

Process Underway To Resolve

Environmental Issues Settlement-Key Goal

A project as large and complex as Susitna raises a variety of issues — engineering, economic, and environmental. The project has been reviewed since the beginning of the feasibility study by the public, native groups, and local, state, and federal agencies. A primary goal now is to identify and resolve outstanding issues. Two parallel efforts are underway: the process of settling environmental issues and the need-for-power evaluation. The settlement process is designed to resolve environmentally related issues with the responsible resource agencies, while need-for-power hearings are designed to respond to the economic and power need issues raised by FERC in their analysis of the license application. The environmental and economic issues come together, for example, in the development of flow regimes FERC's schedule for the Susitna Project, in order to meet the fast-track goal calls for early need-for-power hearings. Early issues settlement with subsequent environmental hearings, and a licensing decision that considers both paths. In this issue we consider the issues settlement process in some detail. The next Susitna Hydroelectric Project Newsletter will focus on need-for-power issues.

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Issues settlement is being coordinated by Tom Arminski, Alaska Power Authority Deputy Project Manager for Permitting. Legal expertise is being provided by Jane Drennan, a specialist in FERC licensing with the Washington, D.C. law firm of Pillsbury, Madison and Sutro. Local legal support comes from Richard Haggart and Jeff Lowenfels, Anchorage attorneys with Birch, Horton and Bittner. Their experience has focused largely on resource issues.

The goal is to resolve outstanding issues by December 1984. The settlement process is planned to reach agreement on project impact assessments and to agree on an acceptable level of environmental mitigation.

After more than four years of studies, a large amount of baseline environmental data has been collected. This information is being evaluated by FERC in the licensing process. The settlement process adds an additional mechanism for involving resource agencies and intervenors in that licensing process. (An intervenor is a group or individual with an interest in the project who has formal-



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With definition of the issues, the next step is to consolidate the lists of issues, address each issue individually, and try to reach agreement on how to resolve it. The issues generally fall into four categories:

- aquatic
- socioeconomic
- wildlife
- land related

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The goal of the aquatic settlement process is an acceptable project operating plan. The plan must consider projected effects on fish and aquatic resources. These effects will then be

balanced against economics and operating concerns to arrive at a final plan. In order to ensure that the objectives of water resource and fisheries managers and fishing/recreation groups are fully considered, workshops will be held. They will acquaint resource agencies with the aquatic models and allow discussion of the issues and alternatives. The workshop results will be used to help determine alternative flow plans. If it is not possible to reach agreement on a suitable flow regime, the issue will be decided by FERC following hearings. Once a flow plan is agreed upon, it may become part of the FERC license and other permit specifications.

Socioeconomic Issues:

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pacts for the license application has been updated to match current population growth predictions and surveys of the adjacent communities have added to the baseline of community information (see article on page 6). Key issues have been identified, and programs will be developed to minimize community impacts. Participants in resolving socioeconomic issues include the Mat-Su Borough, the Alaska Department of Community and Regional Affairs and Department of Labor, and local communities.

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Resources, U.S. Fish and Wildlife, and other resource agencies, and assessments of the impacts of the project on wildlife continue to be refined. Discussions with resource agencies will result in a plan for avoiding or mitigating adverse impacts on the animals themselves and on habitats.

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Board Adds Resources Committee

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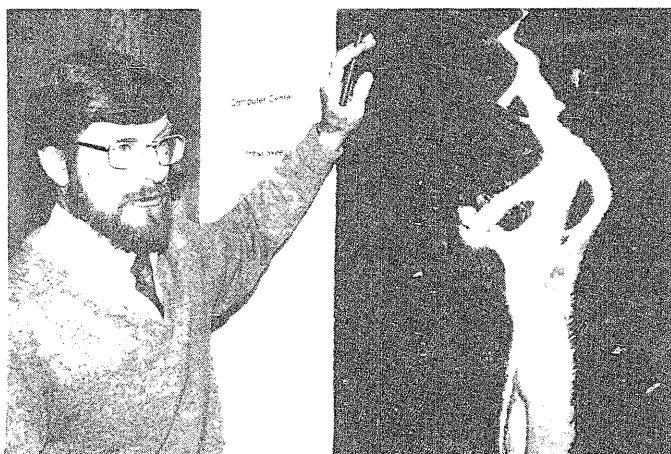
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We've
been
asked

Questions on Socioeconomics

The following are responses to frequently asked questions about the socioeconomic impacts of the Susitna Project by Dr. Richard Fleming. Dr. Fleming manages the socioeconomic program in his role as Deputy Susitna Project Manager, Environmental, for the Alaska Power Authority. He is responsible for overseeing and coordinating the entire environmental program, which is based on the environmental issue areas defined by the FERC regulatory process. Dr. Fleming's experience includes supervision of environmental programs on several other hydroelectric projects, and he formerly served on the staff of the Institute for Environmental Studies at the University of Washington.

Dr. Fleming's master's degree in terrestrial ecology is from the University of Alaska Fairbanks; his B.S. and Ph. D. are from the University of Washington.



Question: What is the purpose of studying socioeconomic impacts in the Susitna project area?

Fleming: The primary purpose is to establish baseline conditions and trends *without* the project, then superimpose the impacts of the project for analysis. An example is the population growth being experienced now in the Mat-Su Borough. We must consider that trend in the without-Susitna scenario before projecting impacts from the project on local communities and the region. Impacts include effects on services such as schools, fire protection, etc., and utility systems such as telephone and water supply.

Question: Can you describe the socioeconomic program to date?

Fleming: In the initial phases we relied on existing socioeconomic information from the federal census, the State and the Mat-Su Borough. That base of information is uneven — Cantwell, for example, is in the unincorporated borough, and little information was available. This year we have been collecting information more specific to the needs of the project through household, business and public sector surveys, and a survey of Intertie construction workers (see article below). The original information was used in a predictive model that considered the growth assumptions and the features of the project to produce an estimate of project impacts. We are currently refining that model to include the new information and recommendations by some agencies.

Question: How will you mitigate for adverse socioeconomic impacts?

Fleming: Our first strategy is to minimize or avoid adverse impacts through good planning and design early in the project. One example of this was in the selection of an access corridor. There was a perception that the Trapper Creek and Talkeetna communities generally wanted only moderate growth in population, wishing to avoid impacts on the community structure, services and quality of life. Cantwell, on the other hand, seemed more in favor of increased business opportunities and growth in population. These socioeconomic factors were considered in selecting an access route from the Denali Highway rather than the Parks Highway.

If there are impacts that can't be avoided, the next step will be to predict them as accurately as possible and identify mechanisms for addressing them at the right time. This will require effective coordination with state and local agencies and the communities themselves.

Question: Do you foresee any positive impacts from the project?

Fleming: Defining positive socioeconomic impacts is difficult — this is something that is in the eye of the beholder. Small businesses may see the staged increase in population from the construction work force as positive, because it increases business opportunities. People who chose to live in these communities because of the remote lifestyle may see the growth as a problem.

