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PROPOSAL

May 1979

To:	North Pacific Fishery Management Council
By:	Alaska Department of Fish and Game
Title:	Biometrical Analysis of Southeastern Alaska Troll Fishery Data
Total Project Cost:	$79,103
Support Requested:	$53,528: sole source contract
Period:	September 1, 1979 through August 31, 1980
Principal Investigator:	Fritz Funk

INTRODUCTION

With assistance from the North Pacific Fishery Management Council, the Alaska Department of Fish and Game proposes to perform biometric analyses of recent Southeastern Alaska troll fisheries data. The objective of this research is to provide baseline information on the distribution and abundance of chinook and coho salmon stocks harvested by the Southeastern Alaska troll fishery, to document fleet performance, to examine techniques of standardizing vessel effort and to highlight significant area or time differences in these and other parameters of importance to troll fisheries management planning.

Hundreds of thousands of dollars have been spent to collect data on troll landings, micro-wire tag recoveries and troll logbook observations. Although this information has been keypunched and initial summaries performed, little effective use has been made of these data. In the past, the complexity of requisite statistical and mathematical methods, together with the sheer volume of data available have proved almost impenetrable barriers to practical analysis. The research here proposed is intended to clarify the limitations of the data, while determining the practicability of applying classic fisheries models in troll fisheries management planning.

The estimated total cost of this project is $79,103. With $12,500 contributed by the Department, $53,528 is requested from the Council to fund this program.

OVERVIEW

The North Pacific Fishery Management Council is responsible for the continuing development of a fishery management plan for ocean salmon taken in the troll fishery in the Fishery Conservation Zone off Southeastern Alaska. To insure that conservation and management measures incorporated in the plan are both effective and equitable, it is essential that refined troll fisheries information be accessible to members of the plan's writing team. Unfortunately, although vast quantities of several different kinds of troll fisheries data are being collected, appropriate summaries and directed interpretations of these data bases are in general not available, known to be erroneous or simply too voluminous to be immediately useful.

Effective management of the Southeastern Alaska troll fishery is difficult. The fishery not only harvests local stocks, but also intercepts salmon ranging in origin from southern Oregon to the Gulf of Alaska. The troll fleet consists of about 950 power troll vessels, constrained by Alaska limited entry law, and a rapidly expanding number of hand trollers (about 2500 fished in 1978), unregulated by limited entry provisions. Because Southeastern Alaska chinook stocks are in generally poor condition, the employment of both sport and commercial time-area fishery closures has increased in recent years. Micro-wire tag recoveries from natural stock tagging experiments have convincingly demonstrated dangerously high exploitation rates on some local coho stocks as well, necessitating further time-area closures in inside waters. These closures of inside Southeastern Alaska waters will primarily restrict local sport and handtrolling effort. Consequently, it does seem prudent to anticipate increased fishing interest in the Fisheries Conservation Zone.

Within the next two years it is likely that the United States and Canada will agree to limit Pacific salmon interceptions. It is anticipated that this agreement will force the implementation of management by quota in most chinook and many coho salmon commercial troll fisheries in Southeastern Alaska unless alternative measures to avoid increasing interceptions of Canadian salmon are discovered. Migration patterns and concentrations of Canadian chinook and coho salmon in Southeastern Alaska are currently only roughly defined.

The raw data required to resolve many of these present and future troll fishery management problems are presently being collected and are maintained on four separate machinereadable data bases:

1. Troll landing documents. The Department maintains data files containing a record for each commercial fishery landing in Alaska. These fish ticket records identify the fisherman, his vessel, the number and total weight of fish delivered, by species and the statistical area from which the fish were taken. Because of the large number of vessels involved, the number of troll fish ticket records ranges from 35,000 to 50,000 annually. Computer-readable files are available from 1969.

2. Vessel registry files, including vessel size, net tonnage, gear type, and related information, are maintained by the Alaska Commercial Fisheries Entry Commission and are available from 1969.

3. Micro-wire tag recoveries. Each year since 1973 the Department has inspected samples of chinook and coho salmon delivered by Southeastern Alaska trollers for the presence of micro-wire tags, inserted at hatcheries before release. More recently, natural stocks of chinook and coho have also been tagged. The Department and the Pacific Marine Fisheries Commission cooperate in the maintenance of this important data base.

4. Troll logbook data. Early in 1976, the Alaska Trollers Association joined with the Department and several other agencies to implement a voluntary troll logbook program. In 1978, 114 trollers reported observations from more than 7,000 fishing days. Their observations included precise fishing location; numbers of coho, large and medium chinook taken; number of undersized chinook released; and the number of hours fished. The 1976 and 1977 troll logbook data bases have been edited and summarized and are maintained by the Department. Entry and editing of the 1978 data will be completed by June, 1979.

Despite the increasingly urgent need for better Southeastern Alaska troll fishery information, none of these data bases have been intensively analyzed. The Department's Southeastern Regional staff includes neither a biometrician nor a computer programmer.

