies.

C. Funding

While the adequacy, or inadequacy of funding to perform fish and wildlife studies has been a major Departmental concern over the past several years, the continuity of it in the future is even a greater one. As this hydro project and initiation of the long term biological studies nears reality, it is paramount that money be appropriated for more than a few months or even a single fiscal year at a time. The accomplishment of the biological studies will require long term contracts for work, equipment development, and the maintenance of a qualified professional level staff. Personnel qualified to plan and conduct the involved research necessary to assess the impacts of the Susitna Hydro Project, cannot be recruited without long term employment guarantees.

Timing of funding appropriations are, and will continue to be, of critical importance; and again support the need for funding beyond a given fiscal year. For example, many of the studies can only be conducted at brief seasonal periods of the year due to particular

stream flow needs, migrational movements of wildlife, or spawning migrations of a specific fish species. To miss one of these periods, due to money appropriation difficulties, is to miss an entire study year.

D. Equipment and Material Aquisition

A great amount of materials, equipment, and scientific gear will be required for these studies. Much of it will require ordering well in advance. Major sonar and telemetry development is anticipated for fish migrational studies.

Many of these items will be ordered in one fiscal year and perhaps not received until the next one. Again, monies must be available beyond a single year. If funding terminates, we will likely have a number of commitments to purchase special equipment which will have to be honored.

E. Summation

Without continuity of funding beyond a single fiscal year, the personnel to plan and conduct the hydro related studies cannot be adequately recruited and/or retained. The large sum of money which may be authorized will, under these circumstances, be of little use.

The Department is being asked to participate in a biological evaluation of the largest hydroelectric project ever planned. It is critically important the project be planned, conducted, and finally assessed in a manner which brings credit to the State and which minimizes fish and wildlife resource protection and mitigation of project impacts.

The guarantee of continuity in study funding and timing may be the single most important factor in achieving this goal.

II. Potential Impacts

A. Fisheries

1. With considerable study of the project's impact on fish and wildlife resources yet to be accomplished, the ADF&G has collected sufficient information and addressed the potential biological impacts of the Susitna Hydro proposal in a number of documents which allow us to state that fish and wildlife resources will be adversely impacted.

The construction and subsequent operation of the Devils Canyon and Watana dams will result in long-term ecological changes. The two dams will inundate an estimated 50,550 acres of the Susitna River Basin aquatic and terrestrial habitat upstream of Devils Canyon. Regulation of the mainstem river will substantially alter the natural flow regime downstream.

Secondary impacts such as improved road, water, and floatplane access may create some additional problems in regulating hunter and fishermen harvest.

Following is a brief summation of the major impacts of the proposed dams illustrating the importance of comprehensive biological studies to determine the extent these impacts will affect fish and wildlife populations.

Susitna Fisheries and Aquatic Habitat

The fish populations are the most obvious aspects of the aquatic community where impacts will be evident due to their high economic and recreational importance to the people of Alaska and the nation. However, impacts are not limited to the fishery resource alone due to the complex interrelationships between all biological components of, and within, the aquatic community and the associated habitat. Our preliminary studies have partially defined that the effects of impoundment and construction activities will include alteration of the natural flow regimes, water temperatures, water chemistry, transport of materials, and the quantity of wetted habitat. Habitat requirements of the critical life history phases for passage, spawning, egg incubation, and juvenile rearing of the Susitna salmon species studied are quite specific. The USFWS Cooperative Instream Flow Service Group has developed criteria which

demonstrate the narrow tolerances of certain salmonid and resident species to the hydraulic parameters of velocity, depth, substrate, and temperature (Bovee, 1978). The seasonally wide fluctuations of water velocity, depth, temperature, substrate and sediment of the free flowing mainstem Susitna, its sloughs and tributaries determine the availability and accessability of salmon habitat. Thus, any alterations to the existing Susitna aquatic ecosystem which restrict or reduce the availability of required habitat, will also reduce fish production in the Susitna Basin and Cook Inlet estuary.

