

December 1984

TO: Council, SSC & AP Members

FROM: Jim H. Branson 

DATE: November 29, 1984

SUBJECT: Request for Secretarial Herring Data Collection Program

ACTION REQUIRED

Approve draft letter.

BACKGROUND

At the September meeting the Council asked me to draft a letter to the Secretary of Commerce requesting a herring data collection program under §303(e) of the MFCMA. The FMP has been put on hold until more data are available regarding offshore stock abundance, distribution and mixing. This draft letter specifies the data we need to continue development of the FMP, but also stipulates that the Council does not want to lose or reduce any current research or management programs for Alaskan fisheries. Since there has been no indication that additional research money is available, I am uncertain how the Secretary can respond to the Council's request.

DRAFT

November 13, 1984

Malcolm Baldrige, Secretary
U.S. Dept. of Commerce
Commerce Building
Washington, D.C. 20230

Dear Secretary Baldrige:

The North Pacific Council hereby requests the Secretary of Commerce, in accordance with Section 303(e) of the MFCMA, to implement a data collection program for the Bering/Chukchi Sea herring fishery which would provide the types of data necessary for development of a fishery management plan. The type and quality of necessary data are specified in the enclosed proposal. This proposal not only specifies the necessary data but also recommends a long-term data collection program. An alternative program devised by the Secretary would be acceptable to the Council as long as the objectives and products are the same.

The North Pacific Council has been in the process of developing the Bering/Chukchi Sea Herring FMP since 1979. This FMP has been the subject of countless discussions among fishermen, the scientific community, the Alaska Board of Fisheries, the Council and other interested parties. The controversial nature of this topic is due primarily to a single problem: lack of adequate data on the Bering Sea herring resource. This lack of data has cost the state and federal governments many thousands of dollars and far too much time that could have been spent more productively.

The Council has addressed this data problem head-on for a number of years, and research sponsored by the Council has produced a large proportion of what is known about the herring stocks of concern. The Council has sponsored a herring symposium, inshore biomass estimation surveys, stock identification/separation analyses, and socioeconomic surveys throughout the region. We have also identified research needs and recommended additional research projects we

considered critical to development of the FMP and management of the fisheries. Included in this was the Council's recent attempt to conduct an offshore herring survey using commercial vessels rather than government research vessels. This effort was thwarted due to unavailability of research funds.

* All this effort has still failed to produce the data necessary for FMP development, and the controversy continues. This culminated in May 1984 when the Council withdrew the FMP from further discussion and development pending additional data.

It is clear that the Council cannot proceed with FMP development until a significant improvement to the data base has been made. We have received unanimous support for research programs on the Bering Sea herring resource from Western Alaskan native and subsistence fishing interests, inshore commercial fishermen, and offshore fishing interests. You have already received a request for a Secretarial FMP, and we expect continuing pressure for both an FMP and additional data collection. It is also clear that the Council is unable to meet the needs and desires of the fishing industries without a substantial increase in programmatic funding. For these reasons we are compelled to request a Secretarial data collection program..

The Council includes one major caveat in this request. This herring data collection program must not be conducted at the expense of other important, ongoing research programs which are collecting data critical for management of other Alaskan fisheries. Therefore, this herring data collection program would be in addition to current programs supporting Council activities in management plan development.

Sincerely,

Jim H. Branson
Executive Director

Enclosure

North Pacific Fishery Management Council
Request for Secretarial Data
Collection Program for Development
of the Bering/Chukchi Sea Fishery Management Plan

INTRODUCTION

Pacific herring in the eastern Bering Sea have been fished continuously since 1959 first by Soviet and Japanese trawlers on the herring winter grounds northwest of the Pribilof Islands and in more recent years by domestic fishermen in coastal waters during the spawning season. While the trawl fishery was extant, monitoring of the resource was through the trawl catch per unit effort (CPUE). The CPUE series showed an increasing trend through the 1960s followed by a severe downward trend through the early 1970s and then signs of stock increase evident when directed herring trawl fisheries were ended in the late 1970s. As offshore trawl fisheries were restricted, inshore roe fisheries developed and new monitoring methodology was established for fisheries located on the spawning grounds. This monitoring of herring abundance during the spawning season is accomplished by aerial enumeration of the total surface area of herring schools present with biomass obtained using estimates of the tons of herring per unit surface area. The method has been employed for only a few years, and the validity of the method as a measure of absolute abundance cannot be clearly established at this time. It is likely that the inshore fisheries during the spawning period will continue to be the dominant herring fishery in the eastern Bering Sea, and aerial assessment of the resource will be the primary stock monitoring tool.

HISTORY OF RESEARCH

Herring stocks have been extensively investigated in areas where they are commercially important (Cushing 1975). Research on Pacific herring has occurred primarily in Southeastern Alaska and British Columbia (Reid 1972, Taylor 1964). Much of the life history and population dynamics of Pacific herring have been developed for these areas. In contrast, research on herring

in the Bering Sea has been limited, and most has occurred within the last six years.