To begin to fill this information gap, the Department proposes to perform directed analyses of the troll fisheries data bases described above. Particular emphasis will be placed on the provision of dependable baseline information needed for troll fishery management planning. Important subsidiary goals are to highlight data deficiencies and to suggest improvements and economies in data collection system designs. Accomplishment of these goals will require extensive computer programming and systems analysis as well as the application of biometrical and statistical techniques.

The Department is uniquely qualified to accomplish this work. Department personnel are directly involved in the collection and processing of troll fisheries data. Much of this information is confidential and Alaska statutes severely restrict disclosure to external agencies or individuals. However, it is simply not feasible to do the data processing within the State at this time. Computer facilities operated in Anchorage and Juneau by the State are utilized primarily for administrative and financial purposes. Neither facility offers timesharing and only rudimentary scientific and statistical software is available. Both facilities are currently undergoing an operating system conversion, and consequently computer availability and services are erratic. The University of Alaska Computer Network has only limited facilities for transmission of large volumes of data between Juneau and Fairbanks, where the central computer is located. In addition, the availability of magnetic disk storage is becoming increasingly restricted and the data would have to be stored on and processed using magnetic tapes. Costs are relatively high at the University of Alaska for this kind of data processing.

Mr. Fritz Funk, who recently completed the computer programming to produce printed and graphical summaries of 1977 troll logbook data, is a qualified biometrician as well. Mr. Funk has finished the required course work for a masters degree in fisheries biometrics at the University of Washington and will utilize portions of the biometrical analysis of the troll fishery for thesis material.

Mr. Funk has amply demonstrated sound scientific judgement and an ability to work with diligence and efficiency during his recent employment by the Department. His extensive background in computer programming, biological science and fisheries biometrics make him an ideal candidate. His location at the University of Washington is also an advantage because of that institution's highly sophisticated computer system, with which Mr. Funk is familiar. Finally, because he would be a Department employee, data confidentiality problems would be avoided.

OBJECTIVES

The objective of this project is to derive quantitative estimates of recent chinook and coho salmon availibility to the Southeastern Alaska troll fishery, by fishing area, time of year, area of origin, and fish size. Secondary objectives are to:

1. Compare and evaluate alternative methods of standardizing troll effort, identifying significant components and describing recent trends in those components, insofar as they can be determined from available data;

2. Recommend improvements in the micro-wire tag recovery sampling design for Southeastern Alaska;

3. Examine and describe recent trends in power and hand troll fleet size, distribution and characteristics related to fishing power;

4. Delineate areas and periods within which significantly higher numbers of undersized chinook salmon are encountered by trollers; and to

5. Investigate the practicality of estimating harvest rates for micro-wire tagged chinook and coho stocks, deriving estimates where feasible.

DIRECTION

Administrative, clerical, and logistical support and direction will be provided by the Extended Jurisdiction Section of the Commercial Fisheries Division. Members of an informal technical resource group will individually offer information and advice, and periodically review project progress. This technical group will include representatives of the Department, Council, National Marine Fisheries Service, Pacific Marine Fisheries Commission and the Alaska Trollers Association.

STATEMENT OF WORK

In order to accomplish project objectives careful planning and coordination will be required. At a minimum, this coordination will include:

1. Preparation of a detailed research plan, to be reviewed by members of the technical group, Mr. Funk's graduate committee and the Scientific and Statistical committee of the North Pacific Fishery Management Council. This review process may take several months. In the interim Mr. Funk will complete preliminary data management housekeeping tasks which will be required regardless of research plan modification.

2. Regular monthly progress reports will be sent to the Extended Jurisdiction Section. Requests for specialized advice, information or assistance will be referred to the appropriate members of the technical group.

3. An interim progress report will be due February 29, 1980.

4. Mr. Funk will periodically travel to Southeast Alaska to confer with Department staff and others familiar with troll fishery data idiosyncracies, management of the troll fishery, chinook and coho salmon biology and behavior. This will also provide opportunities to resolve other problems which may arise.

The following data will be copied to magnetic tape for processing at the University of Washington Academic Computer Center:

1. 1976, 1977, and 1978 troll fish ticket records.
2. 1970 through 1978 troll vessel license registry.
3. 1976, 1977, and 1978 troll logbook data.
4. 1976, 1977, and 1978 Southeastern Alaska micro-wire tag recoveries.

A limited read-only password security system will be established to insure the confidentiality of the unsummarized fish ticket and vessel license information. Raw data will not be stored on public disk devices. A private disk pack with sufficient capacity to store all the individual records will be leased from the University of Washington Academic Computer Center. Several graphics terminals and hard copy plotters are available at the Academic Computer Center. A keyboard terminal will be purchased for timesharing use. At the completion of the project the terminal will be made available for other Council related data processing activities.

An outline of the work to be accomplished is presented below.