Socioeconomics- Update



Socioeconomic specialists have been examining population and economic characteristics of Railbelt communities for the past three years, and a description of potential socioeconomic impacts of the project was provided in the license application. Two major activities have been conducted since then to refine that assessment:

- Community surveys for the three communities that are expected to be most affected by the project — Trapper Creek, Cantwell, and Talkeetna.
- Update of the economic-demographic projections which are used to estimate project impacts on local economies and public facilities and services.

Community Surveys

The purpose of the community surveys, which were conducted in October and November, was to develop a base of information for local communities that will be potentially affected by the project. The

information obtained included population, composition of households, occupations, and hunting, fishing, and trapping activities. Surveys were also made of local businesses, government jobs, and an existing construction work force on the Intertie project. The survey results have been used to revise the socioeconomic forecasts, which in turn will be used to plan for the needs of the existing and projected population. The community survey report will be published in early 1984 and will be submitted to FERC to become part of the licensing process.

Economic-Demographic Model

A socioeconomic impact model was used to develop projections for the local and regional areas where project impacts are expected. The local impact area is defined as the Mat-Su Borough, including land in and around the project site and nearby communities such as Cantwell. The regional impact area includes the area from Kenai to

Fairbanks, including the North Star Borough. The model was developed to allow projections to be easily and periodically revised to reflect changes in existing conditions such as population or in assumptions about the project such as work force size or construction schedule.

The model is divided into three parts: it calculates project impacts on employment and population, by location and year. The model also provides detailed information on the movement of workers and their families, which helps determine impacts on public facilities and services. The additional facilities and services that will be needed to support both project-induced and baseline population growth are then estimated for each year of construction and operation. Finally, potential changes to community income and costs are projected. The projections made in the license application are now being updated to reflect changing economic conditions in Alaska and current population growth estimates.

Presentations On Susitna Status Available

Members of the Susitna project team made a presentation to the Anchorage League of Women Voters on November 9. Topics included background on the project, its licensing status, and the issues settlement process. Similar presentations have been made in past months to the Chamber of Commerce and Resource Development Council. If your organization is interested in scheduling a presentation for a meeting program, contact the Susitna Project Office, 279-6611.

Notice

We are interested in hearing your ideas and answering your questions on the Susitna Hydroelectric Project. Please contact us:

Alaska Power Authority
Susitna Project Office
334 W. 5th Avenue
Anchorage, Alaska 99501
279-6611

Meeting Notices

Working meetings scheduled with resource agencies and the public as part of the Susitna issues settlement process are listed each week at the Alaska Power Authority Offices, 334 W. 5th Avenue, Anchorage. You can find out about meetings by stopping by or by calling 276-0001.

Wildlife and Vegetation-Update



Moose field studies provide information on movements and habitat use.

Wildlife and vegetation studies continue to add to knowledge about animals and their habitats in the project area. In the last year the following studies were underway:

- Moose were counted by age and sex, and preliminary results indicate that about 2000 moose use the area of potential project impact. Radio-collared moose have been monitored to identify movements and determine the size of their home range. Tracking moose calves with radio collars is also important to provide information on causes of death and rates of predation by bears and wolves. Downstream of the project area, biologists are providing information on habitat use along the Susitna River floodplain. These studies also measure the tendency to use disturbed areas, which is key information in evaluating mitigation plans.
- Especially severe winters often change moose behavior by forcing them into lower elevations, adding nutritional stress, and adding to predation. A study to gain information on moose in such conditions has been planned if a severe winter with deep snow should occur. It would involve increased censuses, recording information on dead moose, and monitoring wolf kills.
- The Nelchina caribou herd ranges north and south of the Susitna River. Studies have aimed at learning their patterns in relation to the planned reservoirs and estimating the size and productivity of the herd. A potential project impact would be creation of barriers between different parts of the caribou range, which could affect migration and calving. Radio-collaring has been used to track individual caribou and herd movements, and to help locate different parts of the herd when censuses are conducted.
- Wolf studies are designed to map their use of the project area and to monitor changes in wolf pack size. The principal potential impact on wolves would be loss of prey if moose and caribou populations were reduced, especially moose. About seven wolf packs have been identified, and radio-collaring has been used to track the number and size of the pack, locate den sites, and study food habits.
- Both black and brown bear have been under continual study to determine seasonal use of habitats, location of dens, and food habits. Samples of both types of bear were tracked and their dens marked and examined. The emphasis of the food studies was on spring and early summer food habits, especially use of salmon. Results have shown, for example, that salmon make up less of the black bear diet than previously assumed; the bears largely feed on berries. Radio collars help in locating sampled bears and their dens.
- Dall sheep range has been monitored to determine seasonal habitat use. Interest focused on the Jay Creek mineral lick, which receives heavy use by sheep. Sheep were color-marked and observed from a blind to determine numbers, sex, age, and use of the mineral lick. Last year's field work confirms that about 200 Dall sheep are located in the Watana Hills area near the mineral lick; roughly half of that population have been observed to use the Jay Creek lick. Research on location and mineral content of other mineral licks in the area will help in designing a mitigation strategy for portions of the lick that will be underwater or affected by construction.
- Beluga (Belukha) whales migrate within Cook Inlet depending on availability of fish moving in and out of river mouths. Reduced numbers of fish could affect the whales' food supply and calving. The whale study compares fisher-

ies information with field data to estimate potential impact from project-caused changes in the Susitna River.

- A beaver colony, in order to survive a winter, will stockpile food in underwater caches. Studying these caches provides information on how many beaver use the river. The survey last fall indicated the existence of a considerably larger number of colonies (11 versus 2 the previous year), perhaps because the fall river flows were quite stable. Data on beaver use of the river will be compared with estimated flows to estimate project impacts. For example, the averaging or stabilizing effect of the project may increase beavers' ability to successfully use the river for caching winter supplies of food.
- The Susitna vegetation program has studied plant phenology and moose browse in the project area. The plant phenology study evaluated the location, abundance, and timing of early spring moose and bear forage in the proposed reservoir areas. Moose are attracted to the early development of plant growth and early snowmelt in lower elevations. Similarly, brown bear emerging from hibernation move to those areas seeking overwintering berries and new vegetation growth generally found on south slopes. Early spring is a nutritionally critical period for bears as well as moose, and inundation of the impoundment areas will have an impact on both.

The purpose of the 1983 browse study was to develop cost-effective methods for conducting an extensive browse inventory of the project area. This inventory will be used in estimating the moose carrying capacity of the project area by assessing the amount and type of vegetation available. Moose carrying capacity represents the number of moose that can survive in the impoundment area over a given period of time.

Thank You Eric Yould



Eric P. Yould, Executive Director of the Alaska Power Authority since its creation in 1978, resigned on October 14, 1983. Power Authority Board Chairman, Dick Lyon, also Commissioner of the Department of Commerce and Economic Development, stated that Yould's decision to leave reflected part of the transition of the former administration to that of Governor Bill Sheffield, who was elected a year ago. Lyon said that in terms of the formative years of the Power Authority, the Power Authority is in large part the persona of Eric

Yould.... He is a widely recognized and capable engineer.... He has provided a great deal of leadership.... Since Yould became Director in 1978, the Power Authority has initiated major construction projects (three hydroelectric and one 170-mile transmission line between Fairbanks and Anchorage), brought the proposed \$5 billion, two-dam Susitna Hydroelectric Project into the Federal Energy Regulatory Commission licensing phase, and initiated other construction and energy development projects throughout Alaska.

