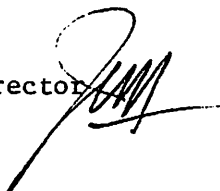


MEMORANDUM

TO: Council, SSC and AP Members
FROM: Jim H. Branson, Executive Director 
DATE: July 14, 1980
SUBJECT: Review of Herring PMP/FMP

ACTION REQUIRED

None. Preliminary review of PMP-FMP status; preliminary review of status of stocks; and review of management through next June.

BACKGROUND

The substantially lower biomass estimates for Bering Sea herring made during the fishery this spring have aroused concern with the user groups of that resource. This agenda item is intended to give them a chance to testify on the subject, if they desire, and to serve as a preliminary review of the herring situation for the Council. We should have final biomass estimates from ADF&G and NMFS at the September meeting at the same time we consider final action on the Council's herring FMP.

The current status of herring management is as follows: The Council FMP cannot be expected to be in place prior to June 1, 1981. The Bering Sea and Aleutian groundfish fishery PMP manages herring for the foreign fishery. Currently, as a result of the Court suit last spring, herring are a prohibited species for all foreigners, including American fishermen delivering to foreign processors. Any that are caught must be returned to the sea. Unless NMFS revises the PMP or develops a new PMP strictly for herring (desirable when the Council FMP for Bering Sea groundfish is implemented), herring will continue to be treated as a prohibited species for the foreign fishery. The U. S. fishery is currently controlled by State of Alaska regulations. The PMP does not affect the U. S. fishery (except in joint ventures). The FMP will control both U. S. and foreign fisheries, but is not expected to be in place until after the spring roe fishery ends in 1981.

attachment

AGENDA E-3(a)
JULY, 1980

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			Sec. Typist	

JUN 27 1980

P.O. Box 3-3908
Anchorage, Alaska 99501

June 26, 1980

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

Dear Mr. Branson:

I represent several villages and organizations in southwestern Alaska which are concerned about the Bering Sea herring fishery. It has come to our attention that the North Pacific Fishery Management Council will be hearing an update on the spring 1980 herring fishery at its meeting during the week of July 21, 1980. Also, the Council directed the Plan Drafting Team to rewrite the Bering/Chuckchi Sea Fishery Management Plan based upon assumptions which were present at its April meeting. This plan was to be voted upon at the Council's August meeting.

We respectfully request that the Council place two matters upon its July agenda concerning Bering Sea herring. First, the National Marine Fisheries Service is presently drafting proposed rules for the Preliminary Fishery Management Plan for Bering Sea herring. These proposed regulations are needed as a result of the court's decision in Napoleon v. Hodges which invalidated the regulations promulgated during the final days of 1979. As a result of the successful harvesting of 20% of the returning herring biomass during the spring 1980 season it is our position that there should be no TALFF for the offshore fishery. Therefore, we request that the Council make a recommendation to NMFS that there be no TALFF or JVP for Bering Sea herring and that it be treated as a prohibited species. We feel that this should be relayed to NMFS before they publish proposed rules.

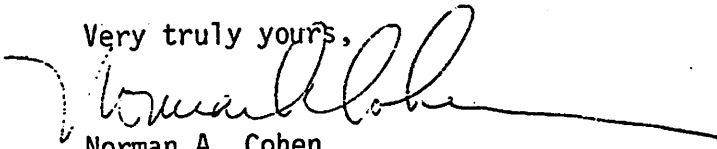
Second, we believe that the 1980 spring herring fishery has brought to light a great many considerations that were not available to the Council at its April meeting. Specifically, the preliminary findings of the Alaska Department of Fish and Game point to a downward trend in the Bristol Bay area which has by far the greatest concentration of herring. Under these circumstances it would appear to be prudent for the Council to include some provisions for TALFF or OY reductions and for a herring savings area when the smaller stocks of herring are fully exploited and the larger stocks are not fully exploited. Some protection for these smaller stocks is required if the herring are to return to all areas of the coast, especially the areas which are dependent upon herring for subsistence use. We believe that the Council should reconsider its April determinations on these issues prior to the August Council meeting. The best time to do so would be at

Mr. Jim Branson
June 26, 1980
page 2

its July meeting.