For example, it is important to note that although the Susitna River is glacial and turbid more than half of the year, the river clears during the winter months and becomes the major winter rearing area for salmonids as they migrate from the clearwater tributaries and sloughs which freeze and dewater. Chinook and coho salmon, which are of high interest to both commercial harvesters and sport anglers in the Cook Inlet area are dependent on these freshwater rearing areas of the Susitna for a period of one to two years before migrating to saltwater. These important rearing areas will be lost downstream of the dams because the river will be turbid year round and have a higher water velocity due to a reversal of the natural seasonal flow and stage conditions after construction. Although total salmon escapement estimates have not been derived for this system, it is probably the second or third largest sockeye

salmon production area within Cook Inlet. Economically, the estimated average annual commercial value of the sockeye, king, pink, chum, and coho Susitna salmon stocks was \$8,721,780 in 1975. This does not include the 1975 estimated value of \$3,701,745 for the additional salmon in the Susitna River Basin necessary for producing this estimated potential catch. Although figures for subsequent years are unavailable because of insufficient data, it can be assumed the value of this fishery has greatly increased.

Economic values related to recreation are unavailable but assumed to be high due to high concentration of the population adjacent to the Susitna River. Non-consumptive economic values are also unavailable.

B. Terrestrial Wildlife

2. The proposed Susitna Hydropower Project will have impacts on several wildlife species which either reside in the project area, use the area for migration or other seasonal purposes or use habitat downstream which will be altered by the stabilization of water flow. Although many species of animals could be potentially influenced, terrestrial studies to date have focused on ungulate populations, primarily moose and caribou.

Moose

Moose are likely to be adversely affected in several ways.

1. Loss of habitat by inundation within the impoundment areas.

Preliminary studies indicate that several moose subpopulations occupy drainges flowing into the impoundment areas. These moose spend much of the year outside of the impoundment areas but each winter tend to migrate into or across these areas.

Much winter range will probably be lost. This will be particularly critical in severe winters. Therefore, a substantial reduction in the number of moose in a large area surrounding the impoundments will probably occur.

Moose numbers are currently reduced in the area probably because of a combination of severe winters and predation.

Therefore, hunter harvest has been restricted in recent years.

However, an average of 146 are taken annually by 475 to 500 *this is during depressed years*

hunters from the moose subpopulation that will probably be impacted directly by the impoundments. This comprises about 3.5 percent of the statewide harvest of moose. However, the importance of the area to hunters is expected to increase as new National Parks and private land holdings restrict the area available to many hunters. If there were a 50 percent reduction in these moose subpopulations, there could be a loss of harvest of over 7500 moose over the 100 year life span of the project.

The reduction in moose densities could also lead to chronic predation problems. The impact on non-consumptive use of moose is difficult to estimate at this time. The Watana impoundment is expected to impact more moose than the Devils Canyon.

2. Loss of browse downstream.

The river bottom downstream to Cook Inlet provide winter range for moose from Game Management Units 13, 14, and 16. Stabilization of water flows may cause much of the willow in this area to be replaced by spruce. This could lead to a reduction in moose numbers in all of these units especially in severe winters. Adequate data are not presently available to even roughly estimate the magnitude of this impact.

3. Accidents

Moose, especially calves, frequently become mixed in mud. Ice shelving caused by winter drawdown also could lead to accidental moose deaths. The Watana impoundment would greatly increase the potential of fatal accidents but there is no way to estimate the importance of this at present.

Caribou

While some loss of caribou habitat may occur, the greatest impact would be through blockage of migrations. In past years, many caribou have migrated across the Susitna River in the impoundment area after calving. Although specific harvest data on the Nelchina caribou herd for this area are currently unavailable, major harvests of these caribou occurs in the vicinity of the Denali Highway during years of high numbers of caribou migration across the Susitna River. At the present time, it is not known if the impoundments will block the caribou from portions of their range or whether they will attempt to cross or go around the impoundments. It could lead to overgrazing of portions of the range and abandonment of other areas or increase mortality due to accidents in attempts to cross the impoundment.

Other Species

The impoundments will almost certainly reduce numbers of bears, wolves, wolverines, other furbearers, small game, and non-game species through loss of habitat. Furbearers and waterfowl may be reduced downstream as a result of altered water flow and fluctuations in the river that are important in providing the stimulus for new riparian vegetative succession with plant species important to these wildlife populations.

trumpeter
swans

A small population of Dall sheep may be adversely affected by disturbance during construction unless human activities, particularly aircraft traffic are controlled.

