

M E M O R A N D U M

TO: Council, SSC, and AP Members
FROM: Jim H. Branson
Executive Director
DATE: September 20, 1983
SUBJECT: Status of Contracts and Proposed Projects

ACTION REQUIRED

- (a) *Contract 81-5 - Incidental Salmon Catch Study: Approve final report and review proposals for further research.*
- (b) *Contract 82-3 - An Economic Profile of the Southeast Alaska Salmon Industry: Approve final report.*
- (c) *UFA Compendium: Approve co-sponsorship.*
- (d) *Lowell Wakefield Symposium: Approve co-sponsorship.*
- (e) *Sablefish Research: Approve proposals for funding.*
- (f) *Net-marked Salmon Study: Approve funding.*
- (g) *Golden King Crab Study: Review revised proposal and approve funding.*
- (h) *Golden King Crab Tag Recovery Program by ADF&G: Approve funding.*

BACKGROUND

Current Council contracts are listed below with information on the contractor, funding amount, percent expended to date, duration, objective, and status. Those contracts requiring Council action at this meeting are indicated with an asterisk.

Current Council Contracts

*81-5: Incidental Salmon Catch Study
(FRI/UW, \$100,000, 86%, October 1, 1981 to Sept. 30, 1983)

Objective: To determine the feasibility of using scale analysis to identify the stream or area of origin of chinook salmon caught incidentally in the foreign trawl fisheries off Alaska.

Status: A draft final report was sent to the SSC for review on September 12, 1983. An Executive Summary is under item E-1(a), along with suggested research that should be considered by the Council. The Council should consider approving the final report, thus closing the contract. Additionally, the Council should review further research in anticipation of supporting it by rapid response funds from FY/84 programmatic funds.

82-2: Crab Observer Program
(ADF&G, \$69,489, 90%, April 1982 to December 31, 1983)

Objective: To gather in-season catch data on species and sex composition, size frequency, fecundity, and discards.

Status: This contract was recently extended to December 31, 1983 to allow more time for preparation of a final report.

*82-3: An Economic Profile of the Southeast Alaska Salmon Industry
(UA, \$10,000, 70%, April 1, 1982 to July 31, 1983)

Objective: To provide current data on effort, costs, and earnings in the Southeast Alaska salmon fisheries.

Status: A draft final report was sent to the SSC for review on September 2, 1983. The contract is up for final approval at this meeting. A summary is available under item E-1(b).

82-4: Halibut Limited Entry Study
(NW Res. Analysis, \$77,290, 93%, June 1, 1982 to October 31, 1983)

Objective: To fully evaluate a share-type halibut limited entry system for Alaska, from design of the system to analysis of its impact on income, prices, geographic distribution and product quality in the harvesting, processing, and marketing sectors; and to generally evaluate other types of limited entry systems.

Status: In July the final report was approved by the Council for public distribution. Public presentations by Stokes will be scheduled sometime this fall or later. The current contract limit, \$77,290, is the original contract cost, \$80,000, minus the cost of the presentations. This separation of costs will allow the contract to be closed out and the presentations to be made later.

83-1: Social and Cultural Aspects of the Pacific Halibut Fishery
(Langdon, \$26,500, 90%, January 1 to July 31, 1983)

Objective: To gather social, cultural and demographic information descriptive of the contemporary Pacific halibut fishery important to management decisions.

Status: The report is undergoing final editing.

83-2: ADF&G Plan Maintenance
(ADF&G, \$60,000, 0%, July 1, 1983 to June 30, 1984)

Objective: To support liaison between ADF&G and the Council by funding personnel travel to Council activities and providing support for such other activities as computer compilation and data analysis, etc.

Status: Work is proceeding satisfactorily; no progress reports are required.

83-4: Joint Venture Trawl Logbook Program
(ADF&G, \$33,400, 0%, September 1, 1983 to September 30, 1984)

Objective: To provide interview coverages at three major ports (Kodiak, Akutan, and Unalaska/Dutch Harbor) to support the joint venture logbook program.

Status: The contract wording is now under review by ADF&G. Field work will not begin until January 1, 1984.

Proposed Projects

*UFA Compendium

United Fishermen of Alaska is requesting \$5,000 for co-sponsorship by the Council. In total, sponsors will contribute 50-75% of the \$91,050 needed. Remaining funds would come from pre-sales. The Council deferred action in July and now needs to decide whether or not to contribute the \$5,000 to partially support this project. Item E-1(c) explains the project.

*Lowell Wakefield Fisheries Symposium on Non-fishing and Fishing Induced Changes in King Crab Populations

The Council received a request to contribute \$4,000 toward support of a Lowell Wakefield Fisheries Symposium in 1984 [see item E-1(d)]. The Council deferred action in July and now needs to decide whether or not to support this project.

*Sablefish Research

In May the Council approved FY/84 programmatic funding for six projects including \$100,000 for Stock Assessment Methodology for Sablefish. Several possible research proposals were developed at a meeting of groundfish biologists in Tiburon, California in July. The PMT and SSC are now reviewing these proposals and will offer their recommendations to the Council at this meeting. The Council needs to decide if one or more of these research proposals should be supported from the \$100,000 previously earmarked for sablefish research.

*Net-Marked Salmon Study

Clinton Atkinson and his son, Bill, have proposed an exploratory search for all information relating to net-marked salmon. This search and an interim report will cost \$3,000, which the Council will need to approve [see item E-1(e)].

*Golden King Crab Study

In May the Council approved FY/84 programmatic funding for six projects including \$150,000 for a study on the Growth and Size at Maturity of Golden King Crab. In July the SSC and Council reviewed a revised proposal moving the study to the Bering Sea and requested that the proposal be sent to agency review. The agencies have responded and the Council is requested to approve the \$136,874 required from FY/84 programmatic funds for the study. Background materials are under item E-1(f). In particular, note that ADF&G estimates that the charter costs and tag awards are conservative and may need revision upward.

*ADF&G Golden King Crab Tag Recovery Study

ADF&G has reviewed the proposed Golden King Crab Study and has requested \$62,000 to support the tag recovery operations. See ADF&G's response in item E-1(f) for the background to this study.

Fisheries Management Conference

The Council is examining the scope and content of a proposed conference on fisheries management. A Council workgroup met on September 9 and will meet again in late October. A firm proposal should be available in December.

Status of Other Projects

Marine Mammal Workshop

This workshop was recommended by the Council's study on Marine Mammals Feeding Habits last year. It will provide a forum for the discussion of biological interactions among marine mammals and commercial fisheries in the southeastern Bering Sea and a five- to ten-year plan to gather scientific information on which to base management of commercial fisheries with regard to marine mammals. The workshop is scheduled for October 18-21, 1983 in Anchorage. Alaska Sea Grant is handling the arrangements. The Council's co-sponsorship of \$10,000 was approved in July 1982. The other co-sponsor is the Marine Mammal Commission which has contributed \$5,000.

Joint Venture Analysis

This analysis of the short and long term effects of joint ventures on the entire domestic groundfish industry was requested by Larry Cotter in early 1982. In July 1982 the SSC recommended that the study be conducted by employing a graduate student to compile existing data and summarize the relevant analyses. This is being done at the Northwest and Alaska Fisheries Center under the supervision of Dr. Rich Marasco. The project is progressing satisfactorily.

Bering Sea Herring Scale Analysis

This project was approved by the Council in March 1983. The \$59,930 from FY/83 funds recently approved by NMFS have been channeled through the NWAFC to expedite the project. The contractor is the University of Washington Fisheries Research Institute and the period of the contract is April 1, 1983 to March 31, 1984. The project will determine the degree of separability of major spawning stocks of herring in the eastern Bering Sea, north Alaska Peninsula and Aleutian areas using scale pattern characters. It will also examine the stock composition of herring collected from the domestic summer food and bait fishery and from offshore overwintering grounds if spawning stocks are determined to be separable. The project is progressing satisfactorily.

Sea Lion Pup Census Adjacent to Shelikof Strait

This project will provide an estimate of the total number of sea lion pups produced at the major sea lion rookeries in and adjacent to Shelikof Strait for comparison with similar counts made in 1978 and 1979. This comparison

should help in determining whether the incidental take of sea lions in the commercial fishery is having any impact on the sea lion population. The Council approved this project in May 1983. A request for \$11,548 has been approved by NMFS for FY/83 programmatic funds. The Marine Mammal Commission has approved an additional \$5,000. ADF&G will conduct the census in June 1984.

Chinook Troll Data Analysis

The project was approved by the Council in May 1983 and will provide a comprehensive analysis and evaluation of the potential consequences of ADF&G changing the chinook accounting period. The project will evaluate available coded-wire tag recovery data to estimate the stock composition and age of chinook salmon taken during different seasons of the year, will evaluate the effectiveness of potential time-area closures, and will compile existing records for the 1982-83 winter troll fishery to describe catch, effort, and participation history in the fishery. ADF&G will do the study from July 1, 1983 until January 15, 1984 for \$22,600. Funding was approved by NMFS on August 2, 1983.

Chinook Observer Program

The Council partially supported an observer program to monitor the 1983 coho-only salmon troll fishery to help determine the effects of the fishery on incidentally-caught chinook salmon. This project resulted from concerns expressed in March by the SSC about the need to evaluate hooking mortality of chinook during a coho-only season. The Council contributed \$1,500 to defray the cost of the observer's transportation and subsistence and the processing of the data gathered.

FRI-UW-83
September 1983

FINAL REPORT

DETERMINATION OF STOCK ORIGINS OF CHINOOK SALMON
INCIDENTALLY CAUGHT IN FOREIGN TRAWLS IN THE ALASKA FCZ

CONTRACT NO. 81-5
North Pacific Fishery Management Council

September 1983

prepared by

Katherine W. Myers

and

Donald E. Rogers

Fisheries Research Institute
School of Fisheries
University of Washington
Seattle, Washington 98195

EXECUTIVE SUMMARY

This is the final report for contract 81-5: Determination of Stock Origins of Chinook Salmon Incidentally Caught in Foreign Trawls in the Alaska FCZ.

Chinook salmon (Oncorhynchus tshawytscha) are the least abundant species of Pacific salmon in Alaska, but they often account for over 90% of the incidental catch of salmon by the foreign groundfish fishery in the Alaska FCZ. Incidental catches of chinook by the foreign groundfish fishery as high as those in 1979 and 1980 (>100,000 chinook) may significantly impact U.S. commercial, subsistence, and sport chinook fisheries, and escapement, yet stock origins of chinook caught by the groundfish fishery are not well known. We used models constructed from the scale patterns of major Asian and North American chinook stocks to classify the scales of chinook caught by the foreign groundfish fishery in the Alaska FCZ in 1978, 1979, and 1981 to region (Asia vs. Western Alaska vs. Central Alaska vs. Southeast Alaska/British Columbia vs. Washington/Oregon/California) and western Alaskan 'river' (Yukon, Kuskokwim, and Bristol Bay) of origin.