License Application On File

The Susitna Project license application is available for public review at the following libraries. Ask for the Susitna Hydroelectric Project License Application to the Federal Energy Regulatory Commission.

Alaska Historical Library
Juneau

Alaska Resources Library
Anchorage

Alaska State Library
Juneau

Center for Research Libraries
Chicago, IL

University of Alaska Library
Anchorage

Noel Wien Memorial Library
Fairbanks

A. Holmes Johnson Public Library
Kodiak

Kegayan Kozga Public Library
Nome

Kenai Community Library
Kenai

Ketchikan Public Library
Ketchikan

Kuskokwim Consortium Library
Bethel

Talkeetna Public Library
Talkeetna

Library of Congress
Washington, DC

Z. J. Loussac Public Library
Anchorage

National Library of Canada
Ottawa, Ontario

Rasmuson Library, University
of Alaska, Fairbanks

Seattle Public Library
Seattle, WA

Sheldon Jackson College Library
Sitka

University of Alaska Library
Juneau

University of Washington Library
Seattle, WA

Washington State Library
Olympia, WA

Arctic Environmental Information
and Data Center, Anchorage

Palmer Public Library
Palmer

susitna hydroelectric project

Newsletter

february 1984

Profile—Board of Directors

The Alaska Power Authority Board of Directors oversees all activities and sets policy to fulfill the Authority's mission of developing new, cost-efficient sources of energy for the State of Alaska. Members are appointed by the Governor; and confirmed by the Legislature; public members serve 2 to 3 year terms and state agency officials serve for unspecified durations.

The Chairman of the Board is Richard Lyon, Commissioner of the Alaska Department of Commerce and Economic Development. Commissioner Lyon was appointed in late 1982, and brings a variety of public and business experiences to the organization. Chairman Lyon was interviewed recently about the role of the Board:

Question: How were you chosen as a member of the Alaska Power Authority Board of Directors?

Lyon: I was sworn in as Commissioner at the same time as Governor Sheffield, December 6, 1982. Sitting on the Power Authority Board is a matter of statute, but being Chairman is not. I was selected for that position by the other directors. Since the Power Authority is in the Department of Commerce and Economic Development for administrative purposes, the Board felt it would be simpler to have

the Chairman and the Commissioner be the same person.

Question: What is the composition and organization of the Board?

Lyon: We have three other cabinet members on the Board, and we're also really fortunate in our three private sector members (see profile of Board members below). The current membership gives us good regional and experience balance. I am very comfortable with the calibre of the Board and I think the State is going to be well served.

Question: Are all the Board members new?

Lyon: The Governor has felt strongly that he wants to take a new look at everything the State is doing, and has a lot of new department heads. In addition, the entire 7-person Power Authority Board is new.

Question: There is a management study of the Power Authority underway now by the Charles T. Main Company. Do they have any recommendations on the function of the Board?

Lyon: Phase 1 of the study has been completed. The Main analysis indicates that the Power Authority and the Board should deal more with plan-

ning, and that's receiving more attention within the Power Authority, as it is within the Administration. The Department of Commerce and Economic Development now has an Office of Energy and we've had a high degree of cooperation with the Power Authority on the State Energy Plan.

Question: How are Power Authority decisions actually made?

Lyon: There's a clear distinction between day-to-day operating decisions and policy decisions. We are trying to define this very carefully so the Board is not involved in operating decisions and is not involved in negotiating for the Power Authority. Most of those things are staff functions. The state contracting procedures, for example, already put every contract through a rigorous process of approval.

Question: What is your feeling on the status of the FERC fast-track licensing schedule for the Susitna Project?

Lyon: I feel quite confident about our ability to stay with the process. Last December, I met with FERC Commissioner Georgiana Sheldon in Washington, D.C. and assured her of not only the Board's but also the Governor's dedication to maintaining the Susitna licensing schedule. We



Richard Lyon, Board Chairman

recognize some licensing needs are hard to predict, but if we fail it won't be for lack of commitment.

The Power Authority's posture is that we're fully supporting the fast-track licensing process, and that process will answer some basic questions: are the dams safe, do we need the power, and is it feasible? The Governor will be working with the Power Authority on outreach within the State to involve in the planning all the folks who will be using the power.



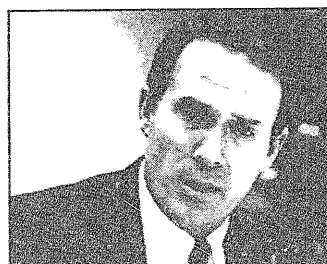
Robert Heath,
Commissioner of Alaska Department
of Revenue

Robert Heath came to state government in 1983 from several positions in private industry. He has served as Senior Vice President for Administration for Western Airlines, and as Vice President of Finance for Alaska International Industries and Burgess Construction Company. Mr. Heath was also Controller for the Anchorage Natural Gas Company.



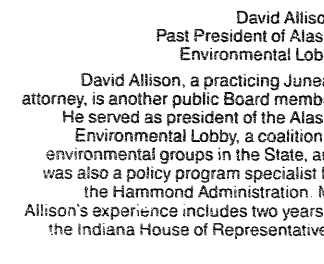
Peter McDowell,
Director of Office of Management
and Budget

Pete McDowell administers budget and internal auditing as Director of the Governor's Office of Management and Budget. He served on the Business Management Task Force of the Governor's Transition Team. Mr. McDowell has extensive management consulting and financial audit experience in industry, and is also a trustee of the Alaska Permanent Fund Corporation.



Lee Nunn,
ARCO, Inc.

Lee Nunn, the third public member of the Board, is the Prudhoe Bay Operations Staff Manager for ARCO, Inc. He was formerly Alaska District Engineer of the Army Corps of Engineers. Mr. Nunn, a West Point graduate, has been a White House Fellow and holds a master's degree in nuclear engineering.



David Allison,
Past President of Alaska
Environmental Lobby

David Allison, a practicing Juneau attorney, is another public Board member. He served as president of the Alaska Environmental Lobby, a coalition of environmental groups in the State, and was also a policy program specialist for the Hammond Administration. Mr. Allison's experience includes two years in the Indiana House of Representatives.



Esther Wunnicka,
Commissioner of Alaska Department of
Natural Resources

Esther Wunnicka holds responsibility for managing Alaska's natural resources to the benefit of all Alaskans. She has served on the Board since 1982. Earlier she managed the Outer Continental Shelf Office of the Department of Interior and chaired the Federal-State Land Use Planning Commission. Commissioner Wunnicka chairs the Resources Committee of the Board.



Robert Huffman,
Past General Manager of Golden
Valley Electric Association

Robert Huffman is one of three public members of the Board. He retired as general manager of Golden Valley Electric Association after 14 years, with earlier experience in addition as a lineman and line supervisor. His excellent working knowledge of electrical utilities, rate structures, and the region, adds depth to Board decisions.