C. Socioeconomics and Recreation

It is important to recognize that any direct or indirect biological impacts of this project may, and likely will, affect the recreational and/or commercial utilization of major salmon and resident fish species, and wildlife species, and their associated habitat. The close proximity of municipalities containing half the human population of Alaska emphasizes the socio-economic values of the fish, wildlife, and habitat resources of the Susitna River Basin. The Susitna drainage is highly used and important to the sport and commercial fisherman, the recreational enthusiast, industry, and municipalities. The popularity of Denali State Park and nearby Mt McKinley National Park further attests to the high social, recreational, and aesthetic qualities of the area. Specific data on these subjects in the hydroelectric project area watersheds are incomplete or lacking. Adding to the importance of the area for fishing and hunting is the enactment of the D-2 and Antiquities Act provisions on other lands where certain recreational uses, may be restricted.

D. Navigability

Much of the Susitna River drainage downstream of the proposed hydro development is one of major recreational development. Stream side

recreational sites and subdivisions are markedly increasing the numbers of people utilizing the river for transportation during both the summer and winter seasons.

It is unknown to what degree the substantial change in natural stream flows may affect travel and transportation (both recreational and commercial) of these downstream river portions. They may, however, be quite significant.

3/7/79



Conservation

UNIVERSITY OF ALASKA

September 24, 1979

Mr. Brian Rogers
Alaska State Legislature
Juneau, Alaska

Dear Brian:

During the late 1950's environmental studies of the Susitna project were begun. From that time to today a good deal of scientific and resource information has been gathered which permits some understanding of impacts to be experienced around the project site and upstream within and adjacent to the planned impoundment. With the new project plans being developed by the state, further work will be done on assessment of effects on fish and wildlife. Plans for such studies are now being developed. The purpose of this letter is to emphasize the need for studies of downstream environmental and social impacts.

Even without undertaking a series of project plans, it appears certain that downstream flow regimes will be altered significantly. Among the changes we anticipate are a reduction in turbidity and silt load reduction in summer flows, increased winter flows, and changes in water temperature and timing of ice formation. Such changes could have profound effects on fish and wildlife habitat. Such changes give rise to a few questions I should like to flag for the committee's attention:

1. What effect will flow regulation and reduced silt load have on marsh and riparian habitats downstream, specifically for moose, waterfowl, and fur animals? Generally speaking, seasonal flooding by silt laden waters tends to create and maintain the productivity of these habitats.
2. What effect will flow regulation have on seasonally flooded aquatic habitats downstream? Similar processes to that mentioned in Number 1 above may also be important to some aquatic habitats.
3. Would changes in flow regimes affect fish migration into the Susitna River system? Chemical composition of riverine waters has been shown to be important to fish homing into similar river systems. Some tributaries of the Susitna are important salmon habitat.
4. How would changes in flow rates and turbidity affect riparian and marine habitats of Cook Inlet adjacent to the Susitna River mouth? The Susitna River may be an important source of nutrients for these varied habitats.

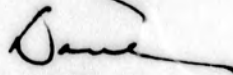
UNIVERSITY OF ALASKA

Brian Rogers
September 24, 1979
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5. What type of sport fishing might develop downstream from the project and what would be the value of this fishery? There is a high demand for sport fishing throughout the area.
6. Would changes in ice regimes affect fish and wildlife habitat? Seasonal aspects of temperature and flow regimes will be altered and should be evaluated.
7. How would the project affect human occupancy and transportation on the lower river? Changes in flow regimes will alter water depths and flows within river channels and will affect human occupancy and facility patterns along the river.

These examples open several lines of inquiry which may shed some light on other value systems associated with the Susitna project. I hope they are of help.

Sincerely,



David M. Hickok,
Director

DMH/bsm

SAVE THE SUSITNA

by Beau Bassett

Getting to know the Susitna is a gradual process. Soon after putting one's canoe in at the Denali Highway bridge, the river begins to unravel mystery after mystery as it bends and flows beneath your paddle. You are soon swallowed up in the predominantly mountainous upper Susitna River basin, bordered on the west and south by the rugged Talkeetna Mountains, on the north by the summits of the spectacular Alaska Range, and on the south and east by the flat Copper River plateau. The swiftness of the main current draws the canoe's bow down stream. You are on your way today . . . but what about tomorrow? Will the Susitna still be there for you?