I. Data Base and software preparation

   A. Merge, edit and preprocess 1976-1978 troll fish ticket data.

   B. Merge and preprocess 1976-1978 troll logbook data.

   C. Assemble, convert, and create required map-plotting software.

D. Generate polygonal approximation for plotting troll statistical areas.

E. Merge, edit and preprocess 1976-1978 micro-wire tag recovery data.

F. Other required data and software adaptation.

II. Troll effort standardization

A. Review of classical fisheries effort standardization techniques.

B. Logbook data

Methods will be investigated including factorial and nested analyses of covariance of chinook and coho catch and number of released chinook by vessel, time period, statistical area, and hours fished, for 1976, 1977 and 1978; logarithmic or other transformations applied, if appropriate.

C. Fish ticket data

Methods will be investigated including factorial and nested analyses of covariance of chinook and coho catch, by vessel, time period, statistical area and vessel characteristics, for 1976, 1977, and 1978; logarithmic or other transformation applied, if appropriate.

D. Comparison of standardization techniques and interpretation of differences.

III. Descriptive statistics

A. Frequency distributions of troll vessel characteristics, 1970-1978.

B. Map plots and tables of hand and power troll effort, 1976-1978.

C. Standardized catch per unit effort by species, and year (1976-1978).

1. Plots versus time.
2. Tables by statistical area and year.
3. Map plots by time period.

D. Average chinook weight, by time period and statistical area.

E. Distribution of micro-wire tag recoveries, by time period, statistical area and area of origin.

IV. Other topics

A. Implied distribution of undersized chinook, by time period and area, 1976-1978.

B. Micro-wire tag recovery sample design.

C. Apparent fish ticket data inconsistencies.

D. Harvest rates for micro-wire tagged stocks.

Computer graphics, in particular map plots, will be heavily utilized to consisely display the multitude of descriptive statistical information. Three dimensional graphics as well as map plotting software are readily available on the UW computer system.

COSTS

The biometrical analysis of Southeastern Alaska troll fishery data is estimated to cost $79,103. Together with $12,500 contributed by the Department, $53,528 is requested from the Council to fund this project. The contribution by the Department is largely personnel services for technical and advisory support. It is anticipated that consulting, project review and other assistance by biometrical, programming and biological research personnel will total 3 3/4 man-months.

Budget Summary

	Requested Funds	State Funds	UW Computer Matching Funds
Personal Services	$26,000	$11,000	
Travel	3,000	750	
Contractual Services	16,917	750	$13,075
Commodities	450	0	
Equipment	2,295	0	
Subtotal	$48,662		
Overhead (10%)	4,866		
Total	$53,528	$12,500	$13,075
Total project cost	$79,103		

BUDGET

Requested Funds

Personal services		
Biometrician I @ $2167/month including benefits (Seattle)		$26,000
Travel		
Six trips between Seattle and Southeast Alaska to confer with fisheries biologists and biometrical staff, 2-4 days each: one trip to Anchorage for final report to SSC.		$ 3,000
Contractual services		
I. Computer services contract to UW NORFISH		
A. Computer processing time		
220,000 system resource units @ $.05/unit	$11,000	
B. Other computer costs		
1. Private disk pack rental @ $50/month	$ 700	
2. Public disk storage space - 2 million characters for one year @ $.03125/1000 characters/month	$ 750	
3. Hard copy graphics time - 25 hrs. @ $25/hr.	$ 625	
Total computer costs qualifying for matching funds	$13,075	
C. UW Cost Center - accounting & clerical services	$ 700	
D. Administrative overhead @ 56% of direct salaries	$ 392	
Total computer services contract	$14,167	
II. Duplication and communications		
A. Duplication of final report, graphics and printer summaries	$ 2,000	
B. Telephone communications	750	
Total contractual services		$16,917
Commodities		
I. Miscellaneous office and graphics supplies	$ 200	
II. Ten 2,400 ft. magnetic tape reels @ $25/reel	$ 250	
Total commodities		$ 450

Equipment		
Lear 31 Keyboard terminal	$ 1,395	
Anderson Jacobsen 1200 Baud modem	$ 900	
Subtotal		$48,662
Administrative overhead @ 10%		$ 4,866
Total		$53,528

State Funds

Personal services		
Senior Biometrician Clerk Typist Systems Analyst/Programmer Regional and Area Fishery Biologists E.J. Supervisor		
Total 3 3/4 man months @ 2925/month	$11,000	
Travel		
One trip each from Juneau to Sitka, Anchorage and Seattle	$ 750	
Contractual Services		
Data Processing time $500 Telephone $250		
Total	$ 750	
Commodities None		
Equipment None		
Total	$12,500	

FROM THE DESK OF
KIRK BEININGEN
REGIONAL COUNCIL COORDINATOR

6/29/79

OREGON
Fish & Wildlife

Bob Mace —

This is a good proposal; the results will bring Alaska's status up to speed with the pace of the fishery and with the other Pacific states (Canada is a separate issue for the moment). Before this proposal is passed on by the North Pacific Council, it should be reviewed by PMFC's Salmon-Steelhead Committee + Coastwide Data Committee — mainly to ensure the objectives will mesh smoothly with those of the other states.