

# STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

Agenda Item #9

Dec 1977

JAY S. HAMMOND, GOVERNOR

SUBPORT BUILDING - JUNEAU 99801

November 25, 1977

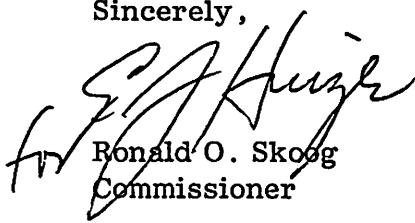
Mr. Harold O. Lokken, Chairman  
North Pacific Fishery Management Council  
P.O. Box 3136 DT  
Anchorage, Alaska 99510

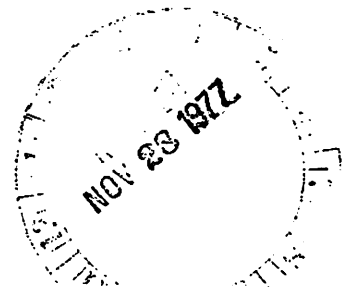
Dear Harold:

Alaska Department of Fish & Game has lead-agency responsibilities for the development of the King Crab Management Plan which is to be submitted as a draft document to the Council on February 22, 1978. After considering how previous plans have been presented to the Council, I believe that the process can be improved if the plan development team were given the opportunity to present an interim report to the Council prior to the submission of the completed draft. The interim report would contain a statement of objectives, a history of the fishery and its management, biological descriptors, status of the stocks (including MSY and ABC), the preliminary optimum yield, and proposed regulatory measures. This would help alleviate the problem of the Council being presented a draft plan to adopt for public review without having an opportunity to discuss the provisions of the plan in detail with the writing team, as was the case with the Tanner crab plan. Another positive aspect of processing the plan in this manner includes an earlier opportunity to evaluate the specification of the management objectives and regulatory options. The Council then can react to the interim report and provide the writing team any additional direction they deem appropriate before receiving the completed draft plan.

Therefore, I am requesting that the King Crab Management Plan drafting team submit such an interim report for review by the Council prior to its January meeting and that the Council schedule at least half a day at that meeting to hear a formal presentation by the Team.

Sincerely,

  
Ronald O. Skoog  
Commissioner



## SCIENTIFIC AND STATISTICAL COMMITTEE

## MEETING

Nov. 29-30, 1977

The Scientific and Statistical Committee convened at the North Pacific Fishery Management Council offices at 1:30 p.m., Nov. 29.

All members of the SSC were present except Dr. George Rogers and Dr. Edward Miles. Dr. Miles joined the group the following morning.

Topics which were reviewed included:

- A. Procedures for interface with the Council.
- B. Modifications in the estimates of Bering Sea Tanner crab populations and OY and ABC estimates.
- C. Estimates of the EY and re-building rates for blackcod in the Gulf of Alaska.
- D. Comments of the industry on the troll salmon plan.
- E. Considerations and recommendations concerning RFP's.
- F. Data needs.
- G. Bering Sea clam report.
- H. Resource development plan.

PROCEDURES FOR SSC INTERFACE WITH COUNCIL

1. The committee felt that existing procedures established for the SSC review of management team documents, technical papers, etc., need to be improved to ensure that the Council and its Advisory Panel were conversant with the SSC's views and actions, and the sources of technical data used for decision making. It was apparent that several actions taken by the Council based on new data submitted by management teams at the last session of the Council were presumed to have been reviewed by the SSC.

The SSC is recommending that in order to more clearly establish the working relationship between the Council, the SSC and the Advisory Panel that a revised cycle of management plan development be initiated. Our recommendations are outlined in the flow diagram submitted to Council members. We suggest this procedure be followed by the Council and Advisory Panel and adopted if found satisfactory.

## SOURCE DOCUMENTS

2. Any need for clarification or additional information on materials received from agencies, academic institutions, industry or management teams should be addressed to the appropriate agency for clarification, not to individuals in the agency.

### BERING SEA TANNER CRAB

3. (a) Population size
- (b) ABC
- (c) Recruitment patterns
- (d) OY of 17,500
- (e) Line division as described by Chairman Lokken

### BLACK COD

4. (a) There is no document available concerning rebuilding rates.
- (b) From an explanation by Mr. Larkins, there is a method of making a quick, but authentic analysis of the blackcod situation.
- (c) Re-building concepts are based on
  - (1) overfishing is impacting recruitment patterns. The decline of EY is not due to a natural change in recruitment patterns.
  - (2) there is a presumed static model.
  - (3) there is no consideration of density dependant factors in the population model.
  - (4) the re-building process is not associated with the original population model.
  - (5) there is no analysis of the impact on average size gain for individuals in potential stock losses in yield and economic gains or losses.

### SALMON TROLL PLAN

#### 1. Cape Suckling

(a) There is inadequate data to analyze to make any statement on the impact closure of this area will have on coastal communities and to what extent management practices in that area will have socially or economically. This data needs to be developed before options can be considered seriously. Our recommendation is that the area remain closed as recommended in the plan.

## 2. Cape Fairweather time and area closures

(a) There is a general consensus of the SSC that although the writing team had used the best data available, there is considerable uncertainty in (1) the extent of the shaker problem by number and area, (2) the level of mortality associated with it and (3) the biological and sociological consequences of the proposed closure. The Committee feels there needs to be an improvement and clarification of the technical data supporting such a closure prior to the Council taking action on this option.