The upper Susitna River is a scenic, free-flowing river with very few signs of man's presence. Three glaciers flow down the southern flanks of the Alaska Range near 13,832 foot Mount Hayes to form the three forks of the upper river which flows southward for fifty miles. The glacial silt-laden river then curves toward the west where it winds in a single deep channel through 130 miles of wilderness. The wilderness is the home of one of the regions' most significant wildlife resources, the wide-ranging Nelchina caribou herd. There are seasonal migration routes across the Susitna River to and from major calving areas. Moose, black bear, and grizzly bear (referred to as brown bear in Alaska) roam freely in the valley. Wolves, mountain goats, wolverines and dall sheep are seen frequently in the alpine and subalpine zones. The two subspecies of the peregrine falcon, both on the list of endangered wildlife of the United States, migrate through and are thought to be resident in the river basin. The upland spruce-hardwood forest is the habitat for hundreds of species of birds and small mammals.

The river abruptly changes character just above the steep walled Devil's Canyon. It is here that the river's gradient increases and its channel narrows. For the next 11 miles, the Susitna dances and swirls in rhythmic fashion, causing waves 20 feet high to create an aquatic roller coaster through the canyon. It is certainly some of the foremost Class VI white-water in North America and it is here where the ultimate challenge lies for the paddler. These Devil's Canyon rapids and a group of kayakers' efforts to run them, were the subject of a segment of ABC's "American Sportsman" program last March 6th. It was the first opportunity for many Americans to see what more and more paddlers are calling "the Everest of white-water rivers."

Perhaps Dr. Walt Blackadar, one of the nation's finest white water paddlers, has best characterized this section of the "Big Su." Shortly after his successful run of the canyon, he made these observations. "Devil's Canyon on the Susitna vividly separates Satan from St. Peter, hell from heaven, Class VI from Class V, and frequently man from his kayak. It has never severed man from earth, but how it does try! This is the summit of big water boating by today's standards — surely the Everest of white water kayaking! Surprisingly enough, it is water which a good kayaker should be able to handle in stride, for he can expect a boost on his roll from the Devil or the Lord, depending on which one is not already to tangle with Him yet. To lose the Devil's Canyon section of white water would be a tragic loss to America and its future

generations, because there is no other place like it in North America, or for that matter the world as far as I know."

Almost without warning, the Susitna flattens out again near an old mining settlement called Gold Creek. It turns south at this point, as if exhausted from its turbulent trip down Devil's Canyon, and flows another 120 miles through a broad valley into Cook Inlet near Anchorage, almost 300 miles from its source. This lower section of the Susitna is incomparable in its own right. It is one of the most important rivers to commercial fisheries in the whole state of Alaska. The river and its tributaries serve as critical spawning grounds for thousands of chinook, sockeye, coho pink, and chum salmon. These annual fish migrations are necessary to support the substantial fish populations which in turn provide significant economic benefits to the state. During the 1973 season alone, over 14 million pounds of commercial salmon were caught in Cook Outlet. Not to be overlooked is the excellent sportfishing for grayling, rainbow trout, lake trout, dolly varden, and whitefish that exists in the Susitna River basin.

To know the Susitna is to appreciate it in its entirety. The river and its enormous basin provide so much life sustaining force and habitat that it must be considered a non-renewable resource. Its untamed nature is symbolic of the traditional Alaskan lifestyle which finds man working with and dependent on the land. Hunting and fishing for subsistence living is still a value of high priority in the lives of many of those who live in the Susitna River basin. The unique qualities of the Susitna River have not gone completely unnoticed. As early as 1973, the upper Susitna River was recommended for study as a possible addition to the National Wild and Scenic Rivers systems. This study is still pending. More recently, Congressman Morris Udall's bill, H.R. 39, calling for the creation of up to 112 million acres of Alaskan National Interest Lands, proposes that the Susitna be designated a wild river within the Scenic and Wild Rivers system. It would truly be an outstanding addition to the already protected wilderness areas of our country.