The villages along the southwestern Alaska coast remain very concerned about the future of the Bering Sea herring fishery. We appreciate your attention to these requests and will be looking forward to their being considered at the July meeting of the Council.

Very truly yours,



Norman A. Cohen
Attorney at Law

cc: Donald C. Mitchell
Harold Sparck
Guy Thornburg



Marine Resources Company

HEAD OFFICE:
4215 - 21st Avenue West
Suite 206
Seattle, Washington 98199
Phone: (206) 285-2701
Telex: 32-8041 MRC SEA

NAKHODKA OFFICE:
Verkhne - Morskaya, 134
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Primorski Krai
692900 U.S.S.R.
Telex: 213434 MRKNHDSU

July 18, 1980

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

Dear Jim:

Re: Proposal for an Eastern Bering
Sea Herring Research/Experimental
Production Project

On behalf of ourselves and the fishermen who fished for us this year in the Bering Sea, I am pleased to submit the attached "Proposal for an Eastern Bering Sea Herring Research/Experimental Production Project" for Council consideration. Please note that we are not requesting any financial support, only Council endorsement.

If the proper administrative approvals can be obtained from NMFS, this project would be incorporated into our developmental groundfish fishery this fall in the Bering Sea. We plan to have the Sulak and/or up to 4 BMRT/RTM-type processors working with 4-5 American trawlers. They will operate in the entire Eastern Bering Sea from the Unimak Pass area to the outer shelf area southwest of St. Matthew Island. Estimated total production is about 12,955 MT broken down as follows:

Herring	3500 MT
Pollock	7500
Pacific cod	1500
Atka mackerel	150
Sablefish	120
POP	50
Rockfish	25
Squid	10
Other species	100

Total: 12955 MT

Jim Branson
July 18, 1980
Page 2.

Marine Resources Company and the fishermen who fish for us feel quite strongly that due to conflicting data presently available regarding the Bering Sea herring stocks (1980 Togiak data versus that presented in the draft herring FMP), it will be impossible to make a reasonably accurate assessment of the status of this resource. For this reason it will be very difficult, if not impossible, to arrive at any rational management decisions as to what sort of reasonable quotas or allocation schemes should be set so that the maximum benefit can be derived from this valuable resource.

It is our considered opinion that, given the value of this resource to both native and non-native fishermen and the difficult economic situation in most of our fisheries, we can ill-afford to under-exploit or overexploit the Bering Sea herring resource. Unfortunately, though, with the inconclusive data available, there is a strong possibility we will do one or the other.

Obviously more data such as stock composition, age structure and relative year class strengths are needed in order to set reasonable quotas and allocation schemes with any degree of certainty. There also is a recognized need for information on the high seas distribution of the Western Alaska herring stocks. Such data can only be obtained on the high seas in the areas where the herring are aggregated.

We are not aware of any research cruise which have been or will be organized for this purpose. For this reason, given the critical situation on hand, we are willing to organize and operate our fall fishery so that the required data can be collected.

The attached proposal, which outlines our ideas on such a project, was put together following discussions we had with scientists and management staff at the NMFS Alaska Regional Office and the Northwest and Alaska Fisheries Center and the Alaska Department of Fish and Game.

It should be noted that the facilities and accommodations on the trawlers and processors together with the survey and sampling efforts would be provided at no cost. Since this would be a directed operation, the participating biologists would be assured of getting the necessary samples (We understand that such was not the case when the Miller Freeman was involved in a herring assessment cruise in the Bering Sea two years ago). To carry out such a

Jim Branson
July 18, 1980
Page 3.

sampling program using a dedicated research trawler would cost in excess of \$250,000 and since sampling effort would be considerably less, chances of success would not be as great as our proposed joint research/production operation with 4-5 well-equipped trawlers.

The amount of herring involved (up to 3500 MT) is small when compared with the amount of under or overharvest which is likely to occur. Ironically twice this amount was wasted as deadloss during the Togiak sac-roe fishery this spring.