The following actions are suggested:

(1) The management team shall prepare a written document clearly responding to the questions raised in the industry appraisal.

(2) A field study of the fishing grounds be done in 1978 on the shaker problem. This should be a joint study by ADF&G and industry.

(3) That every effort be made by ADF&G to determine the importance of the Fairweather stocks to the streams and rivers of Southeast Alaska (coded micro-tag analysis).

(4) The management team should examine the size distribution data from various areas to determine the variance around the reported mean sizes and the mathematical significance of differences between and within areas.

The SSC will critically review the "Sitka Plan.

5. Further refinement is needed in order to make the following sources of information fully meaningful:

- a. fish ticket (provide for multiple areas)
- b. log book
- c. statistical areas (re-defined)

6. Fin-clipped salmon must be landed with the head on to preserve the integrity of the tag recovery program.

7. The management and conservation of silver and chinook salmon should be coordinated between the Council and the ADF&G.

RFP's

1. Tag recovery...ADF&G should be notified that Council will terminate funding in 1980 and transfer costs

to other sources. It is not the Council intention to fund long-range programs.

2. There is a need for a herring and capelin study with reference to inshore stock studies. SSC will support an experimental design. The study should show how long it will last and periodic reports on progress should be made.

3. Reporting procedure.

#### DATA NEEDS

Frank

PAC Council

BERING SEA CLAM (Steve Hughes)

1. Environmental monitoring.

a. Interaction, other elements.

b. Impact on benthic communities

c. Community structure

#### RESOURCE DEVELOPMENT PLAN

1. Technically sound

1. Monitoring ADF&G/NMFS to collect biologicaly data.



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Northwest & Alaska Fisheries Center  
2725 Montlake Blvd. E.  
Seattle, Washington 98112

20/4

November 28, 1977

TO: *D. Lokken*, Chairman, North Pacific Fishery Management Council  
FROM: *Dayton L. Alverson*, Center Director, NWAFC

SUBJECT: Population estimate and ABC of C. bairdi from NMFS 1977 eastern Bering Sea trawl survey

The attached report is intended to clarify the confusion which has arisen over the estimates of standing stock and ABC for C. bairdi of the eastern Bering Sea from the 1977 NMFS trawl survey. Although the memorandum identifies the difficulties and their sources, it is an escapable fact that much of this confusion could have been avoided if the Center had imposed better quality control. We assume full responsibility for our failure to exercise better controls and apologize for the problems it has caused.

The following remedial actions will be necessary:

(1) We will improve our quality control by limiting the source of information from the Center on all matters related to the Council to a single source. All substantive information from the Center shall be transmitted to the Council only over my signature or by delegation of authority. Information on eastern Bering Sea crab will be considered for my approval only if approved by Dr. Frank Fukuhara and/or Dr. Murray L. Hayes.

(2) The Director of NMFS and the Regional Director, Alaska Region, should be informed of our errors and the latest revision. Mr. Schoning was informed by memorandum telecopied on November 23, 1977. The Regional Director was informed by telephone conversation on November 22, 1977, and subsequently by copy of the memorandum which was telecopied to Director Schoning.

(3) The erroneous estimate which appeared in the proceedings of the INPFC, King Crab and Tanner Crab Subcommittee report must be corrected. We will submit an errata to INPFC as soon as we confirm the accuracy of the estimate for king crab.

Lastly, although we have discussed the general contents of the attachment with you, by this memorandum and its attachment we notify the SSC and Council of the correction to our previous estimates for C. bairdi.

Attachment



A CLARIFICATION OF THE CURRENT STATUS OF  
C. BAIRDI STOCKS IN THE EASTERN BERING SEA:  
ABC ESTIMATES AND RECRUITMENT TRENDS<sup>1/</sup>

Prior to the 1977 trawl survey in the eastern Bering Sea, the estimate of ABC for C. bairdi was clearly understood. The stock of crabs appeared abundant, but a downward trend in recruitment was expected to make itself felt around 1980. As 1977 survey information became available, the status of the stock became less clear as conflicting estimates emerged. This led to the current state of confusion regarding the size of the stock, the associated ABC, and the predicted recruitment trend.

The intent of this report is to clear up the confusion regarding the status of the C. bairdi stock. The sequence of events leading up to the calculation of ABC will be laid out. In addition, recruitment prediction will be discussed in terms of methodology, assumptions required and implications for future harvests.

ABC Estimates

It is common knowledge to those involved in NPFMC deliberations on C. bairdi in the eastern Bering Sea that calculations of ABC have involved two components: stock size estimates of legal-sized crabs, and estimates of the optimum exploitation rate to be applied to that stock. These two components will be discussed in turn. However, most of the confusion surrounding ABC estimates has emanated from conflicting stock size estimates.

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<sup>1/</sup>Report prepared at Northwest & Alaska Fisheries Center, National Marine Fisheries Service, 2725 Montlake Blvd. E., Seattle, WA 98112.

## Stock Size Estimates

The 1976 NMFS survey provided stock size estimates first used for ABC calculations. In order to use the most current information for the Management Plan, final ABC estimation was postponed until results of the 1977 survey were in. The sequence of events is shown in Figure 1.