But time is running out for the Susitna. The river has been labeled desirable and feasible as a source of hydroelectric power to meet the state's speculative energy demands for the next 25 years. The threat is immediate. The U.S. Army Corps of Engineers has proposed a plan to build a two-dam system, on the Upper Susitna at Watana and Devil Canyon. This would be the biggest project ever undertaken by the Corps of Engineers. What's more, the Corps has never built a dam in the type of arctic environment that Alaska provides. Nevertheless, the project is gathering momentum. The state administration has given its conditional support. Politicians and investors seem united to dam the Susitna. However, the people of Alaska and this nation, have yet to speak.

The environmental impact of the proposed dams is staggering. Development of the Devil's Canyon site includes the construction of a concrete, thin-arch dam with a structural height of 625 feet and with a crest elevation of 1,455 feet. 31 miles further up on the river, the Watana site would include an 810 foot high earthfill dam, with a normal reservoir elevation of 2,200 feet. The burden the Susitna would bear, and the environ-

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mental costs to the public are overwhelming. Taken together, the two dam reservoirs would flood over 50,550 acres of pristine wilderness at normal pool elevation. At higher than normal levels, much more would be inundated. An almost continuous 84 mile reach of this beautiful river would be lost. All forest and plant biomes within the reservoir pools would be permanently lost. Substantial moose and caribou habitat (along with that of many other wildlife species) would be destroyed. Based on historical herd movement, caribou and other animals attempting to cross the reservoirs in the spring would die from ice-shelving conditions and other difficulties encountered in swimming both reservoirs. Gone would be nearly the entire 11 mile stretch of whitewater cascading through Devil Canyon. The Everest of rivers would be reduced to a fluid plain.

The impact on the salmon fisheries that use the Susitna could be just as dramatic. The potential for tragic losses to this commercial industry could be comparable to what has already happened in the Pacific Northwest. The proposed dams may create drastic downstream water quality problems, as the water leaving the turbines will be higher in temperature, nitrogen supersaturated and very low in dissolved oxygen. The threat of a hydrologic imbalance in the Susitna is compelling and could upset critical salmon rearing and spawning cycles.

Because of its glacial origin, the Susitna carries a heavy load of glacial sediment during the high runoff periods in the late spring and summer. It has reached as high as 5,000 ppm in certain areas of the river. Studies released by the Corps of Engineers indicate that the suspended sediment in releases at the Devil's Canyon dam will be at constant low levels of 15-35 ppm. The combination of reduced suspended sediment and water levels resulting from controlled water flow from the reservoirs will have significant effects on all living organisms in the river. One of nature's most important annual rituals, the cleansing and flushing out of debris from the river's channels will have been eliminated. As this debris builds up, the river will change its character, and in the process, die a slow death. While this may take place below the dams, tremendous amounts of sediment will settle out and become trapped in the reservoirs. Thus, although the Corps may have predicted a useful life for the reservoirs to be 100 years, increased sediment levels in the future of the Susitna can effectively cut the reservoirs usefulness in half. More than a few dams built in the United States in the last 30 years have had their reservoir storage capacity so reduced that they have proved to be economic and environmental catastrophes. The prospect of leaving useless holding areas of silt and mud covering thousands of acres to future generations is unthinkable.

The environmental impacts of the Corps' project go on and on. Very serious impacts will take place during the construction phase of the dams and power facilities, as 650 miles of transmission line cut through broad corridors to both Fairbanks and Anchorage, and as greatly increased access into this wilderness river basin stimulates more off-road vehicles use and hunting and fishing pressures. The proposed two dam system becomes more undesirable when one considers the risk of seismic activity in the Susitna region. One of the strongest earthquakes in recorded history struck southcentral Alaska is March

of 1964. The magnitude of the quake was 8.4 on the Richter scale. The Corps seems to be inviting disaster as that quake was centered only 120 miles from the proposed damsites. What is even more foreboding is the relationship of both damsites to the Denali fault system. The Susitna fault, truncated by the Denali fault, bisects the upper Susitna River basin a mere 2.5 miles west of the Watana damsite. Memories of the not soon to be forgotten Teton Dam failure should force us to take a more critical look at the desirability of any dam on the Susitna River.