The highest incidental catches of chinook salmon by the foreign groundfish fishery in the Alaska FCZ usually occur along the continental slope (200 m contour) in the Bering Sea in INPFC statistical areas 1 and 2 during the first, third, and fourth quarters of the year, and most of the scale samples collected by U.S. observers were from these time-area strata. Chinook in the 1979 and 1981 groundfish fishery catches in the

eastern Bering Sea were predominantly ages 1.2 and 1.3. Mixing proportion estimates calculated for Bering Sea samples in 1979 and 1981 indicate that western Alaska was often the predominant regional stock. However, significant estimates for non-western Alaskan stocks indicate the presence of Asian, central Alaskan, and southeast Alaskan and British Columbian chinook, and these stocks predominated in some time-area strata. Age 1. chinook of Washington, Oregon, and California origin were not present in the 1979 and 1981 groundfish fishery samples from the eastern Bering Sea. Yukon was the predominant western Alaskan stock in 1979 catches of age 1.2 and 1.3 chinook and Bristol Bay was predominant in 1981 catches of age 1.2 chinook. Kuskokwim chinook did not appear to be present in the 1979 and 1981 trawl fishery catches. The quality and quantity of samples collected by U.S. observers on groundfish vessels in the Bering Sea in 1978 and the Gulf of Alaska for all years were not adequate for determination of stock origins.

RECOMMENDATIONS

In view of the results of this study, we recommend the following additional areas for research:

1. Interception estimates

Mixing proportion estimates and data on age composition of the fishery samples could be used in combination with catch data to provide estimates of the number of fish of each stock caught by the foreign groundfish fishery in the Alaska FCZ. These estimates would be directly applicable to the evaluation of the economic impact of the foreign trawl fishery on western Alaska and other regional stocks.

2. Classification of 1982 foreign trawl fishery samples

If quality and quantity of the samples are adequate, brood year 1976 (age 1.4), 1977 (age 1.3), 1978 (age 1.2), and 1979 (age 1.1) chinook scales collected by NMFS observers in 1982 could be classified to region or stock of origin using the same techniques that we have devised for our present study. This would provide needed additional information on the stock-of-origin of chinook caught by the foreign groundfish fishery and the distribution of chinook salmon stocks in the eastern Bering Sea and Gulf of Alaska.

3. Improvements in classification of 1981 trawl samples

We think that the mixing proportion estimates of brood years 1976 (age 1.3), 1977 (age 1.2), and 1978 (age 1.1) chinook in the 1981 trawl

samples would be improved by the addition of the 1983 inshore scale samples to the standards used for classification. The estimates obtained for 1981 NMFS observer samples during our present study should be considered as provisional since the scales of 1983 returns were not available in time to be included in our analyses. In addition, our present standards for brood years 1975-78 do not include any samples of 1982 Asian chinook returns. These samples have been requested (Rogers et al. 1983), and we hope to receive them within the next year.

4. Effect of non-preferred scales on mixing proportion estimates

To our knowledge, no studies have been conducted on the effect of inclusion of non-preferred-area scales in standard or unknown samples in scale pattern recognition studies. FRI is currently collecting scale samples from different areas on the bodies of chinook salmon to examine variability in scale characters with body zone. These studies could be extended to determine the effect of inclusion of non-preferred-area scales on classification of high seas fishery unknowns. Perhaps, a set of scale characters that do not vary with body zone could be determined. These types of studies would be particularly relevant to the analysis of NMFS trawl samples, as they are collected from many different areas on the body of the fish (Myers and Rogers 1982). We found that when both preferred- and adjacent-to-preferred-area scales were included in the unknown samples, we often obtained larger mixing proportion estimates for Asian chinook than when preferred-area scales only were included in the analysis. We suspect that many of our Asian scale samples may have been collected from a different body area than our North American scale

AN ECONOMIC PROFILE OF THE SOUTHEAST ALASKA
SALMON FISHERY

by
Douglas M. Larson
Alaska Sea Grant Program
University of Alaska
Fairbanks, Alaska 99701

A Report to the North Pacific Fishery Management Council,
in Fulfillment of Contract 82-3

August 1983

EXECUTIVE SUMMARY

Based on responses to a 1982 survey of fishermen, detailed profiles of costs, earnings, and investment in the 1981 Southeast Alaska salmon fishery were developed. The results indicate that gross earnings of purse seiners averaged \$107,000, while power trollers grossed roughly \$26,000, drift gillnetters grossed about \$23,000 on average, and hand trollers reported gross earnings of roughly \$4,700. Results of chi-square tests made possible by the participation of the Commercial Fisheries Entry Commission indicate that the sample gross earnings distribution is representative of the population in the purse seine and drift gillnet fisheries, while in the hand and power troll fisheries there was somewhat greater representation from fishermen with higher gross earnings. No independent collection of data on fishing costs is conducted, so similar tests on representativeness of sample fishing cost data was not possible.

After subtracting out-of-pocket fishing costs, net cash flows were estimated to average \$24,000 in the purse seine fishery, \$6,700 in the power troll fishery, \$5,600 in the drift gillnet fishery, and -\$600 in the hand troll fishery. These amounts are what is available after fishing expenses to pay debt service and to live on. Including the "hidden" costs of depreciation and the opportunity cost of capital invested, the return to labor and management was found to be generally negative if a 10 percent interest rate was used to represent the opportunity cost of capital. Because it may be argued that fishing investment is illiquid and subject to considerable transactions costs, a 5 percent opportunity cost of capital was also used for comparison. Employing this rate, the return to labor and management was found to be positive for the power troll (\$1,200) and purse seine (\$9,800) fisheries, though it was still negative in the hand troll fishery (-\$2,000) and drift gillnet (-\$4,000) fisheries. The return to labor and management represents the return realized by the efforts of the owner-operator and any unpaid labor employed in fishing, such as family members. The amount of unpaid labor employed varied from 0.08 persons per vessel in the purse seine fishery to 0.54 persons per vessel in the drift gillnet fishery.

Cluster analysis was employed to define subfleets in each fishery which differed in their physical characteristics. Cost, earnings, and investment profiles were prepared for these subgroups as well. Typically, one subgroup contained vessels which were bigger, newer, and more expensive, and which grossed more and had higher net cash flows. One or more other subgroups in each fishery were generally older and less expensive, and had lower gross earnings and costs of operation. When depreciation and opportunity costs of capital were included, often these "lower-tech" vessels had better economic performance reflected by higher return to labor and management, even though they may have had lower net cash flows.

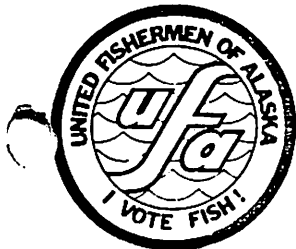
To improve the usefulness of the costs and earnings data in policy analysis, functions relating fishing effort to costs (cost curves) and fishing effort to earnings (production functions) were estimated cross-sectionally, both for each fishery as whole and separately for the subfleets within each fishery, and the results were compared. Because the subfleets are defined by differences in physical characteristics of vessels, they are thought to be more homogeneous with respect to fishing power, and the models for the individual subfleets, or clusters, are preferred from a conceptual standpoint. In the purse seine fishery particularly, the cluster models were better statistically than the whole fishery model.

To illustrate the use of the production and cost models, the effects on fishery-wide gross earnings, net cash flow, and crew wages of an assumed 10 percent reduction in fishing effort were estimated for each fishery. In aggregate, reductions in gross earnings in the drift gillnet fishery from a 10 percent reduction in fishing effort were estimated to be \$330,000 and \$350,000, by the fishery-wide and cluster models, and combined reductions in net cash flow and crew wages were estimated at \$70,000 to \$100,000. In the hand troll fleet, reductions in aggregate gross earnings were estimated at about \$420,000 by both models, and combined reductions in net cash flow and crew wages were predicted to be about \$190,000. In the power troll fishery, aggregate gross earnings would be reduced by \$2.0 million to \$2.2 million, based on the model predictions, while combined reductions in net cash flow and crew wages would be about \$1.5 million. Reductions in aggregate purse seine gross earnings would amount to roughly \$1.6 million, while model estimates of reductions in net cash flow and crew wages were nearly as large, about \$1.5 million. These estimates are in 1981 dollars, and do not include any possible supply effects on price, which if they occurred would probably be more pronounced in the troll fisheries. If price changes do result from the reduced fishing effort and catches, the estimates of reduced earnings will tend to be overestimates.

It is also possible to roughly estimate the reductions in chinook salmon catch which would accompany the reduced fishing effort. Average contribution of chinook salmon to the total value of 1981 catch was examined for each fishery, as well as higher and lower estimates of the chinook contribution, to account for the uncertainty about the actual effects of specific policies. In the drift gillnet fishery, based on the 1981 average contribution of chinook to catch value, 220 less chinook would be caught if drift gillnet fishing were curtailed by 10 percent; in the hand troll fishery this would amount to 4,700 fish; for the power troll fishery an estimated 25,000 less fish would be caught; and in the purse seine fishery an estimated 280 less chinook would be caught.

To re-emphasize, the estimates of reductions in earnings and chinook catches illustrate potential uses of the cost and production models. Fishery managers in charge of specific fisheries are better equipped to estimate the likely effects of specific management policies on fishing effort and chinook interception rates, and once these key parameters are specified, these models can be used to examine the trade-offs involved in those policy decisions.

UNITED FISHERMEN OF ALASKA



Cass M. Parsons
 Executive Director

Mr. Jim Branson
 Executive Director
 North Pacific Fishery Management Council
 P. O. Box 3136 DT
 Anchorage, Alaska 99510

Dear Jim:

Thank you for your letter and your willingness to take the proposal to the Council.

It is an ambitious project, but one I feel needs to be undertaken. We know from our correspondence with fishermen, agencies and legislators that the need for the compendium exists. I am enclosing a few responses with this letter. As you will note, we have had interest expressed from the House of Representatives and we expect at least some members of the Senate to commit funds. After feedback from these bodies, we have decided to decrease the pre-sale target to 25-50%, and increase our grant target to 50-75%.

We have approached 19 state or federal agencies for \$5,000 contributions. We have received written or verbal commitments from both the Department of Commerce and Economic Development and the Department of Labor. Other agencies are the Departments of Environmental Conservation, Natural Resources, University, Public Safety, State Library, Coastal Management, Transportation, Fish and Game, Revenue, Education, and several others. As you may guess, several are contingent on the beginning of the new fiscal year or having commitments from other agencies. That is why a grant from the Council would be tremendously helpful at this time.