1976 Survey estimate.—In the early stages of development of the management plan, the estimate of 109 million crab (269 million pounds) for males greater than 140 mm (corresponds to 5.5 inches) was used for calculation of an ABC of 108 million pounds.

1977 Preliminary survey estimate.—Owing to the great interest in the stock size estimate from the 1977 survey, a preliminary estimate was released shortly after completion of the survey. This was a hand-calculated figure which did not represent the complete set of data for C. bairdi. From this figure, a downward trend of perhaps 30% (?) was indicated. With this preliminary information in hand, the Council gave direction to the Plan Development Team to discontinue use of the "economic density" argument, to set OY equal to ABC, and to limit the foreign fishery to 15,000 mt to be taken north of 58°N.

1977 Survey estimate.—This estimate became available after the September Council meeting but prior to the Plan Development Team meeting the following week. The estimate, 175 million crabs (422 million pounds), was much higher than the preliminary estimate indicated, and reversed the downward trend. By hindsight, it is now clear that in the face of the very large discrepancy between this estimate and that previously reviewed in public hearings and by the Council, the Team should have sought the advice of the Council. On its initiative, the Team calculated an approximate lower confidence limit on the estimate, resulting in a standing stock estimate for male C. bairdi greater than or equal to 135 mm of about 109 million crab (263 million pounds) and an ABC of about 105 million



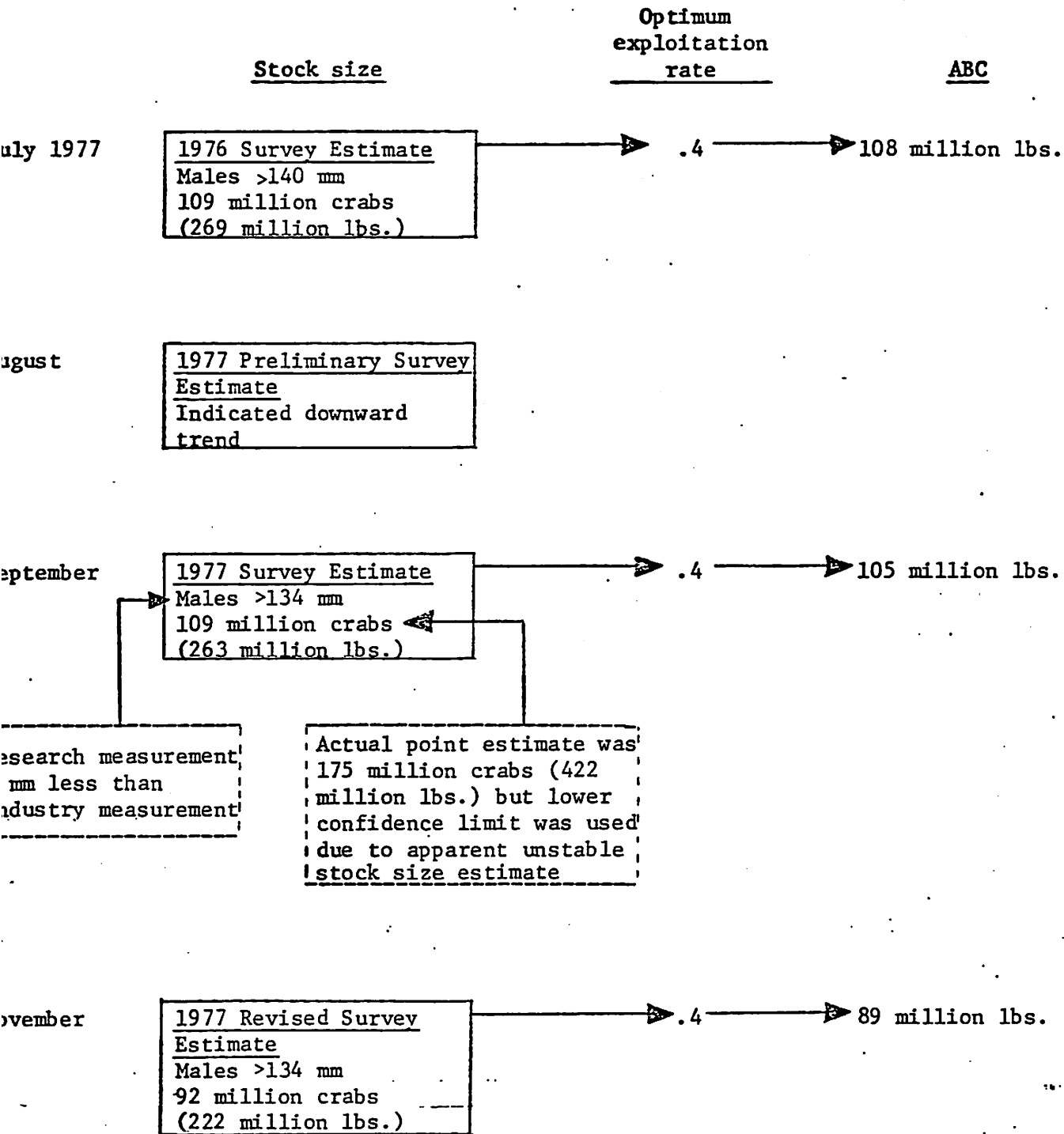


Figure 1.—*C. bairdi*, eastern Bering Sea. Sequence of events in estimates of stock size and ABC.