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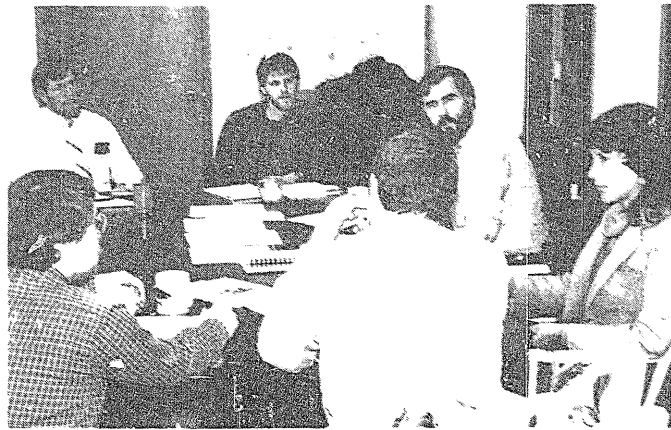
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Commissioner Wunnicke leads Resources Committee.

Licensing Issues

Need for Susitna Power-Key Goal

Projecting how much electricity the Railbelt needs in the next 50 years is a complex problem. The amount of power needed for homes and industry depends on population growth, electricity costs, and availability of other sources. Projections have been made for these factors in planning for the Susitna Project. The license application explains in detail how the projected need was established, what the alternatives are for producing the needed electricity, and how Susitna compares with those alternatives.

As FERC reviews the license application, they are critically

evaluating the assumptions used in planning, and are making their own analyses to test the results. A part of the licensing process involves administrative hearings on need for power. That hearing process is scheduled to begin in late spring 1984 with prehearing conferences, which are opportunities to identify the active parties, set hearing schedules, and order the period of discovery. A period of discovery allows the participants (Alaska Power Authority, FERC, intervenors) to request relevant documents from each other. Direct and rebuttal testimony is presented, with following cross-examination.

Briefs arguing the facts and law in the case are filed with the administrative law judge, who decides whether a need for power has been demonstrated. That decision is scheduled for approximately one month after the briefs are filed.

A positive decision on need for power is not an authorization to proceed. FERC must still consider dam safety and environmental issues. Currently FERC is scheduling hearings on safety and environmental matters to begin in February 1985 and continue into 1986. License issuance would be in late 1986 or early 1987.

Environmental Impact Statement-Draft to Final

The Federal Energy Regulatory Commission, or FERC, is responsible for assessing environmental impacts of the proposed project and preparing an environmental impact statement (EIS). Information in the 18-volume license application, additional requested supplemental data, agency comments on the application, and the Power Authority's reply to the comments, all serve as the basis for evaluating alternatives and assessing impacts.

In July 1983 FERC asked Alaskan agencies and residents to suggest key project issues. At scoping meetings held in Anchorage, Talkeetna, Cantwell and Fairbanks, agencies and the public reviewed a proposed list of issues and added their ideas.

FERC then prepared a document called "Susitna Hydroelectric Project, Scoping Document II," which included issues identified at the scoping meetings, and outlined the draft EIS which is being prepared.

FERC has contracted with two federal laboratories (Oak Ridge and Argonne) to develop the draft EIS by May 1984. The draft EIS will discuss the need for the project and alternative ways to produce the needed electricity. In addition, it will describe the project facilities and plans for construction and operation. Environmental impacts will be discussed, including land use, meteorology, water quality and quantity, fish and wildlife, vegetation, threatened or endangered species, recreation, socioeconomics,

and visual and cultural resources. The Susitna Project and all proposed alternatives will be described in terms of each of these categories, and their environmental impacts compared. The EIS will provide conclusions on impacts and recommend actions. An appropriate mitigation strategy will be assigned, and the license may include requirements for continued environmental studies.

When the draft EIS is complete in May, FERC will publish a notice in the *Federal Register*, and agency and public review and comment will be invited. After a 60-day comment period, the final EIS will be completed and issued by FERC in December 1984. FERC will provide an additional opportunity for intervention at that time.

New Power Authority Executive Director

Larry Crawford, new Executive Director for the Alaska Power Authority, was confirmed by the Board of Directors on November 16, 1983. Mr. Crawford came to the Power Authority from the Governor's Office, where he served as Governor Sheffield's Chief of Staff. Prior to becoming the Governor's Chief of Staff in December 1982, Mr. Crawford had served as Executive Vice President and General Manager of MultiVisions, an Anchorage-based cable television company. Before assuming that post, Crawford had served the Municipality of Anchorage as Municipal Manager for three years and Director of Management and Budget for two years. He is a Certified Public Accountant with nine years of experience with an international accounting firm. He answers some questions below on his new position.

Question: What are your chief responsibilities in directing the Alaska Power Authority?

Crawford: I am the chief operating officer for the Authority. Policy matters are brought before the Board, and we carry out that policy with their guidance. Our chief responsibility is to develop an electrification program and plan for Alaska, including an implementation schedule. Another key job is to work with the utilities throughout the State to determine within them the least-cost alternatives for generating electricity.

Finding creative ways to finance projects is certainly another major responsibility. We are becoming more oriented to an approach of planning a project, marketing its power, and then building, in that order. Working with utilities will be very important.

Question: How does the role of the Power Authority fit within the new State Energy Plan?

Crawford: I see the Energy Plan as a broad policy document. We will derive a set of assumptions from it which will guide us as we develop our specific program, under the umbrella of the plan. The Power Authority has a key role to play in carrying it out.

Question: What is your organizational structure for a project such as Susitna?

Crawford: Our organization is oriented along functional lines, with project teams put together from various functional areas to carry out a specific project plan. The people on the Susitna Project team have "homes" within these areas, but they work on the project and report to the fulltime Project Manager, Jon Ferguson, for the duration of their assignments.

Question: What are your thoughts on Governor Sheffield's Susitna Project budget recommendation of \$8 million for FY 1985?

Crawford: The Governor has made a commitment to Susitna, and his intent seems to be to have the Legislature determine their own level of commitment in their appropriation decision.



Question: What is your position on financing developments like the Susitna Project?

Crawford: If properly done, the electrification program can become self-sustaining, returning equity investments and providing additional monies in the long term for generation and transmission. I think we need to look at creative ways of financing the Susitna Project so the State can leverage its equity and maximize potential state revenues from the project.

Aquatic Studies—Key Environmental

In hydroelectric project planning, protection of fisheries and maintenance of fish resources must be balanced with the construction and operation of the project. Aquatic studies have been conducted in the Susitna River Basin since 1974. These studies have provided a broad base of information on the river, its tributaries and sloughs, and the distribution and abundance of fish. In the January 1982 issue of the Susitna Newsletter, fisheries specialists on the project team were interviewed. That issue also highlighted the activities of the Alaska Department of Fish and Game (ADF&G) SuHydro Aquatic Studies Team. Now, two years later, members of the aquatic team have updated those thoughts.



Tom Trent, Aquatic Studies Coordinator for ADF&G SuHydro Aquatic Studies Team

...“Substantial progress has been made since 1981 in moving from reconnaissance-level data collection to quantifying fish populations and habitats...”

Following is an interview with Tom Trent, the Aquatic Studies Coordinator for the ADF&G Aquatic Studies Team. He answers questions on how the program has evolved since the original article.