In addition to coordinating the state grants, Gerry Kelly is approaching the forest industry, banks, oil companies, Native corporations and other companies who have a stake in the fishing industry in Alaska.

We do plan to revise our initial subscription fee when we have a clearer picture of our revenue and expenses. The important thing is to offer the compendium at a fee which will encourage as many individual fishermen to use it as possible.

ACTION	ROUTE TO	INITIAL
	Exec. Dir.	
	315 Seward Street, Suite #208	
	Juneau, Alaska 99801-1188	
	Admin. (907) 586-2820	
	Exec. Sec.	
	Staff Asst. 1	
	June 21, 1983	
	Staff Asst. 2	
	Staff Asst. 3	
	Economist	
	Sec./Bkkr.	
	Sec./Typist	

Mr. Jim Branson
June 24, 1983
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I hope the updated prospectus will help you in your discussions with the Council. I plan to be out of the office most of July (am hoping to get to the July meeting at Land's End) so if you have further questions and I am not available, please contact Gerry Kelly, who I have asked to help coordinate the compendium.

Sincerely,

A handwritten signature in cursive script that reads "Cass M. Parsons". The signature is written in dark ink and is positioned above the typed name.

Cass M. Parsons
UFA Executive Director

CMP/jb

Enclosure: Revised prospectus
Letters and contrac. copies



UNITED FISHERMEN OF ALASKA

Cass M. Parsons
Executive Director

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ALASKAN FISHERIES COMPENDIUM

SUMMARY

The Alaskan Fisheries Compendium is a reference document and tool which will allow fishermen, processors, other fishery user groups, the legislature, and state and federal officials access to the most current information on all issues and subjects affecting fisheries in Alaska. The compendium will gather together and present in concise form all the essential facts and details pertaining to each fishery topic. In fulfilling this goal, a brief historical review of each topic, as well as the applicable state or federal laws and regulations will be provided.

While documents summarizing and exploring these subjects exist in many cases, a compilation of these publications does not. Nor is this information available to any but those with the most extensive libraries. Simple summarizations of entire subjects are generally non-existent.

The Alaskan Fisheries Compendium will be presented in loose-leaf notebook form for easy copying and up-dating. Approximately 350 notebooks will be published initially with additional copies made according to demand. We will update annually (for a \$60 fee) to incorporate new regulations, policy changes or issues. We plan a regional version of the compendium after the statewide one is completed.

The compendium will be financed 25-50% from pre-sale commitments and 50-75% from those state and federal agencies with a specific involvement in the fishing industry. The UFA has asked these agencies for a \$5,000.00 sponsorship fee. Among the agencies requested to contribute include the University of Alaska, the Alaska Department of Fish and Game, the National Marine Fisheries Service, the North Pacific Fishery Management Council, the Department of Environmental Conservation, the Department of Commerce and Economic Development and so on. The Alaska State Legislature, the Board of Fisheries, fishermen's organization, processors, etc., either have been or will be solicited for pre-sale commitments.

The Alaskan Fisheries Compendium has a completion date scheduled for March, 1984. Those agencies which contribute to the project will receive one copy of the published document.

Because of its high priority, UFA has retained a full-time coordinator for the compendium to assist all agencies, associations, and individuals who wish to make input, collect existing laws and regulations, provide for an orderly review by all parties involved, and administer grant and pre-sale efforts.

The coordinator will work with qualified researchers to assist in the major subject areas indicated in this prospectus. The researcher's role will be to collect pertinent material and prepare concise summaries for each subject. This material will be edited and sent to cooperating agencies for review and approval. Additionally, the researchers will compile an annotated bibliography and index for the compendium.

We are making every effort to keep the planning process open to all. The coordinator and researchers will be in the UFA office in Juneau, accessible to legislators, agencies and individuals wishing to make input. All agencies, firms and associations which help sponsor the compendium will have ample opportunity for review and will have their names on the final copy. This will assure a comprehensive, accurate and objective compendium.

INTRODUCTION

A voluminous body of information exists describing the many facets of the fishing industry in Alaska. Presently this information is scattered throughout private, state and federal collections and thus generally inaccessible. Furthermore, the scientific and legal terminology that characterizes much of this literature often renders findings of significance uninterpretable to potential users, fishermen and legislators alike. Consequently, much of this information is seldom used. The rapid pace of development in the fishing industry diminishes the value of information that is not up to date, readily available and easily interpretable. The lack of a reference document to which people can turn for a concise and clearly written summary of issues and laws which are often complex, aggravates problems throughout the industry. To correct this situation the UFA proposes to produce an "Alaskan Fisheries Compendium".

The purpose of the compendium will be to present non-technical discussions of fisheries issues and laws to facilitate understanding by laypersons so that they may perform their duties in a more professional manner. The current absence of such a document negatively impacts all sectors of the fishing industry, the species upon which the industry depends, and the natural system upon which the species depend. Researchers and officials often work in their own worlds, at cross purpose or duplicating each other's efforts. As a result, both agency and privately proposed projects often meet with resistance from an uninformed public, the recent failure of the NMFS marine sanctuary proposal being a case in point.

Project Goals

The goal of this project is to synthesize the existing but fragmented body of information on Alaskan fisheries into a source book, the Alaskan Fisheries Compendium. The compendium will facilitate problem solving in all aspects of the Alaskan fisheries and thus serve to strengthen and stabilize the industry. The compendium will contain summaries of the literature on each topic of the industry and documents of significance will either be referenced or actually included in the appendices. Thus the compendium will be of much greater utility than an annotated bibliography or a compilation of documents. The major components of the project are briefly described as follows:

- 1.) Thoroughly review and summarize the history, current status, existing regulations and laws, pending legislation and potential future developments of each fisheries topic (described under Objectives).
- 2.) Offer the findings in two different editions of the compendium. One edition will have a statewide emphasis and be suitable for use by the industry, state and federal agencies, and the legislature. The other editions will have regional emphases and be suitable for use by the public, individual fishermen, local processors, and local governments who face problems unique to their geographical areas.

The review and summarization of the current literature on Alaskan fisheries topics will facilitate the following objectives:

- 1.) review of the history of Alaskan fisheries
- 2.) determination of the efficiency and productivity of harvesting techniques of the different gear groups
- 3.) analysis of fisheries management regimes; i.e., problems associated with sport fish, closures and openings, regulatory policy, regional problems, limited entry, interception, allocation and other problems facing the Board of Fish and the North Pacific Fisheries Management Council (NPFMC)
- 4.) evaluation of habitat protection guidelines in relation to the development of the following resources; hydroelectric, mineral, timber and OCS oil
- 5.) improvement in aquaculture, rehabilitation and enhancement techniques
- 6.) evaluation of the effectiveness of fishing loan programs, limited entry and the capital construction fund, review problems resulting from over and under capitalization, ADFG budget and taxation
- 7.) implementation of economic and investment studies of underutilized species
- 8.) planning of ports and harbors, water and sewer development
- 9.) assessment and testing of industry safety standards
- 10.) completion of quality assurance research by ASMI
- 11.) development of marketing techniques for foreign and domestic exports
- 12.) promotion of new products and processing techniques
- 13.) investigation of the problems associated with the expansion of the present industry into new fisheries; i.e., increased utilization of non-traditional resources as bottom fish; Office of Commercial Fisheries Development
- 14.) address the problems related to obtaining trained fisheries and processing work forces; i.e., maintenance and packing of fish, education, strikes and joint ventures to shoreside
- 15.) ascertain the direction of foreign developments that will affect Alaskan fisheries
- 16.) identification of foreign influence within the industry and its affect on the State's regulatory process, management and coordination of state fishery programs and policy, Domestic Fish Advisor, Office of International treaties.

Project Benefits

-5-

The compendium will provide a synopsis in laymen's terms of the entire spectrum of Alaskan fisheries topics, an immediate and tangible benefit to users. They will also serve to identify topics for which a paucity of information exists and ascertain the degree to which these gaps are handicapping development of the industry. These topics will be rank ordered into a priority list of research needs. The compendium will function as a catalyst to promote cohesion amongst existing forces in the industry by providing equal footing on the ground of common knowledge. This body of specialized information will provide an all encompassing vantage point from which people new to the alien terrain of the fishing industry (conflicting regulations, overlapping responsibilities, etc.) will be able to find direction. Ease of interpretability and accessibility will encourage use of the directory and enable users to make informed decisions based on the best information available.

Dissemination of Results

The UFA will encourage wide dissemination of the compendium by advertising in fisheries periodicals and through direct solicitations. The rapid evolution of the fishing industry generates a constantly growing body of information. Compendium users will be provided with an updating service through annual and intermittent supplements.

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The Stocks (Life history, distribution, and abundance of commercial species)

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- Codlike fishes
- Shrimps
- Herringlike fishes
- Mollusks
- Crabs
- Flatfishes

Commercial Fisheries

- Areas
- Gear
- Vessels
- Fishermen
- Processors

Fisheries Management

- Management techniques
- Limited licensing
- Sports fishery
- Subsistence and personal use fisheries
- Allocation
- Federal management

Fishery Economics

Production
Economic value
Domestic and foreign capitalization
Subsistence and personal use fisheries
State/federal role

Fisheries Development

Fully utilized species
Underutilized species
Transportation and infrastructure
State/federal role

Marketing

Promotion
Quality
Pricing
Import/export
Foreign/domestic

Research and Education

State
Federal
Private

Enforcement/Safety

State
Federal

Federal Fisheries Law

Treaties
Conventions

Habitat and the Environment

Aquaculture, enhancement and rehabilitation
Outer continental shelf oil
Timber and forestry
Mineral development
Coastal zone management
Hydroelectricity

Other Topics

-7-

Foreign fisheries in Alaska waters
State and federal coordination

CHAPTER ORGANIZATION

Chapter Title

Summary

Sub-topic heading

History
Present day analysis
Laws and regulations
Projections

Appendices

Glossary

Annotated Bibliography

Index*

PRELIMINARY WORK SCHEDULE

June: Agency and pre-sale solicitations; compendium design and layout; advertising strategy; development of final work plan

July: Enforcement and safety

August: Research and education

September: Development and commercial fisheries

October: Stocks and fisheries management

November: Fisheries economics and marketing

December: Federal fisheries law and other issues

January: Habitat and environmental conflicts

February: Final review and editing

March: Printing and dissemination

*Key words will be cross-referenced in an index at the back of the compendium notebook.