United States Research

In the 1880s, exploratory surveys of the Bering Sea and western Alaska were begun by various departments of the Federal Government. These surveys, which continued into the early 20th Century, generally included a naturalist or fishery biologist who noted the occurrence of herring in the Bering Sea (Bean 1887, Cobb 1907, Gilbert 1895, Jordan and Gilbert 1899, Nelson 1887, Tanner 1890).

The first specific investigation of herring in the Bering Sea occurred in the late 1920s (Rounsefell 1930). Rounsefell collected samples from the catches from Unalaska and Golovin Bay in 1928, the year that commercial herring fisheries developed at Unalaska. The Bering Sea samples were included with samples from the Gulf of Alaska for investigation of the stock relationships of Alaska herring.

After 1928, there were no U.S. herring investigations in the Bering Sea until the advent of the OCSEAP in 1975. There had been some sporadic sampling for biological statistics by the ADF&G in the 1960s and 1970s.

Intensive investigations of the distribution, relative abundance and biology of spawning stocks in addition to the determination of subsistence use levels were begun by ADF&G in 1975 under OCSEAP in an area from the Alaska Peninsula to Kotzebue Sound. Much of this research in addition to stock identification and biomass estimates of spawning fish is being continued by ADF&G through State and NPFMC funding. The NMFS, under OCSEAP, investigated herring in Norton Sound and the Chukchi Sea and also reported on the occurrence of herring in southeastern Bering Sea demersal fish surveys (Wolotira et al. 1977, Pereyra et al. 1976). A winter hydro-acoustic survey was conducted in 1978 and 1979, northwest of the Pribilof Islands by NMFS to estimate the distribution and abundance of herring on the winter grounds.

In recent years, NMFS, first through the International North Pacific Fisheries Commission (INPFC), and later under the Magnuson Act, has placed observers on foreign vessels to monitor catch rates and to collect biological samples. ADF&G also had observers on domestic processors in the Togiak region since 1977 to collect biological data from the fishery.

Foreign Research

When the Soviet Union began fishing for herring in the eastern Bering Sea in the early 1960s, they initiated investigations to determine the extent and distribution of the herring resource. Most of the present knowledge of the offshore distribution and behavior of eastern Bering Sea herring is based on the Soviet research. Specific investigations dealt with winter abundance and distribution (Shaboneev 1965), summer abundance, distribution and migration (Rumyantsev and Darda 1970) and with eastern-western Bering Sea stock relationships (Prokhorov 1968). The main purpose of these surveys was the determination of the extent and potential uses of resources prior to commercial exploitation by the Soviet fleet.

Japanese research in the eastern Bering Sea began in the mid-1950s with limited exploratory trawl fishing. Extensive and systematic surveys of eastern Bering Sea groundfish by the Japanese were begun in 1963 by the Japan Fishery Agency (JFA), and have continued annually with the exception of 1972. These surveys have covered broad areas of the continental shelf, and in some years included the shelf edge and upper continental slope. Japanese research efforts have focused on pollock and other demersal species; herring have only been noted incidentally.

The Japanese collected catch and effort statistics and occasionally length frequency data from their herring fisheries beginning in 1964. These data were provided to the U.S. through the INPFC.

QUALITY OF RESEARCH

The overall quality of domestic research data is fair to poor. In coastal areas, recent intensive surveys have helped to define features of spawning

behavior, relative abundance, and coastwide distribution. The data on early life history, which may be a period when year-class strength could be assessed, are very weak. Individual spawning stocks have been identified along the coast, but the relationship of these stocks to the offshore fisheries is unclear due to an absence of direct data on offshore distribution and migration patterns.

RESEARCH NEEDS IDENTIFIED IN DRAFT FMP

Research will be required to (1) develop means of reducing the incidental catch of herring in other fisheries, (2) refine estimates of abundance and biological characteristics of stocks through resource surveys, (3) improve the capability for predicting changes in resource abundance, composition, and availability, and (4) identify the origin and distribution of stocks in offshore waters.

For purposes of conservation and harvesting efficiency, fishing methods or gear should be modified or developed which will reduce the incidental catch of herring in groundfish trawl fisheries.

Estimates of biomass of specific groundfish resources have been obtained through resource surveys using bottom trawls. However, herring are not generally available to bottom trawls and other gear and methods must be used for assessing biomass. Hydroacoustic surveys, spawn deposition surveys and aerial surveys of schooled fish are some of the methods under consideration.

Hydroacoustic surveys in the nearshore areas just prior to or during spawning are difficult due to the many widely scattered schools that are constantly moving through shallow waters. Hydroacoustic surveys are probably best conducted when herring are relatively concentrated on the winter grounds. Results of surveys conducted during late winter - early spring could be applied in time for management of the inshore fisheries. Some increased ability to identify discrete spawning stocks in the offshore survey area would also be desirable.

Aerial surveys are one of the more cost effective tools for measuring the abundance of spawning herring. However, this method is limited due to weather conditions and narrow time-area coverage. Intensive testing should be made of school distribution within a limited area to determine if surveys are more effective at particular times and to investigate the variability of schools along sighting tracks. Also, aerial biomass estimation procedures and species identification procedures should be improved.