Despite all this, environmental factors do not stand alone in evaluating a project of this dimension. Fortunately, Congress saw fit to enact the National Environmental Policy Act of 1970, which in turn has become one of the most important pieces of environmental legislation in recent decades. NEPA requires the preparation of an environmental impact statement for every major federal action that significantly affects the environment. For several reasons, the Corps is required to prepare an EIS for its two dam proposal on the Susitna River and circulate it for public and agency review. The statement must set out clearly, among other things, all adverse environmental impacts of the project and detailed consideration of any alternatives to the proposed action. At present, the Corps of Engineers has completed a seriously deficient final EIS and is preparing it for final agency and public review.

The courts have ruled that the key to effective administration of NEPA lies in the preparation of the final EIS. The public should concentrate its efforts in making certain that the final EIS is legally sufficient in its breath, and free of the defects of vague, general, and conclusory language.

Because of complexities of congressional funding, water resource projects such as the Corps' Susitna Dam proposals, are typically spread over twenty to thirty year periods. Consequently, 4 to 5 years of environmental, engineering, and design studies customarily precede the construction phase. It makes sense then that for the NEPA process to be most effective, a final EIS should only be prepared after all pertinent environmental and socio-economic studies have been completed. However, the Corps appears to be circumventing this logical decision making process by submitting their final EIS even before crucial studies on project impacts have begun.

The deficiencies in the final upper Susitna River impact statement are glaring. Alternatives to the proposed hydroelectric development are given inadequate consideration. Alternative sources of energy such as geothermal, wind, and solid waste combustion are treated superficially despite the fact that all are potentially significant sources of energy in Alaska. Similarly, the state's easily accessible Healy and Beluga coal fields, which already provide a portion of the power supply to Fairbanks and Anchorage respectively, are dismissed as being too environmentally damaging. Oddly enough, nothing could be more environmentally damaging than the Corps' proposed dams on the Susitna. The Corps is content to develop one massive source of energy under the guise that the Susitna River is a renewable resource. The fallacy of this argument is obvious. The Susitna River is intrinsically tied to

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...funding it, to the wildlife that populate
...and to the fundamental food chains that makes
...river a body of life. These aspects of the river are
not renewable, and once destroyed, are gone forever.

It is in the best interests of the state of Alaska, and
th nation as a whole, that the state develop a long range
comprehensive energy development plan. It can co-
ordinate the wide variety of energy sources available in
a synergistic fashion so as to add flexibility to the prob-
lem of meeting future energy demands. Smaller scale
hydroelectric projects, conservation, oil, gas, solar, wind,
geothermal, and coal can all contribute to meet future
energy problems head on.

Nowhere is the Corps' final impact statement more
deficient than in its analysis of environmental impacts.
It bases its evaluation of fish and wildlife resources in
the Susitna River project area upon the inconclusive
short term studies of a few species done three or four
years ago. For example, the moose population in the
affected portion of the Susitna basin is estimated by
interpreting a 1973 Alaska Fish and Game fall aerial
moose count. Yet, the Department of Fish and Game
readily admits that such a count is of little or no scientific
value today. The Alaska Fish and Game officials are so
concerned about the proposed hydroelectric develop-
ment on the Susitna River that they have prepared a
thorough fish and wildlife study proposal for the areas
of significant environmental impact. They feel that com-
pletion of this type of concentrated study is a prerequisite
to any final decision to go ahead with construction of the
dams, now tentatively set for 1980 and 1985. A reason-
able estimate of the cost of this environmental impact
analysis was set at 10-12 million dollars, and would take
at least five years to complete.

The 1976 and 1977 omnibus bills passed by Congress
set up the financial framework within which the Corps
of Engineers must operate. A joint federal-state revol-
ving hydroelectric fund was established to make 25 million
federal dollars available to the Corps for phase one
engineering, design, and environmental studies. However,
for the coming fiscal year, only 5.4 million was officially
appropriated for these studies. The Corps is certain to
start geological testing at the damsites very soon after
a 100 thousand dollar plan of study is completed in late
August. How much money environmental impact analysis
is to receive is an open question that the Corps will
decide. If after the phase one studies are completed,
the state decides to build the dams, the 25 million dollars
will be reimbursed to the federal government, and the
state will finance the construction of the dams itself
through revenue bonds. But most importantly, starting
this October, your federal tax money will be spent plan-
ning for the Susitna's demise.