PROPOSED BUDGET

1.0	<u>Personnel</u>		
1.1	<u>Salaries</u>		
	Secretarial: 4 mos. @ \$1,800.00/mo.	\$	7,200.00
	Bookkeeping: 240 hrs. @ \$18.00/hr.		4,320.00
1.2	<u>Professional Services</u>		
	Project Coordinator: 10 mos. @ \$2,700.00/mo.		27,000.00
	Principal Investigator: 10 mos. @ \$2,500.00/mo.		25,000.00
	Editor: 80 hrs. @ \$40.00/hr.		<u>3,200.00</u>
	Sub-Total Personnel	\$	66,720.00
2.0	<u>Travel</u>		
2.1	<u>Air Travel</u>		
	Three RT Juneau/Anchorage	\$	960.00
	Three RT Juneau/Seattle		840.00
2.2	<u>Per Diem</u> (@\$80.00/day)		
	Nine days in Anchorage		720.00
	Nine days in Seattle		<u>720.00</u>
	Sub-Total Travel	\$	3,240.00
3.0	<u>Office</u>		
3.1	<u>Space</u>		
	10 mos. @ \$324.00/mo.	\$	3,240.00
3.2	<u>Telephone</u>		
	10 mos. @ \$200.00/mo.		2,000.00
3.3	<u>Supplies</u>		500.00
3.4	<u>Equipment</u>		
	Two typewriters 10 mos. @ \$75.00/mo.		1,500.00
3.5	Duplicating		<u>500.00</u>
	Sub-Total Office	\$	7,740.00
4.0	<u>Production</u>		
4.1	<u>Graphics/Design</u>		
	Cover & Contents	\$	2,000.00
4.2	<u>Materials</u>		
	Notebooks: 350 @ \$3.50/notebook		1,225.00
	Tabbed Inserts: 8,750 @ .25/notebook		1,750.00
	Paper: 175,000 @ 500/notebook		1,750.00
4.3	<u>Printing</u>		
	175,000 sheets @ .025/sheet		4,375.00
4.4	<u>Postage</u>		
	Directories: 350 @ \$5.00/copy		1,750.00
4.5	<u>Advertising</u>		
	Brochures: 1,000 @ \$.25/copy		250.00
	Newspapers: 10 @ \$25.00/ad		<u>250.00</u>
	Sub-Total Production	\$	13,350.00
	Grand-Total Requested Funds	\$	<u>91,050.00</u>



University of Alaska

Statewide System of Higher Education

ACTION	ROUTE
ALASKA SEA GRANT	Exec. Dir
CG	
590 University Ave., Suite 102	
Fairbanks, Alaska 99701	
June 15, 1983	

Mr. James Branson
Executive Director,
North Pacific Fishery Management Council
P.O. Box 3136DT
Anchorage, AK 99510

Subject: Porposal -- Lowell Wakefield Fisheries Symposia Series
Non-fishing and Fishing Induced Changes in King Crab
Populations

Dear Jim:

Following the outcome of the March SSC meeting, I began putting together preliminary information on the symposium suggested on fishing and non-fishing induced changes in populations of crustacea. The species to be looked at would be shrimp, tanner and king crabs. Because pandalid shrimp and tanner crab have already been the subjects of international meetings held in Alaska, and due to the fact that comprehensive proceedings documents have been published from those meetings, this proposal has taken on a slightly different tone.

It was felt important at this time to concentrate on the king crab. Hence, the attached proposal for your consideration.

If there are any questions regarding the proposal, please let me know.

Thank you.

Yours truly,

Brenda R. Melteff
Coordinator

BRM:ach

cc: D. H. Rosenberg

June 15, 1983

PROPOSAL

Title: Lowell Wakefield Fisheries Symposia Series
Non-fishing and Fishing Induced Changes in King Crab Populations

Principal Investigator: Brenda R. Melteff
Alaska Sea Grant College Program
University of Alaska
Fairbanks, Alaska 99701

BACKGROUND

King crab stocks of the northeastern Pacific Ocean and eastern Bering Sea have played a major role in the development of the fishing industry along the west coast of the United States. Since the early 1960s, the domestic catch has grown substantially. During 1980, 185.6 million pounds of king crab were harvested, with an ex vessel value of about \$170 million. The fishery is conducted by a fleet of vessels that is recognized as one of the world's most modern. It can also be listed among the factors responsible for the elevation of the Alaska cities of Kodiak and Dutch Harbor to major U.S. fishing ports.

After peaking in 1980, the king crab catch declined significantly. Preliminary data indicate the 1982 catch was 38.5 million pounds. The sharp decline has been attributed to reduced abundance of legal sized male king crab. This reduced abundance has significantly affected the economic viability of the fleet and stimulated interest in the effects of fishing and non-fishing sources of mortality on king crab stocks.

Fishery-induced changes in abundance are the keystone of current management, which regulates by size limits and a single-sex fishery. How the single-sex fishery affects crab reproduction and how the size limits influence mortality of sub-legal crabs are among topics that need further investigation. Non-fishery factors which also contribute to mortality among king crab stocks are yet another facet requiring more study and data collection. Key physical and biological factors contributing to king crab survival need to be documented in order to improve abundance forecasting and preservation. Finally, ways to predict how a management plan will economically affect the fishery need to be evaluated and considered before any plans are adopted.

OBJECTIVE

To provide a forum for fisheries scientists and management personnel working with king crab to present reports on their activities and to discuss and develop strategies for future use in the king crab fishery.

APPROACH

To hold a Lowell Wakefield Fisheries Symposia on non-fishing and fishing induced changes in king crab populations during the spring of 1984. In addition to the North Pacific Fishery Management Council, participation will be invited from the National Marine Fisheries Service, the Alaska Department of Fish and Game, other fisheries agencies, departments and universities in Oregon, Washington and Alaska, as well as from fisheries agencies of Japan and the Soviet Union. The University of Alaska Sea Grant Program will coordinate the symposium including invitations and arrangements for participants, logistics for the meeting dates, place, publicity and other publications.

PRODUCTS

Alaska's fisheries biologists and managers working on king crab will have the opportunity to meet and interact with their peers from other states and nations. The information gained from presentations and discussions will provide an ordered list of research projects needed to understand what has happened to the stocks and how they can be most effectively managed. A proceedings document will be published incorporating the research results presented and the future research needs.

ESTIMATED BUDGET

This proposal requests \$4,000.00 from the North Pacific Fishery Management Council for participant travel and publication.

SEP 8 1983

AGENDA E-1(e)
SEPTEMBER 1983

CLINTON E. ATKINSON

Fisheries Consultant and Advisor

September 1, 1983

Mr. James Branson
Executive Director
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, Alaska 99503

ACTION	ROUTE TO	INITIAL
	Exec. Dir.	3
	Deputy Dir.	
	Admin. Off.	
	8000 CREST DRIVE NORTHEAST	
	SEATTLE WASHINGTON 98115	
	TELEPHONE (206) 524-4242	
	TELEX (TWX) 910 444 2108	
	Staff Asst's	
	Economist	
	Sec. 2000	
	Sec. 1000	

Dear Mr. Branson:

My son and I have reviewed the two recent reports on the Japanese flying squid drift-net fishery in the North Pacific, and its relation to the occurrence of net-marked salmon taken by the troll fishery in Southeast Alaska. Both reports review the ecological separation of the two fisheries, exploring the possibility of mixing of the species and the incidental take of salmon by the squid fishery.

From our preliminary review of the literature, we note that the distribution of salmon is slightly more restrictive than described in the reports; the preferred range for salmon is 2.3°C - 12°C, with the tolerable range between 1°C - 15°C. It appears, however, that the range for squid is much broader, with flying squid found in the Pacific Ocean from New Zealand to the Bering Straits. I have not yet been able to find information on the preferred range for squid.

The Japan Fishery Agency, though, must recognize the broad range of the squid, since they have keyed the northern limits of the squid regulatory area to conform with the southern boundaries of the salmon isotherm. If the preferred range, i.e. concentration of squid, occurs in the cooler waters to the north, there would be considerable temptation for the fishermen to go north in violation of the regulations. If this is the case, there would be a good chance that salmon are being taken by the squid fishery, causing the net-marks observed in the troll fishery.

The first part of the study would be to clarify the ecosystems of the salmon and of the flying squid.

The next part of the study, as we see it, would be a very detailed description of the fishery, including periodic concentrations of the fleet and of vessels along the northern boundaries of the regulatory area. We would also review how the Japanese Government regulations are formulated, and more important, how they are enforced by the Fishery Agency. This is the most difficult part of the study and would require time to explore the kind of information available from the government and from private industry. Weekly FAX information is available for some fisheries, and I hope that the squid fishery is one of them.


We are also aware, through various sources, that both the Taiwanese and Koreans are fishing for squid in the North Pacific. Since these fisheries are probably not subject to the extensive regulation that the Japanese fishermen are, they could well be the source of the net-marks. Through our contacts in Korea and Taiwan, we would attempt to get similar information on these fisheries.

Finally, we believe that it is necessary to examine the frequency and seasonality of the net-marks found in the troll fishery in Southeast Alaska, and try to correlate them with the distribution of the squid, and/or other fisheries in the North Pacific. Over the past two or three years, U.S. troll fishermen have been keeping log records giving information on individual incidences of net-marks. The log information has been entered into a computer and should be readily available for analysis. Also, as I mentioned to you earlier, there is a report on net-marked fish which was done at the Montlake Lab some time ago as a part of the INPFC studies, and I will send you a copy as soon as I can locate it.

The cost of the above study is difficult to estimate, because of the reliance on the availability of foreign data, which is somewhat of an unknown at this time. I would propose, however, that we proceed with a search for available data and prepare an interim report for you to review; this report would include a proposal for a more detailed and precise report. Our estimate for the exploratory search and interim report is \$3,000.

I am leaving for Japan and Korea tomorrow and would appreciate it if you would inform my son at this address, if and when the Council approves the exploratory search and interim report phase of this study (\$3,000). I would like to begin the data search in Japan and Korea before I return on about October 4th. It could save much time and subsequent expense.

Sincerely yours,



Clinton E. Atkinson
Fisheries Consultant and Advisor

att.

CEA/wca



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northwest and Alaska Fisheries Center
Resource Assessment and Conservation Engineering
2725 Montlake Boulevard East
Seattle, WA 98112

SEP 1 1983

AUG 21 1983

F/NWC1:MLH

ACTION	ROUTE TO	INITIAL
	Exec. Dir.	J
✓	Deputy Dir.	
	Admin. Off.	
cc: Rosenberg	Exec. Sec.	Rla
	Staff Asst. 1	
	Staff Asst. 2	
	Staff Asst. 3	
	Comptroller	
	Sec./Bkkr.	
	Sec./Typist	

Mr. Jim H. Branson, Executive Director
North Pacific Fishery Management Council
P. O. Box 103136
Anchorage, AK 99510

Dear Jim:

We have reviewed the technical proposal "Growth and Size at Maturity of Golden (Brown) King Crab, Lithodes aequispina" by North Pacific Research (or is it University of Alaska's Institute of Marine Science).