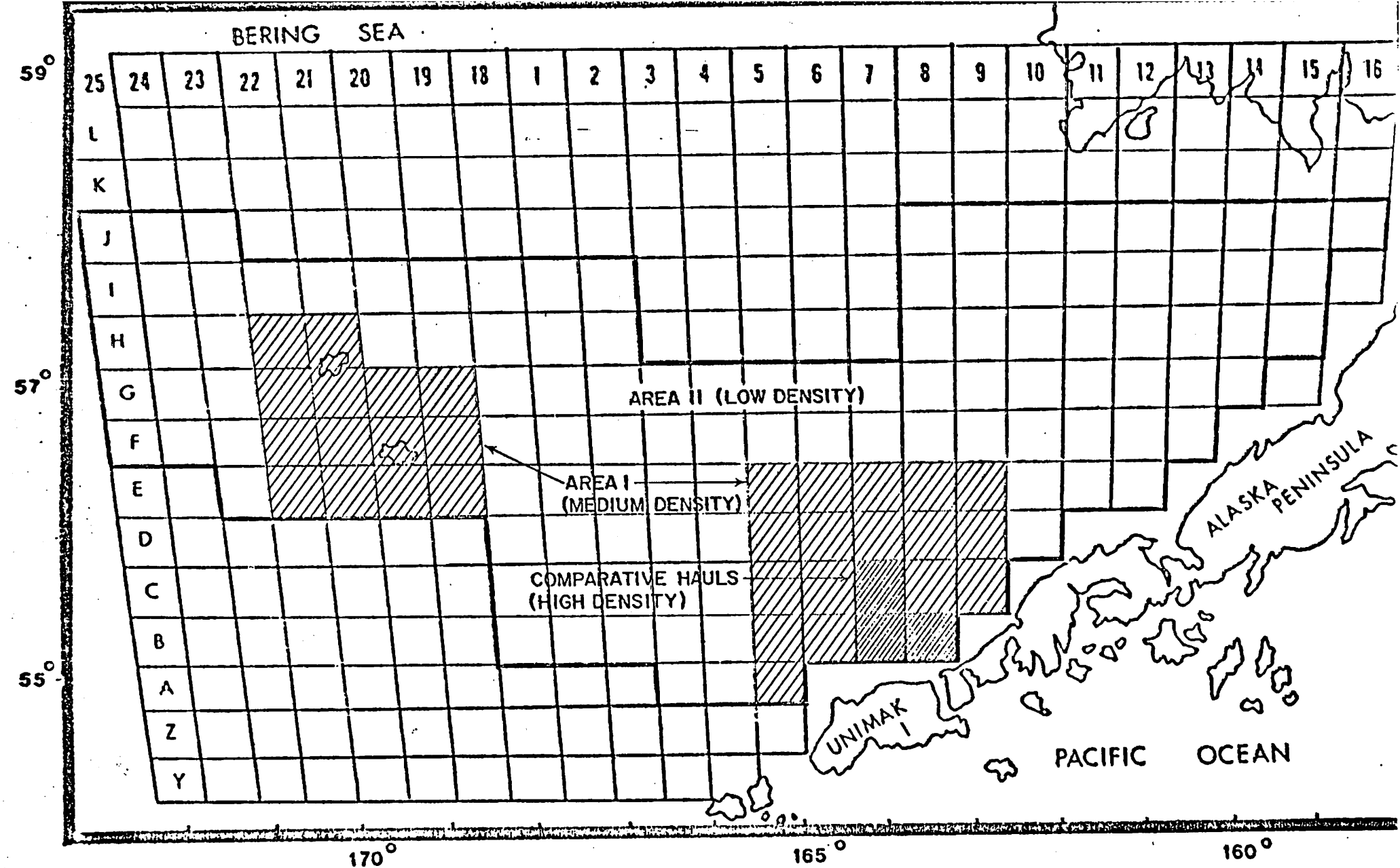


Figure 2.--*C. bairdi*, eastern Bering Sea. Relationship of comparative haul area to other haul areas for the 1977 NMFS survey.

pounds. This estimate is mentioned here only for the sake of completeness in discussing the sequence of events because its substantive impact was totally nullified by revised population estimates.

It should be noted that this estimate applies to male crabs greater than 134 mm, as opposed to the 1976 estimate which applied to crabs over 140 mm. This change was brought about when it was determined that the research carapace width measurement is, on the average, 5 mm less than the industry measurement, owing to different measuring devices. Thus, the estimated stock of crabs over 134 mm would be equivalent to the stock exploited under the minimum legal size regulation of 140 mm. This also necessitated the use of a somewhat lower average weight per crab of 2.41 pounds, rather than 2.47 pounds.

1977 Revised survey estimate.—In mid-November, an error was detected in the computer analysis of stock size which reduced the estimate by almost 50 percent. This miscalculation was due to excessive weight given to a small portion of the data by the computer program employed to estimate stock size. The effect of this error was to prorate very high catches from a set of comparative hauls, taken in a relatively small area north of Unimak Island, over a much wider area (Area I of Figure 2). The result was an inflated estimate of stock size. Correction of this error, by giving the comparative haul data its appropriate weight in the analysis, gives an estimate of 92 million crabs (222 million pounds), leading to an ABC of 89 million pounds.