The state, and more importantly the public has only the
present environmental impact statement prepared by the
Corps to look at in evaluating the costs and benefits of
the project. Arguably, the environmental costs incurred
are understated, and in part even overlooked in the
final EIS. The value of lost fish and wildlife resources
and the value various recreational and subsistence users
place on their use of the upper Susitna River basin should
be as accurately as possible factored into the cost-benefit
analysis. On the other side of the coin, the Corps'-
claimed 300 thousand dollars in recreation benefits is
highly questionable in a state that already has thousands
of lakes. The Corps' original projected cost for the two
dam system in 1975 dollars was approximately 1.5 billion
dollars. Given the inflationary rate, the technological dif-
ficulties of building these dams in an arctic environment,
and the comparable cost overruns in other large develop-

ment projects it has been suggested that the actual cost
to the state could be as high as 6-8 billion dollars.

Yet, how well does this price tag represent the cost to
the people of our nation as a whole? It seems every new
proposal involving the loss of living rivers, like the Susitna,
society must ask if the increased benefits of extending
civilization really compensate for the loss to our culture of
an increasingly rare wilderness. This should be the ulti-
mate cost-benefit analysis.

The baseline data on which the final EIS is based raises
some particular problems. The Alaska Power Administra-
tion conducted a power survey in 1974 and attempted
to predict energy needs in the Susitna railbelt region
based on speculative population and employment projec-
tions through the year 2000. The accuracy of these
projections is questionable at best given the difficulties
of making such estimations over a 25 year period. The
Corps maintains that heavy industry will not be attracted
by cheap secondary energy made available at periods
of low demand. Also the proposed system of developm-
ent is to require stage development (first the Watana dam,
then the Devil Canyon) to insure that excessive energy
production does not stimulate energy demand. The
essential question is, will the projected load growth by
the year 2000 actually be close to 15,000 gigawatt
hours (more than 7 times the 1974 energy loads of
Fairbanks and Anchorage)? More specifically, will that
load growth be the result of continued sharp increases
in population and employment in the state of Alaska, or
will it ultimately be the result of substantial industrial
development in the Susitna rainbelt region (the area
between and including Fairbanks and Anchorage) which
has been attracted by the surplus energy created by the
hydroelectric projects on the Susitna River? At least one
corporation has gone on record as believing there will
be more than enough energy for industry. Just recently,
executives of Kaiser Aluminum disclosed plans to the
Whitehorse Chamber of Commerce, in the Canadian
Yukon, for the construction of a 500 million dollar alumin-
um smelter employing 1,200 people in the area. The plans
require the construction of a dam at Devil Canyon on
the Susitna River, and certainly will be dependent on
energy created by that hydroelectric development.

Historically, Americans have used the waterways as
their lifelines. Our rivers have served as the source of
drinking water, electric power, crop irrigation, industrial
processes, transportation, recreation, and waste disposal.
They have been damned, dredged, diverted, paved,
piped, heated and treated. The American people as users
of the waterways for both recreational and development
purposes are gradually recognizing their responsibility
to get involved in planning how and where the nation's
rivers are to be used. But the hour is late for the "Big Su."
The question whether the Susitna River should be altered
at all or whether it should be left in its natural state may
never be fairly answered. Given the prospect for the
tragic loss of this magnificent river, can you afford not
to get involved?

There are two sure ways you can help to save the
Susitna. Write to:

Subcommittee on General Oversight and Alaska Lands
Hon. John Seiberling, Chairman
1327 Langworth House Office Building
Washington, D.C. 20515

and express your support for the inclusion of the Susitna
River in the Wild and Scenic Rivers system as proposed
in Morris Udall's bill H.B. 39. Secondly, make a contribu-
tion to the United States Canoe Association's Conserva-
tion Department so that the Susitna will be there to-

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