There is no question that information on growth and size at sexual maturity is needed for this species. The task is not technically demanding and Mr. Jewett, with good biometric assistance (such as Dr. Somerton), has the capability of doing the work. Mr. Jewett has amended the proposal in response to input from Dr. Robert Otto at Kodiak. Dr. Otto has data on sexual maturity of brown king crabs from the eastern Bering Sea and has tagged brown king crabs for growth studies.

Implicit in the proposal is collaboration with ADF&G. Apparently, ADF&G has agreed to loan IMS pots and, of course, only ADF&G is situated to conduct the tag recovery and follow-up that is required. We would recommend against any independent arrangement for tag recovery. Also, since both ADF&G and NMFS regularly conduct such studies, the data should be collected and maintained in formats compatible with one of the agency data bases.

Sincerely,

William Aron
William Aron
Center Director





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

National Marine Fisheries Service

P.O. Box 1668

Juneau, Alaska 99802

SEP 16 1983

September 12, 1983

Jim H. Branson, Executive Director
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, AK 99510

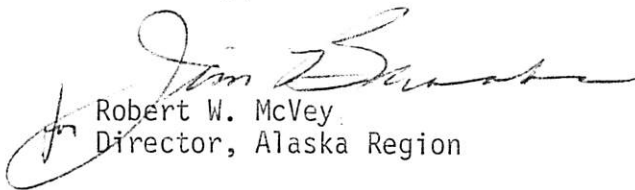
Dear Jim:

ACTION	ROUTE TO	INITIAL
	Exec. Dir.	3
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	Exec. Sec.	
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	Asst. Dir. 2	
	Asst. Dir. 3	
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We reviewed Stephen Jewett's revised proposal to study the growth and size at maturity of golden king crab in the Bering Sea. We understand that the revisions include: (1) lengthening the duration of the tagging operation from 12 days to 18 or 20 days; (2) deleting the 12-day tag recovery operation; (3) increasing the number of crabs to be tagged from 1,000 to 3,000-4,000; and (4) increasing the reward for tag recovery from \$5 to \$10-\$20.

We have no objections to the above revisions. Although the reward for recovered tags seems a bit high, we defer to judgments of those who have had experience with such incentives. We fully support this study, recognizing its potential value in the management of the golden king crab fishery.

Sincerely,


Robert W. McVey
Director, Alaska Region



SEP 14 1983

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

P.O. BOX 3-2000
JUNEAU, ALASKA 99802
PHONE: (907) 465-4100

September 14, 1983

Mr. Jim H. Branson
Executive Director
North Pacific Fishery
Management Council
P.O. Box 103136
Anchorage, AK 99510

Dear Mr. Branson:

This is in response to your August 10 and August 11 memoranda requesting comments on the proposed brown crab research study. I am pleased that our earlier comments, which recommended conducting this research effort in the Bering Sea/Aleutian Islands area rather than Southeastern Alaska, have been incorporated into this proposal.

We strongly support the Council funding of this project. There is a paucity of basic biological data for this resource and a genuine need for the research. There is, however, one major oversight in the proposal which needs to be addressed before final Council action. I do not believe that there are adequate provisions for the collection of tagged crab from the commercial fishery. The proposal calls for tagging some 3,000 to 4,000 brown crab and relying on the Department to collect information on the estimated 150 to 400 recoveries. This proposal presents two problems, both solvable. Problem one is the administrative cost to the Department for paying the recovery fees to the fishing industry. I would recommend that our staff provide self-addressed, postage paid post cards to individuals who recover tagged crab. Either the contractor or the Council could pay the tag recovery fee directly. Alternatively, the contractor could sub-contract with the Department to provide this service.

Problem two is the additional manpower requirements to collect the information on tagged crab. The king crab industry which operates out of the Dutch Harbor area has substantially changed its operations in the past several years. Previously, our limited manpower resources could closely monitor the industry because the majority of crab processing occurred onshore. This is not the case today. The vast majority of the processing occurs on floating processing facilities and a relatively small percentage of the total harvest is processed ashore. Therefore, to collect the information from tagged crabs, personnel will have to be

Mr. Jim H. Branson

-2-

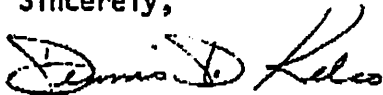
September 14, 1983

assigned to the floating processors. My staff estimates that up to 20 floating and catcher processors can be expected this season in the Aleutian Island fishery. Experience indicates that the recovery of the desired level of five to ten percent of the tagged crab will require four new personnel for the duration of the four-month fishery. My Department is interested in conducting the tag recovery operation; however, budget restrictions make it impossible to commit the necessary funds. Without the appropriate funding, I fear that sufficient tags will not be recovered to satisfy the statistical design of the project. Therefore, I must request the necessary funding from the Council. I have attached a budget request for your review.

One final comment, the proposed budget appears to be a bit conservative. The proposal calls for securing a charter vessel for \$2,500 per day. For planning purposes, I believe that \$3,000 per day (with fuel) is more appropriate. Also, I believe the \$500 budgeted for tag recovery is inadequate. The project has been expanded to upwards of 4,000 tagged crab at \$10 to \$20 per tag recovery. A ten percent recovery may cost some \$8,000.

Thanks for the opportunity to comment again on this proposal. If you need additional information, please contact Dr. John Clark at 465-4210.

Sincerely,



for Don W. Collinsworth
Commissioner

Enclosure

cc: John Clark
Bob McVey
Bill Aron

September 14, 1983

Growth and Size at Maturity
Of Golden (Brown) King Crab

Budget Request by the
Alaska Department of Fish and Game

	<u>Totals</u> <u>(thousands)</u>
<u>Personnel</u>	
16 Man Months of F&G Technician III (\$2,918 with benefits per month, Kodiak schedule)	\$46.7
<u>Travel</u>	
4 R/T Kodiak/Dutch Harbor and per diem	3.6
<u>Subsistence (meals)</u>	
480 days @ \$27/day	<u>13.0</u>
Grand Total	\$62.0

AUG 11 1983

Stephen C. Jewett
Institute of Marine Science
University of Alaska
Fairbanks, AK 99701
474-7841

08 August 1983

ACTION	ROUTE TO	INITIAL
	Exec. Dir.	J
	Deputy Dir.	
	Asst. Dir.	
	Asst. Dir. 1	
	Asst. Dir. 2	
	Asst. Dir. 3	
	Secretary	
	Sec. Dir.	
	Sec./Typist	

Mr Jim Branson
Executive Director
North Pacific Fisheries Management Council
P.O. Box 103136
Anchorage, AK 99510

Dear Mr Branson:

The revised proposal that I recently submitted to NPFMC was prepared without any corroboration from Dr Robert Otto (NMFS), who is involved in golden king crab research. I recently made contact with Dr Otto and he made the following suggestions regarding my proposal: lengthening the 12-day tagging operation to approximately 18 or 20 days; deleting the 12-day tag recovery operation; increasing the tag-recovery reward of \$5 to \$10-\$20; and increasing the number of crabs to be tagged from 1,000 to 3,000-4,000. These suggestion are agreeable with me. These changes in the technical approach should have little change on the proposed budget. If you would like a second revision of the proposal please let me know as soon as possible.

Sincerely,



Stephen C. Jewett
Research Associate of Marine Science

cc: R. Otto

JUL 20 1983

ACTION	ROUTE TC
	Exec. Dir. AGENDA E-1 Supple.
	Deputy Dir. July 1983
	Admin. Off.
	Exec. Sec.
	Staff Asst. 1
	Staff Asst. 2
	Staff Asst. 3
	Economist
	Sec./Bkkr.
	Soc./Typist

13 July 1983

Mr Jim H. Branson
Executive Director
North Pacific Fisheries Management Council
P.O. Box 103136
Anchorage, Alaska 99510

Dear Mr Branson:


Enclosed is my revised proposal entitled "Growth and Size at maturity of Golden (Brown) King Crab, *Lithodes aequispina*." I earlier expressed my skepticism to you about conducting a tagging study in the Aleutians due to the broad spatial coverage of that fishery. That skepticism has abated somewhat after discovering that most of the harvest comes from two rather localized areas. Hopefully, tagged crab can be recaptured from the area I have proposed.

I talked with Mr David Clausen (NMFS-Auke Bay) (Bob Otto was not available for contact) regarding an alternative method for measuring male maturity over the chela allometry proposed in my study. He actually does not favor another method, but is not certain what is the best method. We discussed some recent findings of Dr David Somerton regarding size at maturity of male king crab. In an unpublished study addressing "Size at maturity of the Golden King Crab (*Lithodes aequispina*) in the Northern Bering Sea" Dr Somerton reported "... golden king crab have a greater change in chela relative growth at maturity than do blue king crab." This point is particularly important when examining the general utility of chela allometry as a tool for estimating the size at maturity of male king crab. Dr Somerton continues "It is now clear that blue king crab and red king crab (both *Paralithodes*) do not have a pronounced change in relative growth at maturity, whereas golden king crab and deep-sea king crab (both *Lithodes*)." In light of his findings I feel that the chela allometry method is still the best one to use on golden king crab.

Please notice that the budget for the revised proposal is more than double the previous one. This increase is mainly attributed to exorbitant charter costs for that part of Alaska. I have enquired about piggybacking with NMFS surveys, but this is not possible due to the type (trawling) and timing (July-September 1983) of survey planned. A possible mechanism for reducing the proposal budget is to conduct the work through my company (North Pacific Research) rather than IMS. I hesitate in doing this because I prefer to work through the university framework. However, the university overhead is really tough to live with in the current research arena.

I hope this revised proposal is in order. I will be in Anchorage July 25 & 26 for a meeting, and I will call you then to see if further clarification of the proposal is needed.

Sincerely,



Stephen C. Jewett
Research Associate of Marine Science

TECHNICAL PROPOSAL

Growth and Size at Maturity of Golden (Brown)
King Crab, *Lithodes aequispina*

Prepared for:

North Pacific Fisheries Management Council
P.O. Box 3136 DT
Anchorage, Alaska 99510

Prepared by:

North Pacific Research
S.R. Box 30320 J
Fairbanks, Alaska 99701

July 1983

TITLE: Growth and Size at Maturity of Golden (Brown) King Crab,
Lithodes aequispina

RELEVANT FISHERY MANAGEMENT PLAN: King crab

OBJECTIVES AND NEED:

Recent declines in red king crab (*Paralithodes camtschatica*) stocks have created greater interest and subsequent exploitation of stocks of golden king crab. Stocks are currently fished in southeastern Alaska and along the Aleutian Islands at depths of 200-400 meters, somewhat deeper than the depths at which red king crabs are fished. Most of the golden king crab catch in Alaska is taken from the Dutch Harbor and Adak statistical areas. During the 1982-83 fishing year (Nov. 82-Feb. 83) 9.1 million pounds were harvested from these two areas (Per. Commun. Richard Petersen, ADF&G, Kodiak, AK). The landings in southeastern Alaska last winter (1983) approximated 600,000 pounds. The objectives of this study are to examine the growth and size at maturity for golden king crabs. Since this crab is a deep-water species, its growth is presumably slower than that of red king crabs. Growth information is necessary in order to address recruitment to exploitable size. The commercial fishery for golden king crabs in the Aleutians currently uses 165 mm carapace width as the minimum legal size, which is based on the same criteria as for red king crabs. However, the length-width relationships are different for the two species, reflecting dissimilar growth patterns (Jewett, 1983). Size at maturity for golden king crabs is not known for the Aleutian Islands, however, size at maturity for this species has recently been examined in the northern Bering Sea (Somerton, in prep.). Harvesting golden king crabs using the red king crab legal size, and not knowing the size at maturity for golden

king crabs, presents the danger of either harvesting them prior to maturity or under-harvesting if they are taken at a size well beyond maturity.