### Optimum Exploitation Rate Estimates

The other component of the ABC estimate, the optimum exploitation rate, has been less subject to change (Figure 1). The estimate of .4 was originally derived from examination of the history of the king crab fishery in the eastern Bering Sea. This fishery has held up well under this average level of exploitation. There are certainly differences between king crab and Tanner crab. However, there is a lack of knowledge on the importance of these differences. Thus, it seemed reasonable to apply this fishing rate to the C. bairdi stock.

A yield-per-recruit analysis carried out earlier this year made use of information on biological parameters for C. bairdi as they were developed. This analysis provided an objective, although theoretical, value for optimum exploitation rate. The value corresponding to the 134 mm size limit (140 mm commercially) is .7. This is a high rate of fishing and probably not attainable under current conditions. Even if it were, there are other considerations which lead to the choice of a somewhat less objective but more conservative lower value.

The yield-per-recruit analysis assumes that recruitment is not affected by the exploitation rate prescribed. However, knowledge relating to the degree to which large male crabs contribute to the spawning stock is highly speculative. In addition, growth and mortality data used by the analysis are of a preliminary nature, and could affect the exploitation rate estimate. Further, it can be assumed that most fish stocks fluctuate. Shellfish stocks are known to be especially variable in their abundance from year to year, some even demonstrating cyclic fluctuations. Under these conditions, a high exploitation rate increases the chance that fishing will coincide with a down-trend in abundance, resulting in low future recruitment. It is clear that within the framework of the Y/R analysis, the choice of exploitation rate depends on the

assumptions that one is willing to make. However, taking the above considerations collectively, it seems prudent in the case of Tanner crab to opt for a value lower than the theoretical analysis indicates. Thus, the .4 figure, originally applied as a reasonable value based on the king crab fishery, also can be validly chosen from the yield-per-recruit analysis as a conservative starting point in management of the fishery. An additional factor leading to this choice is the projected future recruitment trend for C. bairdi.

#### Recruitment Trend

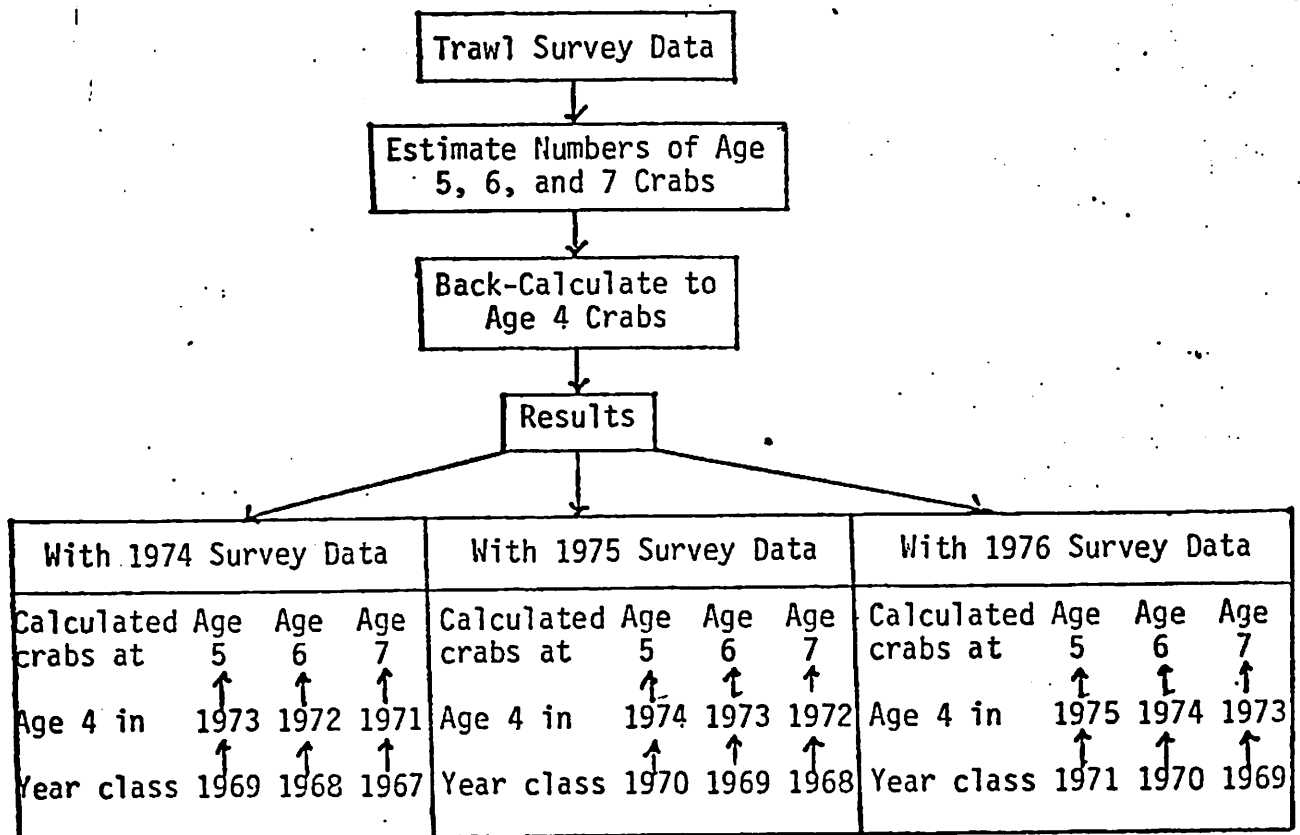
The estimation of recruitment for C. bairdi was previously reported in a Northwest and Alaska Fisheries Center processed report by Somerton and Low in April 1977. An oral presentation was presented by Dr. Alverson at the North Pacific Council Meeting in Anchorage in May. At that presentation, Dr. Alverson stressed that recruitment of C. bairdi into the fishery beginning in the early 1980's, will probably decline and continue to do so for a few years. In this section of the report, the basis for Dr. Alverson's presentation will be elaborated in more detail than reported in Somerton and Low (1977). In particular, the implication of assumptions that were made in the estimation will be elaborated and the relation of recruitment estimates to future harvests will be discussed.