We ask that the Council support our proposal. Moreover, we ask that you request NMFS to promulgate the necessary regulations required to permit our processors to receive herring from the U.S. trawlers involved. From our side we pledge to work closely with the Council, NMFS and ADF and G to insure that the data and samples collected meet the scientific criteria established so they will be meaningful in terms of shedding light on the status of the Bering Sea herring resource for the benefit of all parties concerned.

Yours sincerely,



Walter T. Pereyra
Vice President and General Manager

WTP:kb

Enclosure

cc: Senator Magnuson
Senator Stevens
Senator Gravel
Congressman Young
Congressman Pritchard
Terry Leitzell
Robert McVey
Dr. William Aron
Charles Meacham
Ronald O. Skoog

PROPOSAL FOR AN EASTERN BERING SEA HERRING RESEARCH/EXPERIMENTAL
PRODUCTION PROJECT

By
Marine Resources Company
4215 21st Ave. W., Seattle, WA

PROBLEM

Data on the Eastern Bering Sea herring resource is incomplete. Moreover, what data that is available is conflicting as regards conclusions which can be drawn as to the status of this important resource. A brief review of the status of stocks information and conclusions which are presented in the draft herring FMP as contrasted with preliminary data from this year's Togiak fishery are illustrative in this regard.

Draft FMP for herring in the Bering-Chukchi Sea presents evidence that suggests the Eastern Bering Sea herring resource is in good condition with increasing biomass and strong year classes entering the fishery. Specifically the FMP states:

. Aerial surveys have indicated an increase in herring abundance in all major spawning areas during the 1976-1978 period. Preliminary observations in 1979 indicate a similar or slightly greater abundance relative to 1978.

. Based on peak-day aerial counts of herring schools it is estimated that the spawning biomass in 1978 from Bristol Bay to Norton Sound was between about 250,000 - 500,000 MT.

. The 1979 surveys indicated that herring abundance was approximately equal to that recorded for 1978 in all areas.

. A relatively high abundance of 3 year old herring (1976 year class) were present during the 1979 spawning season indicating that recruitment to the 1980 fishery will be good.

. Under average conditions an exploitation rate of 20 percent would be appropriate.

. ABC for 1980 is thus set at 49,600 MT.

. Preliminary TAC is set at 48,438. (Following a reanalysis of the 1979 data the TAC was set in the PFMP at 41,200 MT (including 200 MT for the subsistence fishery), broken down as follows: DAH 33,200 MT (DAP 27,000 MT; JVP 6,000 MT, and subsistence 200 MT), TALFF 6,000 MT and reserve 2,000 MT).

Preliminary indications from data gathered from the Togiak sacroe fishery gives a somewhat different picture. For example, it is reported that the peak spawning biomass was only about 100,000 MT and that the run was dominated by older age groups. The 1976 year class, which had a strong showing as 3-year olds last year, did not enter the fishery in numbers.

If the Togiak data is accepted as representative of the size and composition of the Eastern Bering Sea herring resource, then the immediate conclusion one reaches is that the resource is in a depressed state and needs maximum protection. Such a conclusion is not warranted at this time for the following reasons:

- 1) The total population could not have declined by two-thirds decline in apparent abundance as suggested by peak spawning counts without experiencing a greater than threefold increase in instantaneous total mortality.

- 2) It is difficult to establish a supportable biological hypothesis whereby the relatively strong 1976 year class could be severely reduced without having a similar or more severe reduction in the older age groups.

- 3) Storms were prevalent this spring which probably decreased the effectiveness of the aerial surveys.

- 4) A rapid temperature drop of 7° F (48° F to 41° F) was observed following one severe storm. This suggests that thermal conditions may not have been optimal for spawning which could have caused a reduction in the availability of herring on the spawning grounds or a delay in the time of spawning. This later explanation is supported by reports of increased amounts of spawn on the spawning substrates after the fishery was closed down in late May.

Obviously additional data on the age class structure and relative abundance of the Eastern Bering Sea herring stocks is critically needed before the end of this year in order to establish the actual status of this important resource. Moreover, information on the origin and distribution of the stocks in offshore waters is needed to properly manage this resource. Without such information it will be extremely difficult to establish quotas and allocation schemes with any degree of certainty or to proscribe appropriate conservation measures, should they be required.