Question: Since 1981, what have been the major changes in the ADF&G SuHydro Aquatic Studies?

Trent: The basic field study components remain: studies of adult anadromous fish; resident and juvenile anadromous fish; and aquatic habitat and instream flow. Substantial progress has been made since 1981 in moving from reconnaissance-level data collection to quantifying fish populations and habitats.

Populations of sockeye, pink, chum, and coho salmon in the Susitna River system are still monitored annually at four sites, and we are monitoring numbers of spawning salmon and their distribution in tributary and slough habitats above Talkeetna. We have cut back on the use of sonar salmon counters in the main channel, and are relying almost exclusively on traditional tagging and recapture methods. In 1982, we began counting chinook salmon that passed the main channel sites at Sunshine, Talkeetna, and Curry. We also made a comprehensive study of the eulachon or smelt populations. Sampling to determine salmon and Bering cisco spawning areas in the main channel was completed in 1983, but new work began to evaluate salmon egg production and the residence time of adult sockeye and chum salmon occupying slough habitats upstream of Talkeetna.

Studies that described the fish species and their seasonal habitat use now focus on measuring and quantifying the available habitat as related to the naturally varying flows of the river.

Our information on adult resident and juvenile anadromous fish has been refined each year, as is essential to determine the number of fish and amount of their habitat that may be impacted by the project.

We have marked and recaptured grayling in the Watana impoundment area to define the age structure of the population, and have modeled the effects of sport fishing on long-term yield. These streams may experience increased fishing when improved access is provided during project construction. The model will help to manage these grayling fisheries and mitigate impacts of increased fishing.

We expanded the studies of hydraulic conditions needed for salmon spawning to include tributary, tributary mouth, side channel, and mainstem habitats, in addition to slough habitats which were already being studied. This information is then used to determine the availability of slough, side channel, and tributary habitat used by spawning salmon as a function of mainstem flow.

Question: Has the geographic scope of your project changed?

Trent: Basically, no. Ground surveys of salmon spawning work were expanded to include monitoring of chinook salmon discovered in three tributaries above the Devil Canyon site, and studies of fisheries resources in streams crossed by access road corridors were included in our 1983 investigations.

Our primary emphasis has been on the Susitna River from Devil Canyon to Talkeetna, because of the probable magnitude of the effects of flow regulation. We will work on providing similar levels of quantification in the reach of river below Talkeetna in 1984, because this area has very large numbers of salmon associated with it seasonally.

Question: What kind of new information is available regarding the Susitna River salmon resources?

Trent: We have concluded that two migrations of sockeye salmon enter the river, and only the second migration spawns in slough habitats upstream of Talkeetna. We have also determined that Susitna River chum salmon, which make up 80 percent or more of the chum returning to Cook Inlet, are produced mostly in the Talkeetna River drainage. Our data have allowed us to quantify escapement numbers of Susitna River chinook salmon as well as sockeye, pink, chum, and coho salmon for 1982 and 1983, and for the first time we have documented small numbers of chinook spawning in tributaries above Devil Canyon. With the new data, we have been able to refine our estimates of the numbers of sockeye, pink, chum, and coho salmon that spawn between Talkeetna and Devil Canyon. (See table on opposite page.)

New information has been gathered on juvenile fish, as well. We can now estimate by species the number of juvenile salmon which outmigrate from the Devil Canyon-Talkeetna

reach, and have estimated numbers and survival for juvenile sockeye and chum that were spawned in this reach. These data only cover one complete year of the open water out-migration cycle, however.

Question: What kind of new information is available regarding the resident fishery resources of the Susitna River?

Trent: We have been studying resident fish so that habitat criteria can be developed for use in instream flow modeling. Monitoring radio-tagged rainbow trout tells us about their use of the Susitna and tributaries by season. It would have been difficult to use other means because of low population densities and the glacial nature of the river. These rainbow studies are helping us understand the relative population size and primary spawning areas for this species.

Question: What kind of new information is available regarding the Susitna aquatic habitats?

Trent: We have worked on providing information to define the instream flows that are needed to allow adult salmon to pass into sloughs. Information is now also available on the relationships between mainstem flow, water quality characteristics, and water levels in various habitats.

Question: You mentioned an instream flow study in your answer to the prior questions. What is an instream flow study, and why is it important?

Trent: Instream flow studies estimate the losses or gains of fish and wildlife habitat or other instream uses as a function of changes in the flow regime within the river. The primary effects of hydroelectric projects on downstream resources are changes in naturally occurring flows, so it is important to quantify the project effects on various flow-dependent resources and uses.

This information is then used to decide how flows can be regulated to support both generation needs and other instream flow-dependent values such as fisheries, recreation, and navigation. Ideally, an instream flow regime will be established which supports several beneficial uses.

Question: Is any of your work directed toward analyzing the impacts of this project?

Trent: Impact analysis is not one of the direct responsibilities of the ADF&G SuHydro Team. Our charge is to provide the data and analytical tools to support that analysis.

Question: Based on your previous response, is any of your work directed toward development of mitigation options?

Trent: Instream flow studies can be used to assess project impacts, and they can also be used to estimate flows that may improve or enhance fish habitats. Therefore, flow recommendations may mitigate some of the adverse project impacts. We have proposed studies in 1984 to weigh the feasibility of enhancing selected areas by adding gravel or modifying the channel. These methods need to be coupled, however, with proper instream flows to ensure they will work. As with the impact analysis work, our studies are directed toward development of the data and tools that can be used by others to prepare project mitigation plans.



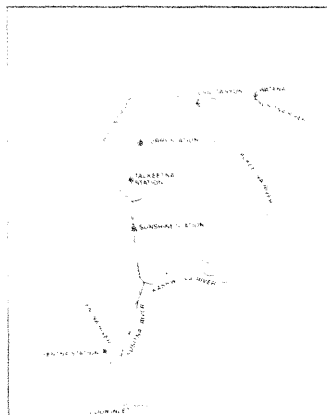
The ADF&G Gold Creek Camp, shown here, is approximately 35 miles up river from Talkeetna.

mental Issue

Woody Trihey has participated in the Susitna aquatic studies program since 1980. He is a registered Professional Engineer specializing in river mechanics and instream flow assessments. He has provided the following answers to some questions that pertain to instream flow aspects of Susitna Project licensing.



Trihey: Data have been collected that define the importance of a variety of physical aspects of the natural system. For example, we can demonstrate the importance of upwelling water to spawning chum and sockeye salmon, the response of juvenile salmon to the presence or absence of streambank cover, or the response of resident fish such as burbot or rainbow to changes in turbidity. Understanding how the proposed development might change these physical aspects of habitat, investigators can forecast quite accurately the effects of the proposed project on existing fish habitats.



SALMON SPECIES	% OF SUSITNA RUN (1981 - 1983)
Chum	12%
Coho	9%
Pink	7%
Sockeye	2%

These figures represent the percentages of salmon entering the Susitna River that reached the Talkeetna-Devil Canyon area in 1981, 1982 and 1983 (Estimates based on studies at the four ADF&G sampling stations shown on map.)

Question: You were first interviewed in 1981 about the Susitna Project's effects on fisheries. Have you seen major changes in the aquatic program since then?