EXPECTED BENEFITS:

This research would benefit ADF&G golden king crab management by providing growth data and size at maturity which, in part, is the basis for Optimum Yield and Acceptable Biological Catch management strategies. This research is not scheduled to be undertaken by ADF&G due to budgetary constraints.

WORK TO BE PERFORMED:

This project includes field research to be conducted in the Aleutian Islands. A commercial king crab vessel will be chartered for 12 days in early spring 1984, and with the use of ADF&G fine-meshed king crab pots, golden king crabs will be caught, tagged and released. The tagging period is dependent upon the ADF&G management strategy of defining the 1984 golden king crab fishing season; tagging will occur subsequent to the closure of that fishing season. The fishing season is expected to end in April. The location of the tagging operation will be in the vicinity of Seguam and Amukta Islands because most of the 1.2 million pounds that were harvested from the Dutch Harbor area came from between these two islands. Tagging will be accomplished with the permanent, numbered, isthmus spaghetti tag, which has been used successfully by ADF&G to obtain growth data on red king crab (Gray, 1965; Powell, 1967). One thousand (1000) juvenile and adult crabs of both sexes will be tagged. All crabs will be

wet-weighed and measured (mm) using three measurements: 1) carapace length, 2) carapace width and 3) chela height. Maturity of females will be determined by the presence of eggs or egg remnants on the plepods. Maturity of males will be determined from the size of the chela relative to the size of the carapace using the method discussed in Somerton (1980). The released crabs will be at liberty for at least eight months, until the 12-day recovery operation begins with a charter vessel prior to the next fishing season. Tagged crabs are also expected to be recovered by the fishing fleet and subsequently returned to ADF&G under the auspices of a tag-recovery reward program (\$5.00 per tagged crab). This reward program has been used successfully in previous ADF&G crab-tagging ventures (G. C. Powell, personal communication, 1983). The charter vessel used in the tag recovery operation will use fine-meshed pots in an effort to recapture smaller crabs. Furthermore, in order to maximize spatial coverage, the charter vessel may fish waters that the commercial fleet typically do not fish. The time the tagged crabs are at large should encompass the supposed molting period of spring 1984. Little is known about the molting period for this species. Spring is the anticipated molting period for adults; however, evidence of asynchronous molting exists (Jewett, 1983; Somerton, personal observation).

Since this region is one that is heavily exploited for golden king crabs, we are assuming a relatively high exploitation and subsequent tag recovery. A recovery of only 5-10% (50-100 crabs) (assuming molting has occurred) should yield sufficient information to address growth. Recaptured crabs will be measured similarly as in the tagging operation.

Growth will be addressed by examining the relationship of premolt and postmolt sizes according to the methodology of McCaughran and Powell (1977). Some premolt and postmolt data exists within ADF&G; this data will be analyzed with data collected on this project. A National Marine Fisheries Service trawling survey will sample Seguam Pass during the period from 26 July to 4 September 1983. Size measurements will be taken of all golden king crabs caught during this survey and these measurements may be made available to the proposed study.

URGENCY AND DURATION:

The basic biological information to be addressed in this proposal is necessary for determination of the Acceptable Biological Catch and Optimum Yield required by ADF&G. Implementation of the results of this study into the king crab management plan should proceed as soon as possible. This research could be postponed until regular agency budgeting can handle the funding. However, in view of the recent increased levels of exploitation, the basic biological questions asked in this proposal should be addressed immediately so that appropriate steps can be taken in managing this species before the repercussion of perhaps unwise management appears. This research will be conducted in FY 84 and FY 85. The data from the tag recovery operation will not be available until after the golden king crab fishing season of the winter of 1985 (see Milestones). Again, tagging will be conducted in the winter of 1984, subsequent to the fishing season, and recovery will be conducted in the winter of 1985, during and

subsequent to the fishing season. The duration of the tagged crabs are at liberty (10-12 months) should encompass the molting period.

REFERENCES:

- Gray, G. W., Jr. 1965. Tags for marking king crabs. Prog. Fish. Culturist. 27:221-227.
- Jewett, S. C. 1983. Survey of the golden crab *Lithodes aequispina* in Alice Arm, British Columbia. Final Report to Amax of Canada Limited. 59p.
- McCaughran, D. A. and G. C. Powell. 1977. Growth model for Alaska king crab (*Paralithodes camtschatica*) J. Fish. Res. Bd. Canada 34:989-995.
- Powell, G. C. 1967. Growth of king crabs in the vicinity of Kodiak Island, Alaska. Alaska Department of Fish and Game, Inform. Leaf. No. 92, 106 p.
- Somerton, D. A. 1980. A computer technique for estimating the size of sexual maturity in crabs. Can. J. Fish. Aquat. Sci. 37: 1488-1494.
- Somerton, D. A. In preparation. Size at maturity of the golden king crab (*Lithodes aequispina*) in the northern Bering Sea.

MILESTONES:

	FY 84						FY 85																			
	1983			1984			1985																			
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S		
Tagging						<u>?</u>																				
Molting									_____																	
Recovery																		<u>?</u>								
Data Analysis																										
Report Preparation																										
Final Report																										

MAN-POWER ALLOCATION:

FIELD WORK

Jewett	4 wks
Somerton	1 wk

DATA ANALYSIS

Feder	1 wk
Jewett	4 wks
Somerton	2 wks

REPORT PREPARATION

Feder	1 wks
Jewett	4 wks
Somerton	1 wk

BUDGET ESTIMATE:

SALARY

Jewett, S. C., 3 mos	\$22,080	
Feder, H. M., 2 wks	<u>3,200</u>	
Total Salary		\$25,280

TRAVEL

2 Round trips Fairbanks/Dutch Harbor	1,890	
1 Round trip Fairbanks/Corvallis, OR	775	
Per diem, 30 days	<u>1,700</u>	
Total Travel		4,365

SERVICES

Dr. David A. Somerton, Subcontractor	2,500	
Boat charter, 24 days @\$2500	60,000	
Drafting, 20 hrs	760	
Data processing, 40 hrs	1,200	
Communications	300	
Tag-recovery reward	<u>500</u>	
Total Services		65,260

SUPPLIES

Spaghetti tags (1,000 tags)	<u>300</u>	
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TOTAL DIRECT COSTS		<u>\$95,205</u>
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DATE AND ORIGINATORS OF PROPOSAL:

Proposal date - 13 July 1983

Mr. Stephen C. Jewett Institute of Marine Science University of Alaska
Fairbanks, AK 99701 (907) 474-7841

Mr. Jewett will coordinate and participate in the tag and recovery operations. His previous experience in crab tagging includes working on red king crabs with Guy C. Powell of ADF&G, and golden king crabs in Alice Arm, British Columbia. Mr. Jewett's involvement in the data analysis will be in conjunction with Dr. David Somerton. Mr. Jewett and Dr. Somerton will coordinate the data analysis through the Institute of Marine Science Data Processing Group. The preparation of a final report will be coordinated by Mr. Jewett and Dr. Howard Feder.

Dr. Howard M. Feder
Institute of Marine Science
University of Alaska
Fairbanks, AK 99701
(907) 474-7841

Dr. Feder will mainly be involved in the report preparation. His experience as an invertebrate zoologist in Alaska will be especially helpful in interpreting and presenting our findings.

Dr. David A. Somerton
Department of Wildlife & Fisheries
104 Nash Hall
Oregon State University
Corvallis, Oregon 97331-3803

Dr. Somerton has almost exclusively been involved in Alaskan crab research during the past seven years. His most recent work has involved blue king crab and deep sea king crab. All of Dr. Somerton's crab research are strengthened by rigorous statistics, which he performs. Dr. Somerton's main involvement will be in analyzing the data and applying computer techniques, which he has successfully used on other crab species.

NORTH PACIFIC RESEARCH

NORTH PACIFIC RESEARCH (NPR) is a small company that specializes in research in marine biology and fisheries of the North Pacific Ocean region. NPR was organized in 1982 by Stephen C. Jewett and has its main office in Fairbanks. Three research biologists are affiliated with the company.

Recent NPR projects include: (1) a survey of the golden king crab of Alice Arm, British Columbia, (2) a survey of larval and juvenile red king crab in the North Aleutian Basin, (3) a report on the distribution and abundance of benthic invertebrate resources of the Bering and Chukchi seas, and (4) a report of the environmental characterization of the North Aleutian Shelf nearshore region.

Stephen C. Jewett has worked as a fisheries biologist in Alaska for 11 years, the last nine of which have been for the Institute of Marine Science at the University of Alaska, Fairbanks. He holds a Master of Science Degree (1977) in biology from the University of Alaska. Mr. Jewett has participated in various types of marine biological research, such as king and Tanner crab research for the Alaska Department of Fish and Game, pre-pipeline environmental studies of Port Valdez for the Environmental Protection Agency, and numerous studies on distribution, abundance, and biology of fishes and invertebrates from Alaska marine waters for the National Oceanic and Atmospheric Administration (see Biographical Sketch).

Biographical Sketch

Stephen C. Jewett

SS #004-48-2438

Mailing Address: SR Box 30320 J
Fairbanks, Alaska 99701

Work Address: Institute of Marine Science
University of Alaska
Fairbanks, Alaska 99701

Telephone: Home 479-3239; work 474-7841

Born: 31 December 1947, Dexter, Maine

Education: M.S. University of Alaska, 1977
B.A. John Brown University, 1970

Experience: North Pacific Research, Senior Marine Biologist, 1982-present
University of Alaska, Research Associate, 1974-present
Alaska Department of Fish & Game, Fishery biologist, 1973-1974
University of Alaska, Research Assistant, 1972-1973

Member: World Mariculture Society
Western Society of Naturalists
National Shellfish Association
American Fisheries Society
American Fisheries Society - Alaska Chapter
Pacific Science Association

Certifications: Fishery Scientist - American Fisheries Society, 1981
Professional Association of Diving Instructors - Basic
SCUBA Diver, 1980
YMCA - SCUBA Diver, 1978

Teaching: Instructor of workshops in Oceanography and Fisheries Oceanography, conducted through the Fisheries Industrial Technology Center, University of Alaska.

