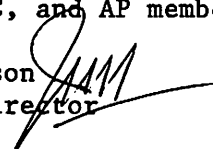


M E M O R A N D U M

TO: Council, SSC, and AP members
FROM: Jim H. Branson 
Executive Director
DATE: March 8, 1985
SUBJECT: King Crab FMP

ACTION REQUIRED

- (1) Status of FMP.
- (2) Review proposals.
- (3) Review Board actions.
- (4) Public testimony/review Seattle hearing.
- (5) Approve regulatory changes.
- (6) Review foreign prohibited species catches.

BACKGROUND

1. Status of FMP

The Bering Sea/Aleutian Islands King Crab FMP was approved with final implementing regulations on December 2, 1984. However, no fishery regulations have been approved yet, and NMFS is preparing to review all existing state regulations including any changes approved this month. An RIR, draft proposed regulations, etc. will be prepared by the Region and actual fishing regulations and delegation to the State should be in place for 1986.

The most recent status of stock information from NMFS and ADF&G surveys was presented to the Council at the September 1984 meeting. Catch statistics for king and Tanner crab fisheries can be found under the ADF&G Domestic Fisheries Report (agenda item B-2).

2. Review proposals

Council staff have reviewed and summarized all king crab management proposals submitted to the Board for the 1985-86 season [item D-2(a)]. The actual proposals are attached to the end of that summary. Only one king crab proposal (#89, check out requirements) would require FMP amendment.

3. Review Board actions

Staff will present an oral summary of Board actions on king crab proposals.

4. Public testimony/Seattle hearing summary

The Council and Board of Fisheries held their annual Washington king crab hearing on March 2 at the NWAFC in Seattle. Only two people signed up to testify, but others in the audience participated in discussions. A summary of the testimony and discussion is included as item D-2(c).

5. Approve regulatory changes.

As noted in the proposal summary [item D-2(a)] only one proposal would require FMP amendment. Because management authority will be delegated to the State, this is the only proposal which would require Council approval.

6. Review Prohibited Species Catches (PSC)

We received a letter from Bob McVey [item D-2(d)] regarding the high Soviet bycatch of king crab in their yellowfin sole fishery. The Soviet PSC limit is approximately 6,600 king crab for 1985 but they took 48,000-51,000 crab before they reached their yellowfin sole quotas and left the FCZ. Apparently the crabs were taken during a very short period and by the time the observer reports were processed it was too late. These high catch rates are very unusual and unexpected.

The total foreign PSC limit for all nations for 1985 will be approximately 675,000 king crab, and the 50,000 taken by the Soviets represents about 7% of the total PSC limit. However, the Soviets have exceeded their annual PSC limit and may be prevented from further fishing in 1985.

NMFS will provide more details of the situation at this meeting.

COUNCIL STAFF REVIEW OF KING CRAB PROPOSALS

Action
Required
Rule-related
notice

I. Seasons

Change the season dates as follows

<u>Area</u>	<u>Proposed Opening Date</u>	<u>Current Opening Date</u>
Eastern Aleutians/ Dutch Harbor (O)	Nov. 1	Nov. 10
Western Aleutians/ Adak	Nov. 1 (thru Aug. 15 for brown crab)	Nov. 10 (thru Apr. 15 for brown crab)
Bristol Bay (T)	Sept. 25	Oct. 1
Pribilofs (Q)	Sept. 25	Oct. 1
St. Matthew (Q)	Sept. 1	Sept. 1
Norton Sound (Q)	Aug. 1 Nov. 15-May 15	Aug. 1 Jan. 1-Apr. 30
St. Lawrence (Q)	Aug. 1	Aug. 1

These proposals maintain the coordinated seasons approach but would move the opening dates of some districts to an earlier date. With the low abundance of crabs the seasons are expected to be short and the fleet will face periods of inactivity between seasons. The proposed opening dates would reduce this lag time.

The proposal to extend the Adak brown king crab season to August 15 instead of April 15 is intended to allow exploration of new areas and to fish in better weather.

The Norton Sound proposal would allow commercial fishermen greater opportunity to fish through the ice.

Rule-related
notice

II. Area Registration

Classify the brown king crab fishery in the Dutch Harbor area (O) as non-exclusive.

Current exclusive area registration regulations prevent fishermen participating in the Bristol Bay red king crab fishery if they participated earlier in the Dutch Harbor brown king crab fishery. This proposal would allow fishermen to fish both.

Rule-related
notice

III. Size Limits

Reduce the Adak area minimum size limit for brown king crab from 6½" to 6".