Trihey: The basic framework and goals of the aquatic studies program have not changed significantly; however, there have been several major accomplishments since 1981 that have moved the study team much further along with regard to quantifying project effects and identifying mitigation opportunities. One of the major accomplishments has been ADF&G's identification of the seasonal fish use of six major riverine habitat types in the Susitna River corridor: mainstem, side-channel, side-slough, upland-slough, tributary, and tributary-mouth habitats. Engineering studies have also advanced a long way, greatly improving our knowledge of with-project streamflow, stream temperature, and sediment conditions in the river.

Question: What is an instream flow assessment?

Trihey: Basically, it is a scientific study undertaken to define the cause-effect relationships between changes in streamflow and various uses of the river. More specifically, it includes an evaluation of the effects of changes in streamflow, water temperature, sediment transport, and water quality, on instream uses or resources. Such an assessment is based on the premise that the physical condition and quality

of a stream determine its usefulness to fisheries or any other instream use.

The first step is to look at natural physical processes that provide for water quality, sediment transport, temperature and streamflow, and then to determine how these physical processes interact with biologic processes to provide a habitat which is occupied by fish and other biological organisms.

The second step is to identify how a proposed development might alter these natural processes and interpret the significance of the physical change from a biologic perspective. This gives us a solid framework for identifying specific impacts on that natural system, and developing a mitigation plan that addresses the real problem.

Question: What are the factors you consider in instream flow assessment?

Trihey: The basic factor is the watershed, which drives four major components of fish habitat: food web, water quality, flow regime, and channel structure. These components interact to make up fish habitat. In an instream flow assessment, one carefully examines a proposed project to identify how it will influence the existing relationships within each component.

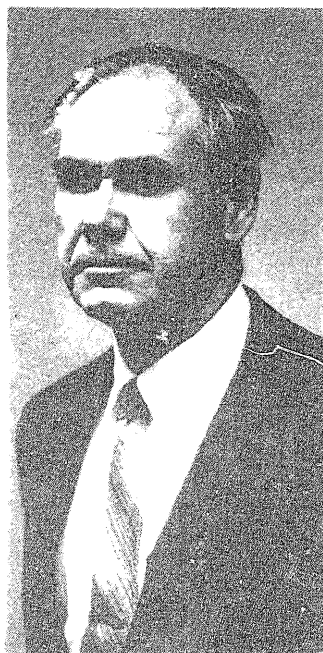
Question: How are the habitat components related to the fisheries resource?

Question: Can you describe the fisheries management objectives that generally are used to represent Alaska policy?

Trihey: The U.S. Fish and Wildlife Service introduced a mitigation policy in cooperation with several other federal agencies in 1981. It is my understanding that the Forest Service policy is compatible with the general policies and management objectives of the ADF&G and other resource agencies in Alaska. Basically, the mitigation policy recommends avoiding or minimizing impacts as the preferred form of mitigation. Remedial or corrective action is midway down the list, and compensation for impacts is the least-favored mitigation technique. The Alaska Power Authority's own mitigation policy strives for no net environmental loss.

Question: What is your opinion on the general adequacy of the information available on the project?

Trihey: I have a lot of confidence in our ability to produce a very fine description of how the natural system works and what the project effects are likely to be for the portion of the Susitna River upstream of Talkeetna. In my opinion, at least one additional year of well-focused, concentrated study will be required to bring our knowledge of the lower Susitna River up to a similar level of understanding with the river segment above Talkeetna.



Mr. Art Allen retired from Harza Engineering in 1982 with nearly 40 years experience in designing, licensing, and building hydroelectric projects. He has been called back to help in designing an operating plan for the Susitna Project that will accommodate concerns for the aquatic resources. He answers questions below on that process.

Question: What are your primary objectives in designing an operating regime for a hydroelectric project?

Allen: Our energy goal is to produce the needed electricity as efficiently and economically as possible, taking full advantage of hydroelectric power's stable long-term costs.

Customer demand changes throughout each day, starting out low in early morning and peaking during the day. About 9 p.m. the load starts to drop steadily until it starts to increase again early in the morning. A mixed system of thermal and hydroelectric plants can use the coal or gas units to increase output gradually, meeting faster-increasing loads with the hydroelectric units. It is most efficient and

costs least to maintain a level thermal load whenever possible. The mixture of hydro with thermal works well, because hydro can be started, change load, and shut down very quickly with minimal effort or cost and with minimum loss of efficiency. The amount of thermal generating capacity that has to be built and paid for can then be reduced and the efficiency of the thermal plants can be improved.

On the Susitna River, the ideal operation, from just a power viewpoint, would be to maintain a continual discharge down river, with variations in discharge from hour to hour. Such discharge variation uses all available water to produce energy, rather than having energy losses on occasions when, otherwise, water would have to be released by means other than through the turbines. These are the kinds of operating issues we consider.

Question: Are there other factors that you consider?

Allen: Seasonal changes in load demand mean that more electricity is needed in the winter, while the maximum natural streamflows are in the

summer. An engineer would say that the two are 180 degrees out of phase, so we need to build up enough stored water in the high flow period to transfer hydroelectric energy to energy production in the low flow period. Within the limits of site characteristics and cost, a higher dam makes it possible to have more storage, which increases the benefits that hydro provides to the system.

Question: What are the constraints on operating with maximum benefit to the system?

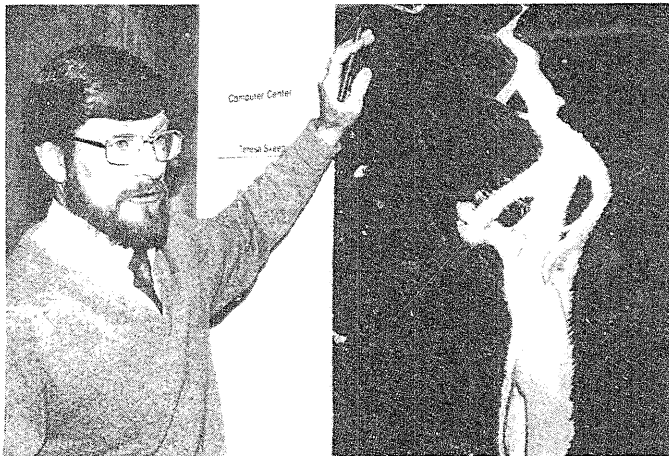
Allen: All we have discussed so far are old-fashioned economics; those goals most definitely must be balanced with environmental concerns. My experience has been that we must analyze and then decide how to operate the system for the benefit of the power customers, the living creatures in and around the stream, and the humans who depend on the river for their living. Environmental concerns may set limits on discharge changes. Environmental and engineering studies are proceeding concurrently and cooperatively to analyze the various problems involved.



Questions on Socioeconomics

The following are responses to frequently asked questions about the socioeconomic impacts of the Susitna Project by Dr. Richard Fleming. Dr. Fleming manages the socioeconomic program in his role as Deputy Susitna Project Manager, Environmental, for the Alaska Power Authority. He is responsible for overseeing and coordinating the entire environmental program, which is based on the environmental issue areas defined by the FERC regulatory process. Dr. Fleming's experience includes supervision of environmental programs on several other hydroelectric projects, and he formerly served on the staff of the Institute for Environmental Studies at the University of Washington.