Long-term fisheries management requires reliable forecasting of stock conditions. Until now, forecasts have been based mainly on past events, such as trends in abundance indices (catch per unit effort) and size and age composition of specific resources without any consideration of the interactions of these resources with each other and the environment. Studies need to be continued to determine for predictive purposes those factors that have major influences on the abundance, composition, and distribution of resources. Monitoring certain oceanographic and climatological conditions (temperature, currents, etc.) in both the nearshore spawning-rearing grounds and the offshore wintering grounds may be very important in understanding fluctuations in herring abundance.

There is a critical need for annual pre-recruit surveys (i.e. of young fish before they enter the fisheries) so that a measure of their abundance can be used to forecast later contribution to the exploitable stock. Assessment of pre-recruit abundance could be made of juveniles in nearshore nursery areas or at a later age in more offshore waters. The major limitation for use of this method is the virtual absence of information relating to distribution of eastern Bering Sea herring during the first two or three years of their life cycle.

current studies in inshore waters are emphasizing the assessment of stock condition through aerial survey observation of schooled fish and age composition data collected from commercial and test fishing catches. Age composition data when collected over a number of years are indicative of the relative strength of various year classes including newly recruited fish, and may be used to a limited degree in adjusting quotas and formulating other management measures.

Basic biological research is needed to systematically investigate population parameters, such as age-specific mortality rates, growth rates, and recruitment rates. Investigations are also needed to establish the degree of utilization of herring in the diet of marine mammals, salmon, and other predators so ecological effects of harvesting can be better evaluated.

Lastly, stock identification needs to be refined so that the distribution of stocks within the eastern Bering Sea and their frequency of occurrence in each fishery can be established.

DATA COLLECTION PROGRAM REQUEST

In order to answer important questions regarding offshore stock abundance and distribution, alternative assessment methods must be examined. Of the various alternative methods, the North Pacific Council has concluded that hydroacoustic-trawl assessment on the winter grounds is most appropriate. However, previous attempts to survey herring on the winter grounds have indicated that an inordinant amount of research vessel time may be needed to obtain a reliable biomass estimate. Consequently, better knowledge of the distribution and behavior of the resource is required before it will be possible to realistically evaluate the potential for implementing a hydroacoustic-trawl survey. Thus, the data collection program should be conducted in two stages. The first step is to improve our knowledge of the general characteristics of the resource. The second step is to utilize that information to determine the optimum program to meet the data requirements identified by the Council, and to collect those data.

PROGRAM OBJECTIVES

The objectives of the first phase of the data collection program requested by the NPFMC are:

1. Estimate the location and range of herring on the winter grounds.
2. Estimate the distribution of herring within the grounds.
3. Estimate the general size and age-length composition of herring schools.

4. Investigate the distribution and schooling behavior of herring schools within the water column during day and night.
5. Assess the amount of mixing with other species.
6. Collect data for studies of stock composition/origin, age composition, and sexual maturation.
7. Evaluate the feasibility of using standard research vessel survey techniques for assessing herring abundance including assessment of the vulnerability of herring to acoustic detection and trawl sampling.

The objectives of the second stage of the data collection program are:

1. Estimate the absolute abundance and distribution of individual herring stocks and the herring resource as a whole.
2. Determine the degree of mixing of individual herring stocks offshore.
3. Determine the degree to which offshore fishing operations can target on individual stocks and/or age classes of herring.
4. Determine stock-recruitment relationships.

PHASE ONE

Phase one is not intended to produce an estimate of herring abundance, rather its primary purpose is to locate, delineate, and sample concentrations of herring on the winter grounds.

The Council has concluded that Phase One can best be accomplished by a survey conducted in a 21,000 square nautical mile area northwest of the Pribilof Islands (Figure 1). The area extends from 57°00'N to 60°00'N between the 100 m and 200 m isobaths. Survey operations should be carried out along transects across the project area.

Standardized echo sounder records should be collected continuously along each trackline. When fish echo sign is detected, midwater trawl sampling should be conducted to determine its species/biological composition. Previous

experience suggests this sampling would be limited to between two and three hauls per day, except when major concentrations of fish are encountered.

Sampling outside the 0600-2000 hour time period must be conducted intermittently to obtain information on diel changes in the behavior and availability of herring. Some sampling should be done using bottom trawls, mainly in areas where off-bottom echo sign is infrequently observed. Because herring are likely to be very patchily distributed within most of the survey area, the amount of time devoted to trawl sampling is expected to vary significantly. Sampling is likely to be most intensive near the shelf break where mixed schools of pollock and herring are expected to occur.

PHASE TWO

Phase Two is intended to produce an estimate of herring abundance and distribution of individual stocks in the offshore area. Success of Phase One will determine whether or not it is feasible or practical to pursue Phase Two of the data collection program. Specific survey methodology will be developed upon conclusion of Phase One. Components of Phase Two may include:

1. Hydro-acoustic surveys;
2. Trawl surveys;
3. Stock separation studies;
4. Life history, climatological and oceanographic research to determine distribution and abundance of juvenile (pre-recruit) herring and environmental factors influencing distribution and abundance;
5. Other research to achieve the identified objectives.