Research Activities: Investigation of the sediment environment in Port Valdez and the effects of oil on this environment - an observational and experimental project. Funded by Environmental Protection Agency - 1974-1976.
Investigation of the benthos on the shelf of the Gulf of Alaska. An environmental assessment study funded by NOAA - 1975-1978.
Investigation of the benthos on the shelf of Norton Sound-Chukchi Sea. An environmental assessment study funded by NOAA - 1976-1977.

Research
Activities
(Cont'd)

- Investigation of the benthos of lower Cook Inlet. An environmental assessment study funded by NOAA - 1976-1978.
- Investigation of the benthos on the shelf of the Bering Sea. An environmental assessment study funded by NOAA - 1975-1977.
- Investigation of the benthos of two bays of Kodiak Island. An environmental assessment study funded by NOAA - 1976-1977.
- Investigation of the benthos and food relationships near Kodiak Island. An environmental assessment study funded by NOAA - 1978-79.
- Investigation of the distribution, abundance, and community structure of the infaunal benthos from the northeastern Bering Sea and the Chukchi Sea. An environmental assessment study funded by NOAA - 1980-81.
- Investigation of the invertebrates related to the extension of the West Prudhoe Bay causeway and the associated waterflood project. An environmental assessment funded by ARCO oil and gas Company through Woodward-Clyde consultants - 1981.
- Investigation of the epifaunal invertebrates in an eastern Beaufort Sea lagoon. An environmental assessment funded by NOAA through LGL Ecological Research Associates - 1982-83.
- Investigation of the commercially-important crabs in Alice Arm, British Columbia. Funded by Amax of Canada Ltd. through Rescan Environmental Services and North Pacific Research - 1982-83.
- Strategic Assessment of the benthic invertebrate biomass of the Beringian shelf. Funded by NOAA through University of Virginia and North Pacific Research - 1982-83.
- Investigation of larval and juvenile red king crabs in the North Aleutian Basin. Funded by NOAA through VTN Oregon, Inc. and North Pacific Research - 1983-84.
- Environmental characterization of the North Aleutian Shelf nearshore region. Funded by NOAA through Kinnetics Laboratory, Inc. and North Pacific Research - 1983.

Publications:

- Jewett, S. C. 1976. Pollutants of the Northeast Gulf of Alaska. *Mar. Poll. Bull.* 7(9):169.
- Jewett, S. C. 1977. Alaska's Latent Fishery - Pacific cod. *Alaska Seas and Coast* 5(1):6-8.
- Jewett, S. C. and H. M. Feder. 1977. Biology of the Harpacticoid Copepod, *Harpacticus uniremis*, Kröyer on Dayville Flats, Port Valdez, Alaska. *Ophelia* 16(1):111-129.
- Jewett, S. C. and R. E. Haight. 1977. Description of Megalopa of Snow Crab *Chionoecetes bairdi* (Majidae, sub-family Oregoniinae). *Fish. Bull.* 75(2):459-463.
- Jewett, S. C. 1978. Summer Food of the Pacific Cod, *Gadus macrocephalus*, near Kodiak Island, Alaska. *Fish. Bull.* 76(3):700-706.
- Feder, H. M., S. C. Jewett and J. Hilsinger. 1978. Man-Made Debris on the Bering Sea Floor. *Mar. Poll. Bull.* 9(2): 52-53.
- Jewett, S. C. and G. C. Powell. 1979. Summer Food of the Sculpins, *Myoxocephalus* spp. and *Hemilepidotus jordani*, Near Kodiak Island, Alaska. *Mar. Sci. Comm.* 5(4&5):315-331.
- Paul, A. J., H. M. Feder and S. C. Jewett. 1979. Food of the Snow Crab, *Chionoecetes bairdi*, Rathbun 1924, from Cook Inlet, Alaska (Decapoda, Majidae). *Crustaceana Suppl.* 5:62-68.
- Jewett, S. C. and H. M. Feder. 1980. Autumn Food of the Starry Flounder, *Platichthys stellatus*, from the north-eastern Bering Sea and the southeastern Chukchi Sea. *J. Cons. Int. Explor. Mer* 39(1):7-14. (Also published In: Proceedings of the 29th Alaska Science Conference. Alaska Fisheries: 200 years and 200 miles of change. B. R. Melteff [ed.]). 796 p.
- Hoberg, M. K., H. M. Feder, and S. C. Jewett. 1980. Some Aspects of the Biology of the Parasitic Gastropod, *Asterophila japonica* Randall and Heath (Prosobranchia: Melanellidae), from Southeastern Chukchi Sea and North-eastern Bering Sea, Alaska. *Ophelia* 19(1):73-77.
- Jewett, S. C. and H. M. Feder. 1981. Epifaunal invertebrates of the Continental Shelf of the eastern Bering and Chukchi Seas. In: The Eastern Bering Sea Shelf: Oceanography and Resources, D. W. Hood and J. A. Calder (eds.). U.S. Dept. of Comm. pp. 1131-1153.
- Feder, H. M. and S. C. Jewett. 1981. Feeding interactions in the eastern Bering Sea with emphasis on the benthos. In: The Eastern Bering Sea Shelf: Oceanography and Resources, D. W. Hood and J. A. Calder (eds.). U.S. Dept. of Comm. pp. 1229-1261.
- Jewett, S. C. and G. C. Powell. 1981. Nearshore movement of king crab. *Alaska Seas and Coast* 9(3):6-8.
- Jewett, S. C. 1981. Variations in some reproductive aspects of female snow crabs *Chionoecetes opilio*. *J. Shellfish Res.* 1(1):95-99.
- Jewett, S. C. and H. M. Feder. 1982. Food and feeding habits of the king crab *Paralithodes camtschatica* near Kodiak Island, Alaska. *Mar. Biol.* 66:243-250.

Publications
(Cont'd)

Jewett, S. C. and H. M. Feder. 1983. Food of the Tanner crab, *Chionoecetes bairdi*, near Kodiak Island, Alaska. *J. Crust. Biol.* 3:196-207 (Also published *In*: Proceedings of the International Symposium on the Genus *Chionoecetes*. B. R. Melteff [ed.] Alaska Sea Grant Rept. 82-10, 1982, 732 p.).

Technical
Reports:

Jewett, S. C. and H. M. Feder. 1976. Distribution and Abundance of some Epibenthic Invertebrates of the Northeast Gulf of Alaska, with Notes on the Feeding Biology of Selected Species. Rept. R76-8, Inst. Mar. Sci., Univ. of Alaska, Fairbanks. 61 p. (Also published *In*: Proceedings of the 27th Alaska Science Conference. Resource Development-Processes and Problems, Vol. II, D. W. Norton [ed.], 488 p. 1976).

Feder, H. M., L. M. Cheek, P. Flannagan, S. C. Jewett, M. H. Johnson, A. S. Naidu, S. A. Norrell, A. J. Paul, A. Scarborough and D. Shaw. 1976. The Sediment Environment of Port Valdez, Alaska and the Effect of Oil on this Ecosystem. Environmental Protection Agency. Final Report. 322 p.

Feder, H. M. and S. C. Jewett. 1977. The Distribution, Abundance, and Diversity of the Epifauna of Two Bays (Alitak and Ugak) of Kodiak Island, Alaska. Rept. R77-3, Inst. Mar. Sci., Univ. of Alaska, Fairbanks. 74 p.

Feder, H. M. and S. C. Jewett. 1978. Survey of the Epifaunal Invertebrates of Norton Sound, the Southeastern Chukchi Sea, and Kotzebue Sound. Rept. R78-1, Inst. Mar. Sci., Univ. of Alaska, Fairbanks. 124 p.

Feder, H. M. and S. C. Jewett. 1980. Survey of the Epifaunal Invertebrates of the Southeastern Bering Sea with Notes on the Feeding Biology of Selected Species. Rept. R78-5, Inst. Mar. Sci., Univ. of Alaska. 105 p.

Feder, H. M. and S. C. Jewett. 1981. Distribution, abundance, community structure and trophic relationships of the nearshore benthos of the Kodiak continental shelf. Rept. R81-1, Inst. Mar. Sci., Univ. of Alaska, Fairbanks. 190 p.

Jewett, S. C. and H. M. Feder. 1982. Food of the Tanner crab *Chionoecetes bairdi* near Kodiak Island, Alaska. Alaska Sea Grant Rept. 82-10, 732 p.

Jewett, S. C. 1982. Predation on crabs of the genus *Chionoecetes*: a literature review. *In*: Proceedings of the International Symposium on the Genus *Chionoecetes*. B. R. Melteff (ed.). Alaska Sea Grant Rept. 82-10, 732 p.

Unpublished
Final Reports:

Feder, H. M., S. C. Jewett, S. G. McGee, and G. E. M. Matheke. 1981. Distribution, abundance, community structure, and trophic relationships of the benthos of the northeastern Gulf of Alaska from Yakutat Bay to Cross Sound. Final Rept. to NOAA. 197 p.

Unpublished
Final Reports
(Cont'd)

- Feder, H. M., R. H. Day, S. C. Jewett, K. McCumby, S. McGee, and S. V. Schonberg. 1981. The infauna of the northeastern Bering and southeastern Chukchi Seas. Final Rept. to NOAA. 122 p.
- Feder, H. M. and S. C. Jewett. 1982. Prudhoe Bay waterflood project. Infaunal monitoring program: the 1981 studies. Final Rept. to ARCO Oil and Gas Company. 203 p.

Conference
Participation:

- 27th Alaska Science Conference; American Association for the Advancement of Science (AAAS). Univ. of Alaska, Fairbanks, 4-7 August 1976.
- 29th Alaska Science Conference; (AAAS), Univ. of Alaska, Fairbanks, 15-17 August 1978.
- American Society of Zoologists, University of Washington, Seattle, 26-30 December 1980.
- The Lowell Wakefield Fisheries Symposia Series - International Symposium on the Genus *Chionoecetes*, Anchorage, Alaska, 3-6 May 1982.