The 6½" minimum size limit for Adak brown crab is the largest for any management area under the FMP's jurisdiction. The reduction to 6" would make it the same as for the Dutch Harbor area (O).

Rule-related
notice

IV. Bait-up Period

Provide that vessels participating in the Bristol Bay area (T) and Bering Sea area (Q) king crab fisheries will be allowed a 5-day bait-up period. Tank inspections 24 hours before the season opening date would be required.

Rule-related
notice

V. Temporary Pot Storage

Allow 7-day pot storage after the closure of districts in the Bering Sea (Area Q) excluding Norton Sound.

Currently when a district closes pots may be left on the grounds only 72 hours. Due to the distances from processing plants and pot storage areas it is physically impossible for fishermen to both unload their catches and remove their pots within the 72-hour limit.

May require
plan amendment.

IV. Check-out Requirements

Require vessels registered in Areas Q and T which land king crab at King Cove to check out by radio with ADF&G before leaving those statistical areas.

Currently there is no king crab season in the South Peninsula and no ADF&G representative in King Cove. Therefore, it is important to notify the Dept. of deliveries outside of the management area.

SUMMARY OF TESTIMONY
Seattle Shellfish Hearing
March 2, 1985

Council Members Present

Gene Didonato
Bob McVey
John Peterson
Rudy Petersen
Jeff Stephan

Board Members Present

John Garner, Hearing Chairman

Council Staff

Jim Glock
Judy Willoughby

Barry Collier, representing North Pacific Fishing Vessel Owners Assn. (NPFVOA), felt that in light of the sparse attendance and budget cuts the Board and Council should consider making the Seattle hearing optional in future years. If few controversial issues are to be discussed, the hearing may not be necessary. However, he stressed that NPFVOA feels very strongly that the Board and Council should hold their deliberations together.

NPFVOA submitted five king crab proposals in 1985 (#32-85, 87). These address minor season changes, rescinding the exclusive registration area status for Dutch Harbor brown king crab, reduction of the Adak brown king crab size limit, and a 5-day bait-up period in the Bristol Bay and Bering Sea areas.

Mr. Collier could support proposal 110 regarding domestic observers and inspection of catcher/processors but said it should apply to all domestic vessels. These issues must be resolved before NPFVOA can support the proposal:

- (1) Liability: a disclaimer of liability in case of observer injury or death must be established.
- (2) Cost: Management agencies should absorb the cost of observers.
- (3) Observers should not have enforcement duties or powers.

Bob Alverson, representing the Alaska Marketing Association, supported the bait-up period for the St. Matthew district of the Bering Sea. He stated that skippers of small vessels feel compelled to carry the maximum number of pots possible in order to compete for the limited resource. This has led to safety problems and has thus contributed to higher insurance rates.

Mr. Alverson said that all tank boats (i.e., those with holds for keeping crabs alive) are in favor of some type of observer program for longliners, trawlers and pot vessels. He noted that since all crab are brought to port in live, whole condition, potentially every crab can be measured which would be a primary duty of an on-board observer.

Richard White, of Universal Seafoods, invited observers aboard his floating processors. Catcher/processors may not have adequate bunk space, however. He would like to see the details of the observer proposal.

He also mentioned that, with respect to the Adak brown crab size limit, larger crab sell much better than smaller crab.

Bob McVey discussed the incidental king crab catch in the Soviet yellowfin sole fishery. Soviet vessels took approximately 48,000-51,000 king crab, greatly exceeding their 6,000 prohibited species catch (PSC) limit. This was discussed at length by the Council and audience.

Bart Eaton stated that incidental catches can best be controlled through time/area closures.

The concern over the lack of a joint Board/Council shellfish meeting was also discussed by Council members and the audience, and John Garner said the Board intends to meet jointly with the Council in the future.

ALASKA BOARD OF FISHERIES
DECISIONS REGARDING
MANAGEMENT OF DOMESTIC KING CRAB FISHERIES
IN THE BERING SEA/ALEUTIAN ISLANDS AREA (OFF ALASKA)
MARCH 1985

During its March 1981 meeting, the Alaska Board of Fisheries developed the Joint Statement of Principles on the Management of Domestic King Crab Fisheries and the Bering Sea/Aleutian Islands (BS/AI) King Crab Fishery Management Framework. These documents, which were prepared in cooperation with the North Pacific Fishery Management Council, clearly define the roles of both entities in the management of the domestic king crab fishery in the BS/AI area. The Board and Council formally adopted the Joint Statement of Principles in October 1981 as an interim measure until formal implementation of the framework plan by the Secretary of Commerce.