Data to answer some of these questions can only be obtained on the high seas in the areas where herring are aggregated. Unfortunately to the best of our knowledge, no research cruises have been or will be organized this year for this purpose. Furthermore,

the present prohibition against any directed foreign herring fishery makes it impossible for NMFS observers aboard foreign vessels to collect such data as these vessels now avoid herring concentrations.

For these reasons, together with the fact that there is a critical need for more data and time is short, we propose that a limited domestic research fishery be permitted this fall from late October through late December to allow collection of the requisite data.

PROPOSAL

This fall we plan to have the 18,000-ton mothership, Sulak, and/or up to 4 BMRT/RTM-type processors work with 4-5 large, U.S. trawlers from late October to late December. This fleet will operate over the entire Eastern Bering Sea from the area around Unimak Pass to the outer shelf area west of St. Matthew Island.

Taking into consideration that we would be fishing in areas with various levels of herring abundance, we estimate that our catch would total around 12,955 MT, broken down as follows:

Herring	3500 MT
Pollock	7500
Pacific cod	1500
Atka mackerel	150
Sablefish	120
POP	50
Rockfish	25
Squid	10
Other species	<u>100</u>
Total:	12955 MT

The primary research aim of this joint activity would be to collect samples, and biological and hydroacoustic data on the dominant aggregations of herring throughout the Eastern Bering Sea. A secondary aim would be to obtain production information on the catching success of large U.S. trawlers in this area during the late fall.

We expect that the proposed joint research/experimental production project will provide information on the following:

- 1) Age structure of the Eastern Bering Sea herring stocks;
- 2) Relative strength of the various year classes presently making up the population;
- 3) Late fall distribution pattern of the herring resource;
- 4) Acoustic signatures of herring relative to other midwater species in this area at this time;
- 5) Availability of herring during the late fall to large U.S. trawlers;
- 6) Daily production capabilities of large U.S. trawlers on herring, pollock and cod during the late fall.

Other information which may be generated include:

- 1) Relative abundance of the Eastern Bering Sea herring resource;
- 2) Offshore distribution of the western Alaskan herring stocks during late fall;
- 3) Spatial relationship between herring and the other pelagic resources in this area;
- 4) Oceanographic factors influencing the offshore distribution of herring during late fall.

A detailed research plan would be developed in concert with the various agencies involved in research on the Eastern Bering Sea herring resource. In this regard we would suggest the immediate formation of an ad hoc committee to formulate a reasonable and attainable research plan.

FUNDING

We are not requesting any funds to carry out the suggested research activities. The various survey and sampling efforts would be pursued as an integral part of our experimental production fishery. The various research agencies themselves would be responsible for supporting their own personnel, including their specific catch sampling and data analysis requirements.



22 JUL 80 11:56

Telegram

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PMS MR CLEM TILLION, CHAIRMAN

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

333 WEST 4TH AVE SUITE 32

ANCHORAGE AK 99501

DEAR CHAIRMAN TILLION,

AS CO-OWNER OF THE 160 FT CRABBER/TRAWLER AMERICAN NO 1, I WANT TO EXPRESS OUR SUPPORT FOR THE EASTERN BERING SEA HERRING RESEARCH/EXPERIMENTAL PRODUCTION PROJECT PROPOSED BY MARINE RESOURCES CO (MRC) FOR THIS FALL.

IT IS OBVIOUS THAT THERE IS INSUFFICIENT AND CONFLICTING DATA REGARDING THE STATUS OF THE WESTERN ALASKAN HERRING STOCK. THERE IS GENERAL AGREEMENT THAT THIS DATA MUST BE OBTAINED ON THE HIGH SEAS. THE PROJECT PROPOSED BY MRC IS THE MOST COST EFFECTIVE WAY TO OBTAIN THIS MUCH NEEDED DATA BEFORE QUOTAS ARE SET AND ALLOCATIONS ARE MADE THIS WINTER. IT SHOULD BE NOTED THAT THERE WOULD BE NO DIRECT OPERATIONAL COST REQUIRED FOR THE PARTICIPATING VESSELS.