#### Estimation Procedure

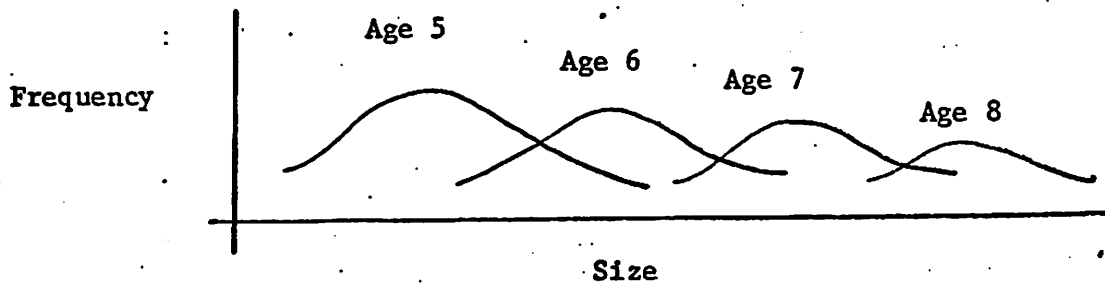
The data used for recruitment estimation are from NMFS trawl surveys in the eastern Bering Sea in 1974, 1975, and 1976. Data collected prior to 1974 are considered to be incompatible with data of later years for such estimation because of some differences in survey coverage and sampling technique. It was desirable to estimate age 4 crabs because the report of Somerton and Low (1977),

which was aimed at determination of minimum size regulation, incorporated yield-per-recruit analysis using age 4 as the age of recruitment (t). Therefore, the recruitment of age 4 crabs had to be estimated to determine potential equilibrium yield. An examination of carapace width frequency histograms of the data collected showed age 4 crabs were not sampled completely by the trawl gear. Since crabs above age 7 begin to enter the fishery, it was decided that crabs in three age groups (ages 5, 6, and 7) should be used to estimate the number of 4-year-old crabs. Once the number of crabs in ages 5, 6, and 7 are estimated, the number of age 4 crabs was back-calculated. The number of age 4 crabs was then taken as a standard measure of recruitment strength. It should be emphasized that this standard should be used as an index for long-term forecast. For a more useful correlation with year-to-year activities of the fishery, the number of crabs at an older age (perhaps age 8 or 9) should be used as another standard of recruitment since the fishery takes mostly age 11 and older crabs.

The flow diagram for estimating recruitment is given as follows:



To estimate the number of age 5, 6, and 7 crabs, an age-width key was derived using a growth simulation model with a total instantaneous mortality of 0.2 and with constant recruitment. In this manner, size frequency histograms by age which would occur under equilibrium conditions were generated which look roughly like this:



Thus in each size interval, the expected fraction of crabs in each age group can be calculated.

Next, by applying the age-width key with the histogram of population numbers by size groups generated from the Bering Sea trawl surveys for the years 1974-76, the number of age 5, 6, and 7 year-old crabs were estimated.

The number of age 4 crabs in each survey year was then back-calculated, assuming the crabs were subjected to a total mortality of 0.2. For example, in the 1974 survey year, age 5 crabs were age 4 in 1973 and the number of age 4 crabs was calculated from  $N_{73}^4 = N_{74}^5/e^{-Z}$ . From the same survey year, age 6 crabs were age 4 in 1972 and thus number of age 4 crabs was calculated from  $N_{72}^4 = N_{74}^6/e^{-2Z}$ . Similarly, age 4 crabs from 1971 were calculated from  $N_{71}^4 = N_{74}^7/e^{-3Z}$ .

In the same manner as described for the 1974 survey year, the number of age 4 male *C. bairdi* from different brood years was calculated from the 1975 and 1976 survey data. The results show that age 4 crabs from five different years (1971-76) could be calculated. These are shown below:

Year at Age 4	Millions of 4-year <sup>2</sup> old male <i>C. bairdi</i> during survey year			Mean
	1976	1975	1974	
1971	*	*	161.6	161.6
1972	*	130.1	136.6	133.4
1973	83.7	93.7	99.4	92.3
1974	58.0	45.5	*	51.8
1975	28.3	*	*	28.3

\* denotes no estimate

#### Precision of Recruitment Estimation

Referring to the previous table, only one estimate could be made for age 4 crabs in 1971. This number was calculated from the 1974 survey data. The number of age 4 crabs in 1972 was calculated from two data sources--the 1974 and 1975 survey data. The estimates (130.1 and 136.6 million) were remarkably close.