Field
Experience:

- 1973 Jun-Aug F/V *Rosie G.* Population indexing of the king crab and snow crab in Kodiak Island waters.
- 1974 Jun-Jul F/V *Virginia Santos.* Population indexing of the king crab and snow crab in Kodiak Island waters.
- 1975 Feb NOAA Ship *Oceanographer.* Survey of benthic meiofauna of the northeast Gulf of Alaska.
- 1975 Apr-Jun F/V *North Pacific.* Project leader. Benthic trawl survey of the northeast Gulf of Alaska.
- 1975 Jun-Jul F/V *Elizabeth F.* Population indexing of king crab and snow crab, and food analysis of the Pacific cod in Kodiak Island waters.
- 1976 Mar-Apr R/V *Moana wave.* Survey of benthic invertebrates of the northeast Gulf of Alaska.
- 1976 Jun R/V *Big Valley.* Project leader. Survey of benthic invertebrates of Ugak and Alitak Bay of Kodiak Island.
- 1976 Aug-Sep NOAA Ship *Miller Freeman.* Project leader. Survey of benthic invertebrates and food of starry flounder of the northeastern Bering Sea and southeastern Chukchi Sea.
- 1976 Oct NOAA Ship *Miller Freeman.* Survey of benthic invertebrates of lower Cook Inlet.
- 1977 Mar F/V *Big Valley.* Project leader. Survey of benthic invertebrates of Ugak and Alitak Bay of Kodiak Island.
- 1978 May R/V *Yankee Clipper.* Project leader. Survey of benthic invertebrates of Izhut Bay, Afognak Island.
- 1978 May Project leader. Exploratory SCUBA-diving for king crab near Kodiak Island.
- 1978 Jun-Jul NOAA Ship *Miller Freeman.* Project leader. Survey of benthic fauna of the Kodiak Shelf.
- 1978 Jun-Jul Project leader. Exploratory SCUBA-diving for king crab near Kodiak Island.

Field
Experience
(Cont'd)

1978 Jul-Aug F/V *Antares*. Conduct benthic assessment in trawls in S.E. Alaska via the submersible *Nekton Gamma*.

1979 Feb NOAA Ship *Miller Freeman*. Project leader. Survey of the benthic fauna of the Kodiak Shelf.

1979 Feb Project leader. Exploratory SCUBA diving for king crab near Kodiak Island.

1979 May Project leader. Exploratory SCUBA diving for king crab near Kodiak Island.

1979 Nov NOAA Ship *Miller Freeman*. Chief Scientist. Survey of the benthic fauna of the northeastern Gulf of Alaska from Yakutat Bay to Cape Spencer.

1981 Jul Infaunal sampling via SCUBA in Prudhoe Bay.

1981 Aug Epifaunal sampling via drop net and epibenthic sled in Prudhoe Bay.

1982 Nov R/V *Alliance*. Chief Scientist. Conduct a population assessment of the golden king crab, *Lithodes aequispina* in Alice Arm, British Columbia.

1973 Feb R/V *Alpha Helix*. Sample larvae of spot shrimp in Prince William Sound.

1983 Apr-May NOAA Ship *Miller Freeman*. Survey of larval and juvenile red king crab in the North Aleutian Basin and Bristol Bay.

TECHNICAL PROPOSAL

TO: North Pacific Fisheries Management Council
P.O. Box 3136 DT
Anchorage, Alaska 99510

FROM: Institute of Marine Science
University of Alaska
Fairbanks, Alaska 99701

TITLE: Growth and Size at Maturity of Golden (Brown) King Crab,
Lithodes aequispina

PRINCIPAL INVESTIGATORS:

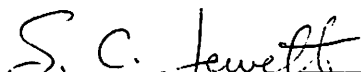
S. C. Jewett	H. M. Feder
Research Associate of Marine Science	Professor of Marine Science


NEW/CONTINUING: New


PROPOSED STARTING DATE: Spring 1984

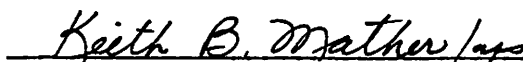
PROPOSED DURATION: FY 84 & 85

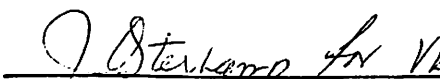
PROPOSED FUNDING: \$136,874



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July 1983

100-0000

Outline of Sablefish Research Studies
prepared for
Scientific and Statistical Committee, NPFMC

September 27, 1983

Prepared by

Barry Bracken, ADF&G
Evan Haynes, NMFS
Phil Rigby, ADF&G
Gary Stauffer, NMFS

GOA PMT Sablefish Research Project Priorities

<u>PROJECT</u>	<u>PRIORITIES</u>			
	<u>Agency Support</u>	<u>Council Support</u>	<u>Annual Cost</u>	<u>Time Frame</u>
1. Domestic fishery monitoring	H	H	~100k	Annual; continuous
2. Japan-U.S. Cooperative Survey Data Analysis	H	--	50k 25k	2-year initial Annual updates
3. Single tagging data base	M	--	50k	1 year
4. Age data, collection & reading	H	--	50k	Annual Continues
5. Gear comparisons	M	--	unknown	1 year
6. Recruitment/oceanography	--	L	25k	2 years
7. Specific migration studies	--	M	> 50k	2 years
8. Electrophoretic stock structure	--	L	< 80k	2 years

H - high
M - medium
L - low

1. DOMESTIC FISHERY MONITORING

As the domestic fishery expands management agencies will continue to lose abundance indices based on foreign catch and effort as well as biological data obtained from the foreign fishery. CPUE and biological data bases using data collected from the U.S. fishery must be developed to replace the foreign fishery data base. A sampling plan needs to be developed after an analysis of sampling intensities, sizes and fishery time, area, vessel components has been completed. The ADF&G will soon be initiating the base study to specify present and needed sampling effort, but at this time a determination of sampling adequacy and funding needs is not available.

2. JAPAN-U.S. COOPERATIVE SURVEY DATA ANALYSIS

Establish a dual data set from the Japan-U.S. longline survey. U.S. scientists need to have access to the raw survey data to examine variance and possible areas of bias from the survey. This would not require additional funding and is considered a high priority. Initial efforts are being taken to acquire the data and accomplish this task. Effort is being conducted by the NWAFC at the Auke Bay and Montlake labs.

3. SINGLE TAGGING DATA BASE

Exchange of tagging data among the various agencies engaged in sablefish migration studies lacks coherency and has been severely limited by both hardware and software compatibility. An additional problem is publishing credit. A single data base file should be compiled that is compatible with existing packages, does not preempt publishing rights, and is available to all agencies involved in sablefish migration problems. A single data base will enhance data reporting, standardization of data entry and real-time analyses related to management problems. Initial efforts are directed to understanding the relation between magnitude and extent of sablefish migration patterns to management schemes. Dr. Jeff Fujioko (ABL) has begun compilation of the data base, but his research efforts are severely restricted by prior obligations. A marked increase in dedication of personnel to this task is essential for its completion.

4. AGE DATA, COLLECTION AND READING

Data on age structure of catch/landings provides basic information to analyze dynamics of the stocks and to determine abundance trends. Sablefish are a long-lived species with infrequent strong year classes supporting the fishery. Routine collection and ageing does not exist for the Alaska or West Coast fisheries. We need to establish an agency group for production ageing of sablefish collections and for conducting research on age validation. Sampling plans for age structure collections from domestic and foreign fisheries and resource surveys need to be developed. This task will not require Council funding but may necessitate some agency reprogramming to handle sablefish age structures. Sample plan will require maximum of 6 man-months and actual ageing probably would not exceed 2 man-years.

5. GEAR COMPARISONS

Comparison of efficiencies for catching sablefish by longline, trap, and trawl gear can be accomplished within existing funding by both NMFS and ADF&G. Statistically valid experimental procedures are being finalized that will provide measures of catchability of each gear type. These measures will result in separate estimates of population abundances by gear type based on summation of decreasing CPUE with time. Mark-recapture experiments executed concurrently with gear comparison studies may provide an additional estimate of population abundance. This study will also include measures of gear efficiency as related to type of hook, hook spacing, etc. Study results will be used to estimate biomass of sablefish stocks regardless of year fished as well as hindcasting the calculations of gear efficiencies to historical abundance measures. Both ADF&G and NMFS (ABL) are active in the funding, planning, coordinating, and execution of this study.

6. RECRUITMENT/OCEANOGRAPHY

Recent studies correlating oceanographic changes with recruitment of hake, English sole, etc., as well as the recent appearance of exceptionally strong age classes of sablefish and cod have highlighted the need to study the recruitment process of sablefish. A potential benefit is the ability to forecast sablefish recruitment strength for both the industry and fisheries managers. Large oceanographic data bases are available, and a first step in the study would be to search out and catalog this information. Secondly, although age composition data from the sablefish fishery is not directly available, size frequency data from surveys and the fishery can provide investigators opportunity to qualitatively if not quantitatively compare oceanographic parameters with recruit class abundance. A study(s) could be performed by management agencies and/or universities.

7. SPECIFIC MIGRATION STUDIES

Extensive tagging studies have been conducted throughout the Gulf of Alaska. A better understanding of sablefish movement has resulted; however, there are gaps in the data that need to be filled by specific carefully designed tagging studies.

Needed research falls into two categories, adult tagging and juvenile tagging.

A. Adult tagging needs to be conducted on spawning populations during the winter to determine distribution of adult fish during the summer months when the extensive fishery is ongoing. There is evidence that fish move offshore from the deep coastal fjords to spawn during the late winter and early spring and that there may be some concentration of adult fish from along the coast for spawning. Information on extent and timing of movement is needed to determine if spawning concentrations occur and if management strategy should be altered to protect spawning populations. No research is currently planned by ADF&G or NMFS. This project would require charter

of a large vessel during the late winter (Jan-Feb) period. Suggested areas are Cape Ommaney and off the Queen Charlotte Islands.

B. Juvenile tagging has been conducted in southern Southeastern and British Columbia. In both cases large numbers of juvenile fish migrated into the Gulf of Alaska. These studies need to be expanded to better understand the recruitment process. Suggested areas include Northern Chatham Strait and Sitka Sound in the Eastern Gulf and Kodiak Island in the Central Gulf. Unfortunately, the occurrence of juvenile is impossible to predict and tagging has to be conducted on an opportunistic basis. ADF&G is retaining 10,000 tags to be used for juvenile tagging. Charter money for at least thirty days would be required to accomplish this task. No money is currently available for this project.

8. ELECTROPHORETIC STOCK STRUCTURE ANALYSIS

Dr. Garrett (U of A, Juneau) conducted a study of the genetic heterogeneity of sablefish for the Northeast Pacific. His early results showed no difference in the genetic make up of the stocks along the coast. In a reanalysis of his data, he made pair wise comparison of all samples and found differences between many adjacent samples and concluded sablefish had many separate groupings. This study needs to be repeated to determine if the pattern persists. Prior to funding a second study, the details of Garrett's second analysis must be evaluated and critiqued by knowledgeable scientists familiar with electrophoretic studies. If the results are found to be valid, then proposals need to be prepared. This study could be conducted by the University of Alaska, NMFS-NWAFC, or private research firms. A sampling plan specifying sample sizes, areas and depths must be developed; agency commitment will be required to provide these samples.