IF THIS PROJECT IS ENDORSED BY THE COUNCIL AND THE NECESSARY PMP PROMULGATED BY NMFS, WE WOULD HOPE TO COMMIT OUR TRAWLER TO THIS JOINT RESEARCH/PRODUCTION ACTIVITY.

TIME IS SHORT AND THE NEED IS GREAT. WE ASK THAT THE COUNCIL STRONGLY ENDORSE THIS PROJECT AT ITS JULY MEETING AND REQUEST NMFS TO IMPLIMENT THE NECESSARY PMP AMENDMENT.

YOURS SINCERELY,

K
KEN PETERSON F/V AMERICAN NO 1

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JUL 23 1980				

ANALYSIS OF HERRING TIME-AREA CLOSURES

The August 1979 draft of the Bering Sea herring management plan contained four options for a proposed herring time-area closure. Supportive analytical data for each option consisted of the historical percentage of herring harvested in each area and the historical percentage of pollock (the other major species harvested in the time-area closures) harvested as an indicator of impacts on other fisheries of instituting a time-area closure.

In reviewing the options for selection of a time-area closure, the SSC expressed the opinion that the data present were inadequate for evaluating the options, and additional data should be provided.

The purpose of the proposed time-area closure is to minimize the incidental catch of herring by foreign fisheries in the event that there is no TALFF. A time-area closure would also be applied to domestic fisheries, when stocks dropped below a level that would produce MSY. The four proposed areas are shown in Figure 1, and relative area comparisons are shown in Figure 2.

To compare the effectiveness of each closure for herring protection, data supplied to the U.S. by Japan were used. The Japanese data cover the years 1968 through 1978 and contain catches by species, month, 1° longitude by $1/2^{\circ}$ latitude, and vessel class. Comparable data are not available from the Soviet fishery; therefore, it must be assumed that they operated in the same areas as the Japanese. U.S. surveillance reports indicate that the Japanese and Soviet herring fisheries did operate in the same general area.

Areal selection was based on the years 1968 through 1972. These years

selected because catches were high and most herring were taken as the target species. Also during these years, there were no catch quotas or regulations that would have influenced fishing. In subsequent years catches have been low, influenced by declining stocks or quotas and regulations. The boundaries of the potential closure areas follow lines of latitude and longitude as much as possible to minimize future enforcement efforts, although, by doing so, some blocks are included in which herring have not been caught.

Table 1 contains the catch of herring within each area for the November - March period that the closures would be in effect, total Bering Sea herring catch for gear other than gillnet for the November - March period, and the annual herring catch for the years 1968-69 to 1977-78. Mean catches were computed for the entire data series and for the years 1968-69 to 1971-72. The latter series is believed to be more indicative of the amount of protection to herring stocks by each time-area closure, because in these years stocks were high, regulations did not exist, and herring was a target species to a greater degree than in later years.

The 1968-69 to 1971-72 data show that 90% of the Bering Sea herring catch occurs from November - March and that 88-95% of this catch is taken within the proposed herring time-area closure. Area C (the largest area) provides the greatest protection, accounting for 95% of the average November - March catch and 85% of the average annual catch. Area B (the smallest area) provides the least protection, accounting for 88% of the November - March catch and 79% of the average annual catch. The other two areas (A and D) are intermediate to B and C and account for 93% and 94% of the average November - March catch and 83% and 84% of the average annual catch, respectively.

The amount of herring protection among the four areas is non-significant, since historically the greatest herring harvest has been in B, the smallest area. However, there are significant differences in relation to the total groundfish catch and pollock in particular.

Table 2 shows that during November - March the total Bering Sea groundfish harvest averaged 16.5%. The proportion of the winter harvest taken in the proposed time-area closures ranges from 24.1% in Area C to 6.3% in Area B. In relation to the Bering Sea annual harvest, the proportion harvested in the time-area closure ranges from 1% to 4%.

The pollock catch record is more meaningful than the total groundfish harvest, because it is the principal target species in the areas proposed. Pollock comprised 77% of the average November - March Bering Sea catch, and pollock and herring combined averaged 83% of the Bering Sea winter groundfish harvest from 1968-69 to 1977-78.