Dr. Fleming's master's degree in terrestrial ecology is from the University of Alaska Fairbanks; his B.S. and Ph. D. are from the University of Washington.



Question: What is the purpose of studying socioeconomic impacts in the Susitna project area?

Fleming: The primary purpose is to establish baseline conditions and trends *without* the project, then superimpose the impacts of the project for analysis. An example is the population growth being experienced now in the Mat-Su Borough. We must consider that trend in the without-Susitna scenario before projecting impacts from the project on local communities and the region. Impacts include effects on services such as schools, fire protection, etc., and utility systems such as telephone and water supply.

Question: Can you describe the socioeconomic program to date?

Fleming: In the initial phases we relied on existing socioeconomic information from the federal census, the State and the Mat-Su Borough. That base of information is uneven — Cantwell, for example, is in the unincorporated borough, and little information was available. This year we have been collecting information more specific to the needs of the project through household, business and public sector surveys, and a survey of Intertie construction workers (see article below). The original information was used in a predictive model that considered the growth assumptions and the features of the project to produce an estimate of project impacts. We are currently refining that model to include the new information and recommendations by some agencies.

Question: How will you mitigate for adverse socioeconomic impacts?

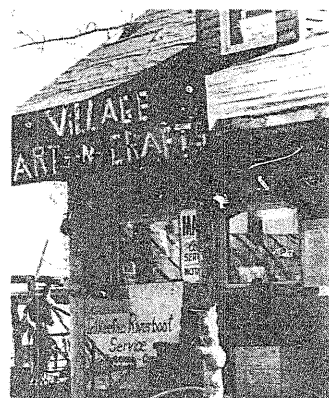
Fleming: Our first strategy is to minimize or avoid adverse impacts through good planning and design early in the project. One example of this was in the selection of an access corridor. There was a perception that the Trapper Creek and Talkeetna communities generally wanted only moderate growth in population, wishing to avoid impacts on the community structure, services and quality of life. Cantwell, on the other hand, seemed more in favor of increased business opportunities and growth in population. These socioeconomic factors were considered in selecting an access route from the Denali Highway rather than the Parks Highway.

If there are impacts that can't be avoided, the next step will be to predict them as accurately as possible and identify mechanisms for addressing them at the right time. This will require effective coordination with state and local agencies and the communities themselves.

Question: Do you foresee any positive impacts from the project?

Fleming: Defining positive socioeconomic impacts is difficult — this is something that is in the eye of the beholder. Small businesses may see the staged increase in population from the construction work force as positive, because it increases business opportunities. People who chose to live in these communities because of the remote lifestyle may see the growth as a problem.

Socioeconomics-Update



Socioeconomic specialists have been examining population and economic characteristics of Railbelt communities for the past three years, and a description of potential socioeconomic impacts of the project was provided in the license application. Two major activities have been conducted since then to refine that assessment:

- Community surveys for the three communities that are expected to be most affected by the project — Trapper Creek, Cantwell, and Talkeetna.
- Update of the economic-demographic projections which are used to estimate project impacts on local economies and public facilities and services.

Community Surveys

The purpose of the community surveys, which were conducted in October and November, was to develop a base of information for local communities that will be potentially affected by the project. The

information obtained included population, composition of households, occupations, and hunting, fishing, and trapping activities. Surveys were also made of local businesses, government jobs, and an existing construction work force on the Intertie project. The survey results have been used to revise the socioeconomic forecasts, which in turn will be used to plan for the needs of the existing and projected population. The community survey report will be published in early 1984 and will be submitted to FERC to become part of the licensing process.

Economic-Demographic Model

A socioeconomic impact model was used to develop projections for the local and regional areas where project impacts are expected. The local impact area is defined as the Mat-Su Borough, including land in and around the project site and nearby communities such as Cantwell. The regional impact area includes the area from Kenai to

Fairbanks, including the North Star Borough. The model was developed to allow projections to be easily and periodically revised to reflect changes in existing conditions such as population or in assumptions about the project such as work force size or construction schedule.

The model is divided into three parts. It calculates project impacts on employment and population, by location and year. The model also provides detailed information on the movement of workers and their families, which helps determine impacts on public facilities and services. The additional facilities and services that will be needed to support both project-induced and baseline population growth are then estimated for each year of construction and operation. Finally, potential changes to community income and costs are projected. The projections made in the license application are now being updated to reflect changing economic conditions in Alaska and current population growth estimates.

Presentations On Susitna Status Available

Members of the Susitna project team made a presentation to the Anchorage League of Women Voters on November 9. Topics included background on the project, its licensing status, and the issues settlement process. Similar presentations have been made in past months to the Chamber of Commerce and Resource Development Council. If your organization is interested in scheduling a presentation for a meeting program, contact the Susitna Project Office, 279-6611.

Notice

We are interested in hearing your ideas and answering your questions on the Susitna Hydroelectric Project. Please contact us:

Alaska Power Authority
Susitna Project Office
334 W. 5th Avenue
Anchorage, Alaska 99501
279-6611

Meeting Notices

Working meetings scheduled with resource agencies and the public as part of the Susitna issues settlement process are listed each week at the Alaska Power Authority Offices, 334 W. 5th Avenue, Anchorage. You can find out about meetings by stopping by or by calling 276-0001.

Wildlife and Vegetation-Update



Moose field studies provide information on movements and habitat use.

Wildlife and vegetation studies continue to add to knowledge about animals and their habitats in the project area. In the last year the following studies were underway:

- Moose were counted by age and sex, and preliminary results indicate that about 2000 moose use the area of potential project impact. Radio-collared moose have been monitored to identify movements and determine the size of their home range. Tracking moose calves with radio collars is also important to provide information on causes of death and rates of predation by bears and wolves. Downstream of the project area, biologists are providing information on habitat use along the Susitna River floodplain. These studies also measure the tendency to use disturbed areas, which is key information in evaluating mitigation plans.
- Especially severe winters often change moose behavior by forcing them into lower elevations, adding nutritional stress, and adding to predation. A study to gain information on moose in such conditions has been planned if a severe winter with deep snow should occur. It would involve increased censuses, recording information on dead moose, and monitoring wolf kills.
- The Nelchina caribou herd ranges north and south of the Susitna River. Studies have aimed at learning their patterns in relation to the planned reservoirs and estimating the size and productivity of the herd. A potential project impact would be creation of barriers between different parts of the caribou range, which could affect migration and calving. Radio-collaring has been used to track individual caribou and herd movements, and to help locate different parts of the herd when censuses are conducted.
- Wolf studies are designed to map their use of the project area and to monitor changes in wolf pack size. The principal potential impact on wolves would be loss of prey if moose and caribou populations were reduced, especially moose. About seven wolf packs have been identified, and radio-collaring has been used to track the number and size of the pack, locate den sites, and study food habits.
- Both black and brown bear have been under continual study to determine seasonal use of habitats, location of dens, and food habits. Samples of both types of bear were tracked and their dens marked and examined. The emphasis of the food studies was on spring and early summer food habits, especially use of salmon. Results have shown, for example, that salmon make up less of the black bear diet than previously assumed; the bears largely feed on berries. Radio collars help in locating sampled bears and their dens.
- Dall sheep range has been monitored to determine seasonal habitat use. Interest focused on the Jay Creek mineral lick, which receives heavy use by sheep. Sheep were color-marked and observed from a blind to determine numbers, sex, age, and use of the mineral lick. Last year's field work confirms that about 200 Dall sheep are located in the Watana Hills area near the mineral lick; roughly half of that population have been observed to use the Jay Creek lick. Research on location and mineral content of other mineral licks in the area will help in designing a mitigation strategy for portions of the lick that will be underwater or affected by construction.
- Beluga (Belukha) whales migrate within Cook Inlet depending on availability of fish moving in and out of river mouths. Reduced numbers of fish could affect the whales' food supply and calving. The whale study compares fisher-

ies information with field data to estimate potential impact from project-caused changes in the Susitna River.