The number of age 4 crabs in 1973 was considered to be more reliably estimated since it was estimated from three data sources representing the 1974-1976 surveys. The estimates were 83.7, 93.7, and 99.4 million crabs.



The number of independent estimates made for crabs at age 4 in 1974 and 1975 were reduced respectively to two and one. One more estimate for each year, however, could be made when the 1977 data are analyzed. Therefore, their precision may be checked out with further trawl surveys.

### Implication of Assumptions used in the Estimation

There are several assumptions that were made in the above calculations which may be in error. The most important of these is that total instantaneous mortality is equal to .2 for 5, 6, and 7 year-old crabs. After the processed report came out, some further estimates of total mortality made came out to be closer to .25 or .27. Furthermore, if Tanner crab have a mortality schedule somewhat similar to king crab, then total mortality is expected to increase with age. The effect of using a mortality estimate which is too small can be seen in the table of population size at age 4 shown previously. For example, there are three estimates of the number of 4 year-olds in 1973. These are:

$$N_{73}^4 = \frac{N_{74}^5}{e^{-z}} \quad N_{73}^4 = \frac{N_{75}^6}{e^{-2z}} \quad N_{73}^4 = \frac{N_{76}^7}{e^{-3z}}$$

If  $z$  were underestimated then  $e^{-z}$  is too large, consequently the estimate of  $N_{73}$  becomes smaller with each succeeding year of survey data. This is exactly what the table shows for the estimates of  $N_{73}$  and  $N_{72}$ , although the trend is reversed for  $N_{74}$ . Thus the further back-calculations are made, the larger is the underestimate of population size. The effect of all this is some change in the estimates of population size presented in the table, however without rerunning the growth model and recalculating the table it is difficult to tell either the direction or magnitude of the changes. It is felt, however, that any changes to the table would not significantly alter the downward trend in population of 4-year-old crab.

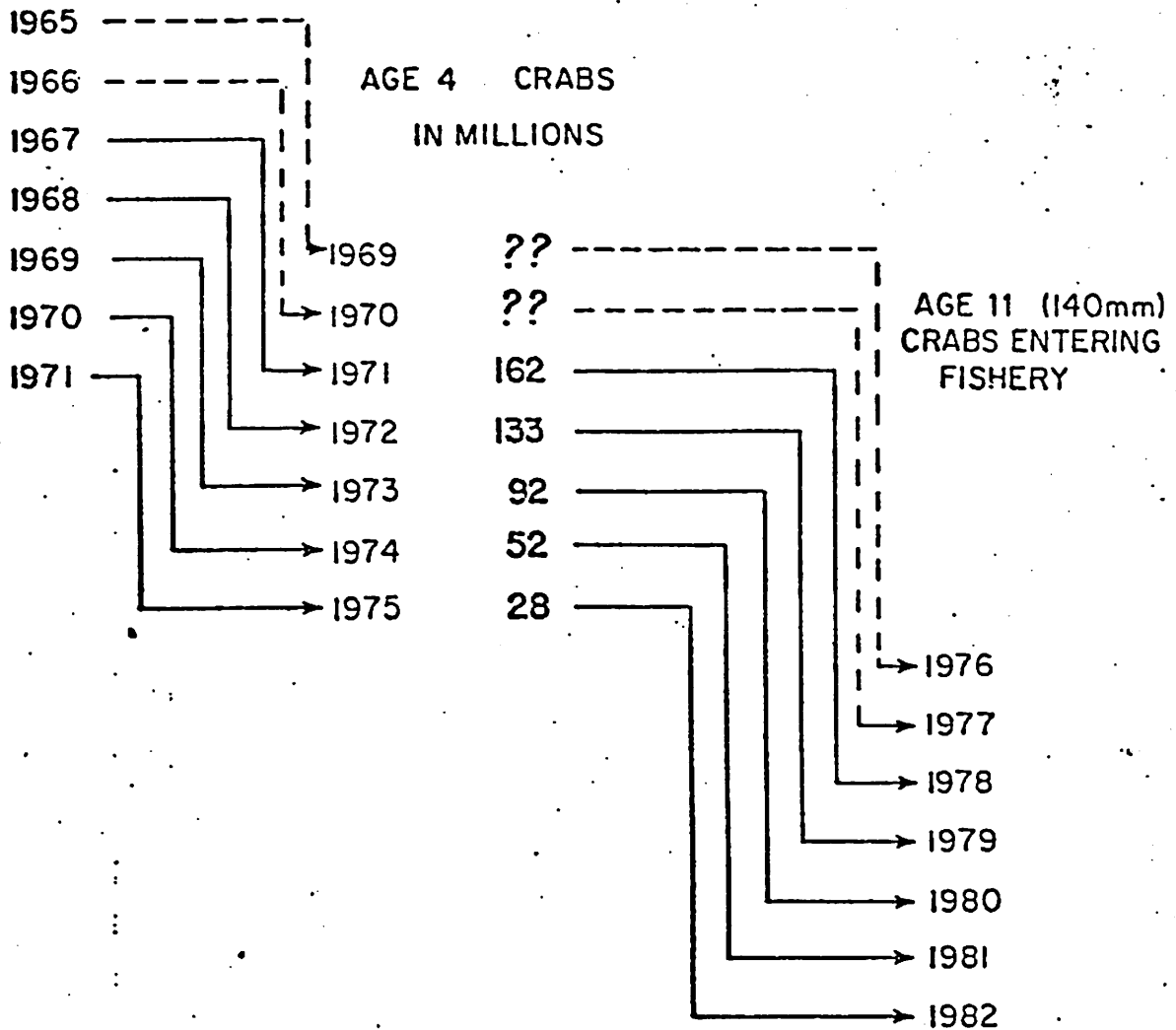
The second major assumption concerns the accuracy of the population estimates produced by the Bering Sea survey. It is known that Tanner crab have a patchy distribution, in particular they form "schools" composed of individuals with similar characteristics. Therefore, representing the population by occupying a small sampling area and expanding the catch from a single tow probably is, by itself, always misleading. If enough samples are taken, however, such a sampling design might not be too bad. It is believed that the main effect on the survey estimates of a population being distributed in patches (following a negative binomial distribution) rather than randomly is to cause population estimates to be more variable from year to year. This variability decreases with the number of samples, so the question is really whether enough samples are taken to adequately describe the population. The only information available in this regard is shown in the table of population estimates. The precision in the estimates of 4-year-old crab abundance based on successive independent cruises cannot be ignored. There is nothing in the way in which these estimates were calculated which would tend to reduce between-year variability in the data. Yet most of the estimates are within 10% of each other. This implies that the survey