The relationship of harvest between areas is the same for pollock as for groundfish, but the percentage of catch drops sharply in Areas A and B, primarily because herring, included in the total groundfish catch, was the major species, along with pollock, harvested in these areas. If a time-area closure is instituted, the greatest impact to existing fisheries would be in Area C which averaged 21.4% of the November - March catch during the period of record (Table 3). Area B would have the least impact with 1.8% of the November - March average pollock harvest, and Areas A and D are intermediate with averages of 5.7% and 15.7%, respectively. On an annual basis institution of Area A would result in an average of a 0.8% reduction of the Japanese pollock harvest, 0.3% with Area B, 3.2% with Area C, and 2.3% with Area D.

This analysis is based on Japanese data, and measures impact to Japanese fisheries only. The U.S.S.R. has also conducted a major fishery in the Areas analyzed. U.S. observer data (Herring draft FMP Sec. 10.3) and historical catch data show that much of the Soviet effort in these areas has been directed toward herring and that the ratio of herring to pollock and groundfish is much higher than for Japan. Therefore, if U.S.S.R. data had been available, the amount of herring protection would have been greater in each area and the overall impact to other fisheries would have been less.

Since all areas are nearly equal in the amount of protection to herring, the herring PDT recommends Area A for the November - March period, because it includes most of the herring winter range and has a minimum impact on the pollock fishery. The PDT is also in favor of instituting Area C (which includes almost the entire herring winter range) as a general closure, with the provision that only the portion necessary to protect herring be closed annually by emergency order. The Regional Director could close the entire area or a portion of it, when 75-80% of the allowable incidental catch is reached, utilizing observer data and vessel position data.

Table 1. Japanese herring catch in the proposed November-March time-area closures and the eastern Bering Sea and the mean catch and mean percentage of the Bering Sea annual and November-March catch for the years 1968-69 to 1971-72 and 1968-69 to 1977-78.

	Herring Catch (mt) by Area				Bering Sea	
	A	B	C	D	Nov.-March	Annual (Jul.-June)
1968-69	40316	40273	40470	40436	41875	50857
69-70	20925	17045	19338	17165	22274	23901
70-71	19415	19298	22935	22737	23717	24236
71-72	12301	11748	12532	11978	12889	13143
72-73	18	18	18	18	435	346
73-74	21	14	94	91	620	219
74-75	17	16	123	115	1569	2663
75-76	5	0	296	291	612	3119
76-77	4929	4858	8424	7873	2127	13413
77-78	4	5	431	375	1257	2703
Mean Catch:						
1968-69 to 71-72	23240	22091	23821	23581	25118	28034
1968-69 to 77-78	9795	9327	10467	10109	11737	13460
Mean (%) of Bering Sea November-March Catch:						
1968-72	93	88	95	94		
1968-78	84	80	39	86		
Mean (%) of Bering Sea Annual Catch:						
1968-72	83	79	85	84	90	
1968-78	73	69	78	75	87	

Table 2. Japanese total groundfish (including herring) catch in the proposed November-March time-area closures and the eastern Bering Sea and the mean catch and percentage of the Bering Sea annual and November-March catch for 1968-69 to 1977-78.

	Groundfish Catch (1000 mt) by Area				Bering Sea	
	A	B	C	D	Nov.-March	Annual
	1968-69	44.5	44.4	44.7	44.6	160.0
69-70	31.3	20.7	28.6	20.9	180.4	1036
70-71	38.1	24.5	42.4	28.6	264.1	1447
71-72	34.2	16.7	53.6	34.2	305.3	1782
72-73	14.9	6.6	44.0	29.2	257.7	1844
73-74	6.6	6.7	109.1	95.2	245.0	1726
74-75	21.2	4.9	61.9	37.4	191.7	1487
75-76	14.0	0.8	32.2	13.2	297.1	1278
76-77	18.9	13.3	52.0	41.6	157.8	1062
77-78	2.7	1.2	69.3	57.2	174.1	957
Mean Catch:	22.6	14.0	53.8	40.2	223.3	1350
Mean (%) of Bering Sea November-March Catch:	10.1	6.3	24.1	18.0		
Mean (%) of Bering Sea Annual Catch:	1.7	1.0	4.0	3.0	16.5	

Table 3. Japanese pollock catch in the proposed November-March time-area closures and the Eastern Bering Sea and the mean catch and percentage of the Bering Sea annual and November-March catch for 1968-69 to 1977-78.