- A beaver colony, in order to survive a winter, will stockpile food in underwater caches. Studying these caches provides information on how many beaver use the river. The survey last fall indicated the existence of a considerably larger number of colonies (11 versus 2 the previous year), perhaps because the fall river flows were quite stable. Data on beaver use of the river will be compared with estimated flows to estimate project impacts. For example, the averaging or stabilizing effect of the project may increase beavers' ability to successfully use the river for caching winter supplies of food.
- The Susitna vegetation program has studied plant phenology and moose browse in the project area. The plant phenology study evaluated the location, abundance, and timing of early spring moose and bear forage in the proposed reservoir areas. Moose are attracted to the early development of plant growth and early snowmelt in lower elevations. Similarly, brown bear emerging from hibernation move to those areas seeking overwintering berries and new vegetation growth generally found on south slopes. Early spring is a nutritionally critical period for bears as well as moose, and inundation of the impoundment areas will have an impact on both.

The purpose of the 1983 browse study was to develop cost-effective methods for conducting an extensive browse inventory of the project area. This inventory will be used in estimating the moose carrying capacity of the project area by assessing the amount and type of vegetation available. Moose carrying capacity represents the number of moose that can survive in the impoundment area over a given period of time.

Thank You Eric Yould



Eric P. Yould, Executive Director of the Alaska Power Authority since its creation in 1978, resigned on October 14, 1983. Power Authority Board Chairman, Dick Lyon, also Commissioner of the Department of Commerce and Economic Development, stated that Yould's decision to leave reflected part of the transition of the former administration to that of Governor Bill Sheffield, who was elected a year ago. Lyon said that "in terms of the formative years of the Power Authority, the Power Authority is in large part the persona of Eric

Yould.... He is a widely recognized and capable engineer.... He has provided a great deal of leadership...."

Since Yould became Director in 1978, the Power Authority has initiated major construction projects (three hydroelectric and one 170-mile transmission line between Fairbanks and Anchorage), brought the proposed \$5 billion, two-dam Susitna Hydroelectric Project into the Federal Energy Regulatory Commission licensing phase, and initiated other construction and energy development projects throughout Alaska.

License Application On File

The Susitna Project license application is available for public review at the following libraries. Ask for the Susitna Hydroelectric Project License Application to the Federal Energy Regulatory Commission.

Alaska Historical Library
Juneau
Alaska Resources Library
Anchorage
Alaska State Library
Juneau
Center for Research Libraries
Chicago, IL
University of Alaska Library
Anchorage
Noel Wien Memorial Library
Fairbanks
A. Holmes Johnson Public Library
Kodiak
Kegoayah Kozga Public Library
Nome
Kenai Community Library
Kenai
Ketchikan Public Library
Ketchikan
Kuskokwim Consortium Library
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susitna hydroelectric project Newsletter

february 1984

Power Authority Board Makes

Susitna Decisions

Actions taken by the Alaska Power Authority Board of Directors in October and November will maintain "fast-track" licensing of the Susitna Hydroelectric Project. The Board approved budgets through mid-1985 that provide environmental and engineering support for the license application now under review by the Federal Energy Regulatory Commission (FERC). The work involves continuing programs such as fisheries and socioeconomic monitoring as well as supplying FERC with the additional engineering, geologic, economic, and environmental information they need to evaluate the project.

Governor Sheffield approved a \$22 million budget for work in Fiscal Year 1984 (ending June 30, 1984), with \$6 million in additional funds set aside as a contingency to be used at the Board's discretion. Because it was not known exactly what added licensing information would be requested by FERC, the contingency fund was included to cover unforeseen activities. The Power Authority Board has approved use of \$2.8 million of the fund at this time, making the working budget for this year \$24.9 million. The additional funds were applied to efforts of the aquatic program (Alaska Department of Fish and Game), updating project economic and financial analyses, and maintaining the fast-track licensing schedule.

For Fiscal Year 1985 (July 1, 1984 through June 30, 1985) the Board of Directors approved a Susitna budget of \$32 million. This will continue support of licensing as FERC completes the environmental impact statement, holds hearings, and continues their detailed review of the project. Several



environmental studies will also continue into FY 1985 (e.g. the aquatic, wildlife, habitat, and socioeconomic programs).

The Susitna Project license application contains a conceptual design of the two-dam project and all related facilities, along with detailed information on project costs, economics, and environmental impacts.

Further review has revealed several areas that, based on the latest geotechnical and engineering information, can be changed to save money and minimize environmental impacts. The Board voted to incorporate the following refinements to the Watana development, with the understanding that including them in the application would not significantly delay the licensing process.

- Foundation excavations would be reduced by 3.5 million cubic yards because of new geotechnical information on the quality of the rock under the dam.

- The Watana dam design uses zones of different earth and rock materials (e.g. gravel, sand, earth). Based on revised excavation plans and location of construction materials, some changes would be made in how the zones would be arranged. The changes would make better use of available materials without affecting dam safety. The embankment slope would also be changed slightly to further reduce earthquake risk.

- The upstream cofferdam and

diversion tunnels reroute the river water during dam construction. The cofferdam height would be increased for added protection against ice buildup and the tunnels modified to reduce sediment deposits.

- The channels approaching the power station intake structure and the spillway would be combined to improve hydraulic efficiency.

- Based on a reassessment of geotechnical information, the underground powerhouse would be realigned to be more compatible with the rock joints. Instead of six power tunnels, three tunnels would carry water to the generators. These power tunnels would also be realigned to reduce construction cost without sacrificing power output.

- The main spillway would be enlarged to handle all predicted flows, instead of the earlier arrangement of a service spillway for normal flood discharges and an emergency spillway for the maximum probable flood.

The Devil Canyon development, planned to be built after Watana, would have only one design refinement. As at Watana, the emergency spillway would be eliminated and a combined spillway large enough for all floods would be included.

These refinements would not change the basic concept being reviewed by FERC, yet could save the project over \$400 million, reducing the estimated cost of the project from \$5.4 billion to \$5.0 billion (both in 1983 dollars).

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susitna hydroelectric project Newsletter

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This is the seventh newsletter published by the Alaska Power Authority for citizens of the Railbelt. The purpose is to present objective information on the progress of the Susitna Project so that readers may make their own conclusions based on accurate information.

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