population estimates probably represent the population accurately.

Implication of Recruitment Estimates

As previously noted, the number of age 4 male *C. bairdi* is taken as a standard of recruitment for long-term forecasting purposes. In fisheries, it is traditional to talk of year-class strengths and in this regard, age 4 crabs in 1971 came from the 1967 brood year. This is the 1967 year class. Similarly, one can talk of the 1967 through 1971 year classes as age 4 crabs that were estimated in 1971 through 1975. The diagram below shows the year classes and their potential entry into the fishery.

YEAR CLASS



The results indicate that year class strength has been declining steadily from 1967 through 1971 as depicted by the decline in millions of age 4 crabs as follows: 162 (1971), 133 (1972), 92 (1973), 52 (1974), and 28 (1975).

At present, the fishery depends mainly on crabs that are age 11 and older. Therefore, taking age 11 as the age of entry into the fishery, the 1967 year class will enter the fishery in 1978. It is noted here that the 1965 and 1966 year classes which entered the fishery in 1976 and 1977 could not be calculated.

As the 1967 through 1971 year classes enter the fishery, they will diminish in size, and therefore the fishery can expect some decline in recruitment into the fishery beginning in 1978 and going through 1982. Accordingly, a reduced harvest can be anticipated, perhaps in the early 1980's. Preliminary analysis of the 1977 trawl survey data indicates that a downward trend in recruitment still exists. Detailed analyses of these data are continuing.

#### Summation

In summary, in spite of a series of conflicting and confusing estimates of stock size for C. bairdi which tended to obscure the situation, the 1977 revised estimate of 92 million male crabs larger than 134 mm (222 million pounds) is firm, is more in line with the 1976 estimate of stock size, and forms the basis of the ABC estimate. The optimum exploitation rate is conservatively taken to be .4, toward the lower end of possible values. From this, the ABC of C. bairdi in the eastern Bering Sea is estimated to be 89 million pounds for the 1978 fishery. Further, the long-range recruitment trend remains down. However, final analysis of the 1977 survey information regarding recruitment is not complete.

Gulf States Marine Fisheries Commission

MEMBER STATES  
ALABAMA  
FLORIDA  
LOUISIANA  
MISSISSIPPI  
TEXAS



P.O. BOX 719  
OCEAN SPRINGS, FL  
32054  
(904) 763-2111  
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September 13, 1977

SEP 1 1977

ROUTING

Mr. William H. Stevenson  
Regional Director  
Southeast Region NMFS/NOAA  
Deval Bldg. - 9450 Gandy Blvd.  
St. Petersburg, FL 33702

*[Handwritten initials]*  
*[Handwritten initials]*  
P.F.

Dear Bill:

Reference is made to my verbal request concerning additional funding for support as a result of service on the Fishery Council. As you know, my first suggestion was to find a graduate student who could assist me here and who could also be trained for the possibility of assuming my position in the not too distant future. This did not present a very happy arrangement, but under the conditions, namely \$10,000 per year, that is the best that I can do.

You will recall that we discussed the possibility of this Commission acting as the liaison for the enforcement work of the states to be performed in connection with Public Law 94-285 and those activities connected with operation of the SFTM Board. Should this develop into a reality we would need an additional \$10,000 to pay for a full time assistant and for the necessary travel expenses incurred in performance of these duties.

This would bring total Council support to \$20,000. An estimate of how this money will be spent is as follows:

Salary of Assistant	\$15,000.00
Administrative Costs	2,000.00
Rent	1,200.00
Travel	800.00
Supplies/Telephone & other misc. expenses	1,000.00
<b>TOTAL</b>	<b>\$20,000.00</b>

I shall be interested in your reaction to this proposal.

Very truly yours,

*[Handwritten signature]*  
Charles H. Lyles