	Pollock Catch (mt) by Area				Bering Sea	
	A	B	C	D	Nov.-March	Annual
					(1000 mt)	(1000 mt)
1968-69	3317	3270	3364	3317	97.9	701
69-70	2416	592	2323	591	122.2	830
70-71	11601	1322	11464	1337	187.2	1231
71-72	18417	4598	35505	20348	242.6	1513
72-73	12820	5715	40024	26988	214.2	1651
73-74	5889	5191	102438	90713	201.7	1476
74-75	18923	4468	46942	34768	157.4	1253
75-76	11106	660	26103	11104	246.4	1137
76-77	10258	1156	36887	28586	113.9	913
77-78	2478	3483	60393	51011	125.1	869
Mean Catch:	9723	3046	36544	26876	170.9	1158
Mean (%) of Bering Sea November-March Catch:	5.7	1.8	21.4	15.7		
Mean (%) of Bering Sea Annual Catch:	0.8	0.3	3.2	2.3	14.8	

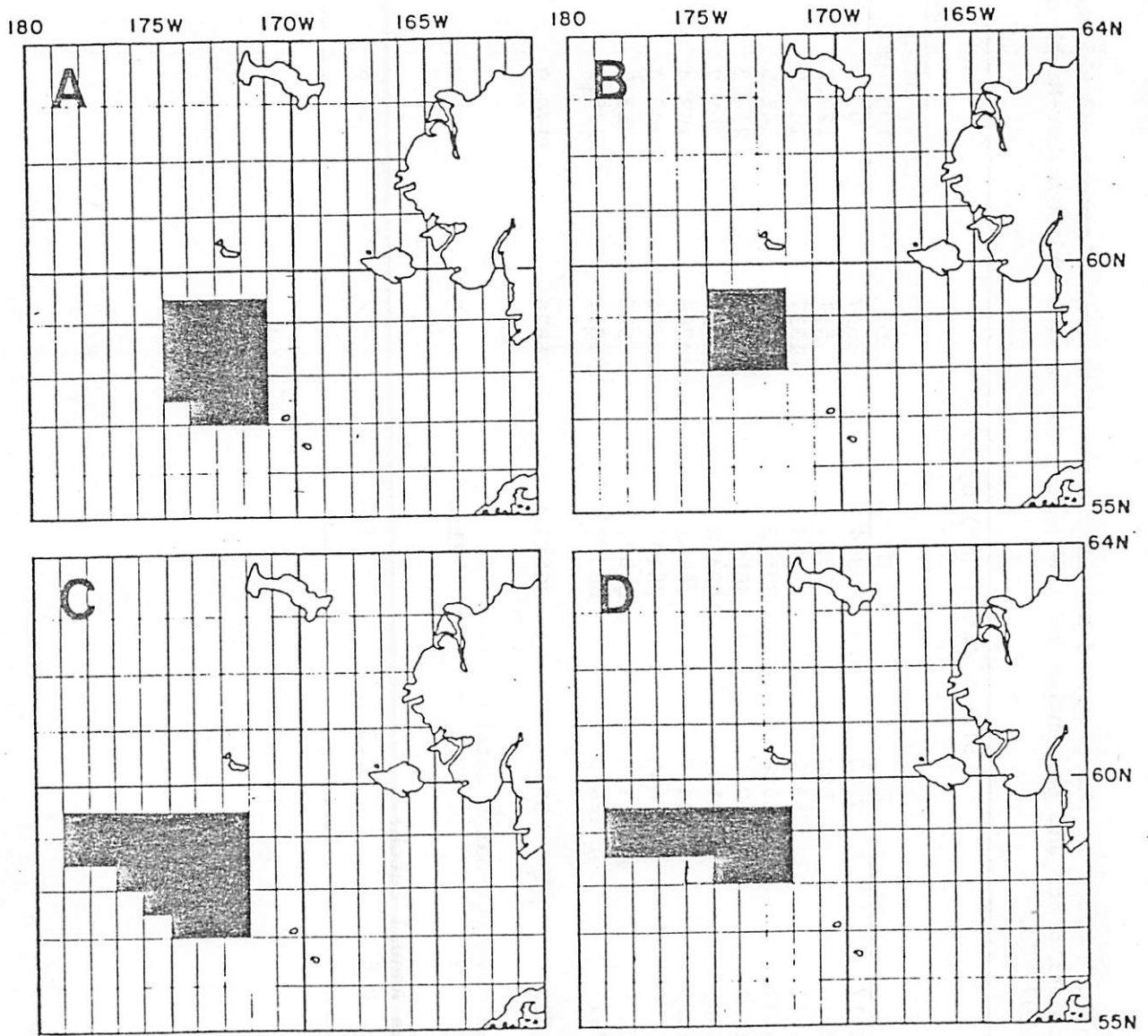


Figure 1. Herring savings area options.

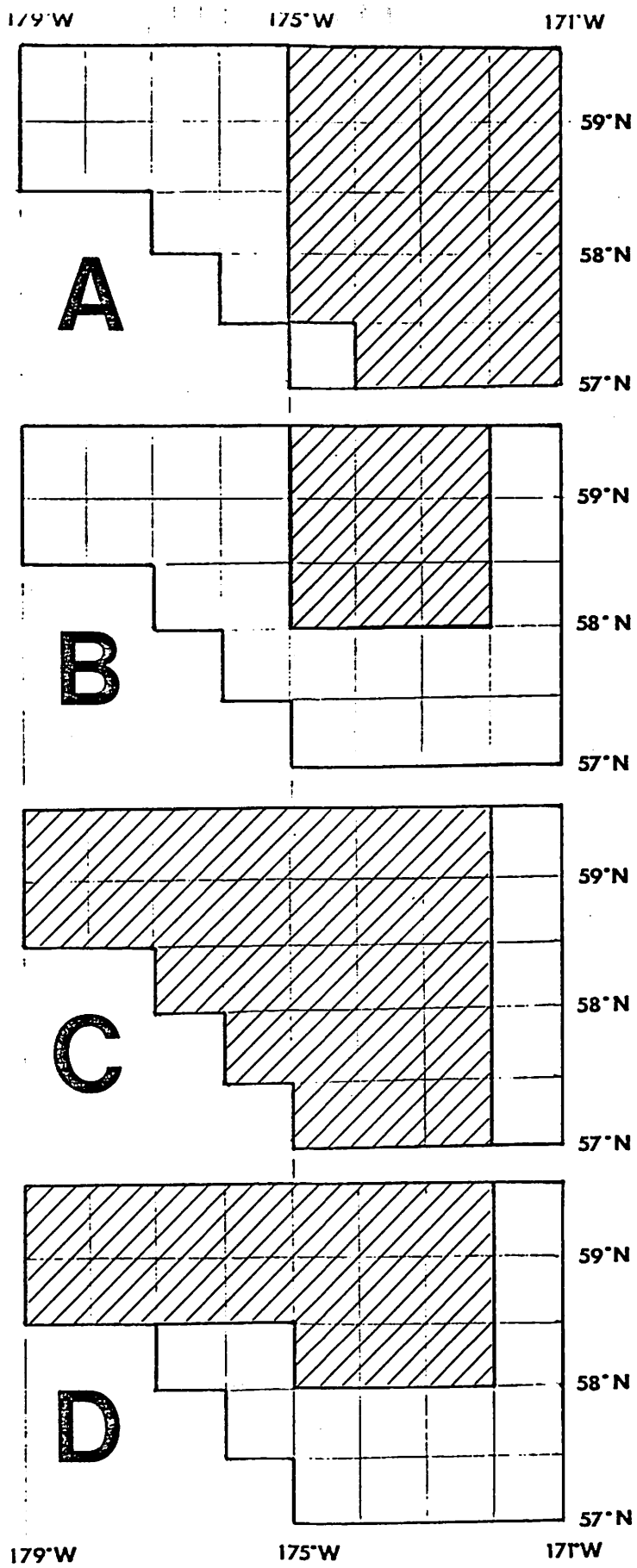


Figure 2. Four options of winter time-area closures in the eastern Bering Sea.