In conformance with the above mentioned documents and recognizing its responsibility for management of the domestic king crab fisheries in the BS/AI area, the Board received public testimony and reviewed staff reports and recommendations by Alaska Department of Fish and Game (ADF&G), Alaska Department of Public Safety (ADPS), Alaska Department of Law (ADL), National Marine Fisheries Service (NMFS), and the North Pacific Fishery Management Council. During its March 1985 meeting the Board discussed at length the issues related to regulations managing these fisheries. Unfortunately, due primarily to budgetary and scheduling problems the Board was unable to meet with the Council for shellfish discussions. The Board did participate in a Joint Board/Council public hearing on March 2 in Seattle. The decision of the Board are presented in summary in this report. Further detail is available on the tape record of the Board meeting.

The Fishery

In the last five years, the Alaska king crab fishery has experienced both record high and record low harvests. Last fall, former major king crab production areas, such as Bristol Bay and Dutch Harbor were opened to limited commercial harvests or not opened at all because of extremely low stock abundances. The resulting reduced crab harvest has had a major impact on all sectors of the industry and upon the communities which rely heavily on

successful crab fisheries. Large fleets and increased effort in the few remaining crab fisheries have put additional pressure on the target fishery and increased the management risks of conducting fisheries at low stock levels. As recently as the 1980-81 season, king crab harvests in the BS/AI area peaked at 164 million pounds. During the 1984-85 season, harvests declined to about 12 million pounds. Additionally, there has been a significant shift of catch composition. In previous years, the predominant harvest was red king crab; in recent years, the harvest is composed of mostly blue and brown king crab. The low harvests have been the result of reduced population levels which, generally, have experienced successive years of poor or failed recruitment. In the near term, further declines in harvest are expected. Harvests over the long term are uncertain.

The reasons for crab stock declines are not well understood. In recent years, environmental conditions have changed, including documented increases in ocean temperatures. The observed temperature changes are within the known temperature regime which king crab live. Predator populations have increased and several diseases have been identified. However, dramatic increases in research over a significant time period would be necessary to quantify any of the above factors. If the funds are committed for these types of basic research programs, then in the future it may be possible to better anticipate population changes. Advance warning would allow for better management and industrial planning to respond to these changes.

On a more promising note, management may be able to respond to other causitive factors which are assumed to contribute to stock declines. Establishing minimum spawning population requirements and limiting incidental harvests of crab in other fisheries, will likely improve stock rebuilding potential. Many of these factors are not fully understood and will require additional research. It is known, for instance, that female stock levels in several fisheries, where abundance estimates are made for females, have shown dramatic declines which parallel declines observed in the male portion of the stock. Commercial fishing undoubtedly has had an effect on reducing the legal male portion of the stock, but what is less understood is the effect of other factors, such as handling, on the female and prerecruit components of the

stocks. The evidence is circumstantial, but these effects may be great. We know that in the Bering Sea Tanner crab fishery, 1.6 king crab are also captured and subsequently discarded for every legal male Tanner crab captured. We also know that large numbers of crab of various sizes and both sexes are being routinely harvested in the demersal groundfish fisheries. These fisheries undoubtedly have some effect, however, the data necessary to quantify these effects are poor or non-existent in the domestic groundfish fisheries. Information for the joint ventures and foreign groundfish fisheries are more complete and rates of observer coverage are improving.

Seasons

After hearing considerable public testimony and staff comment regarding appropriate season openings, the Board adopted the following opening dates:

	<u>Adopted</u>	<u>Was</u>
Norton Sound (Q)	Aug. 1 and Jan. 1	(Aug. 1 and Jan. 1)
St. Lawrence (Q)	Aug. 1	(Sept. 1)
St. Matthew (Q)	Sept. 1	(Sept. 1)
Pribilof (Q)	Sept. 25	(Oct. 1)
Bristol Bay (T)	Sept. 25 - red and blue	(Oct. 1)
Adak (R)	Nov. 1	(Nov. 10)
Dutch Harbor	Nov. 1 - red and blue	(Nov. 10)

The opening dates were recommended by a working group of industry representatives. These dates are identical to the 1984 season except for earlier openings in Bristol Bay, Pribilofs, Dutch Harbor and Adak management areas. The primary reasons provided in support of the earlier openings of Bristol Bay and Pribilof was to reduce the lag time between the end of the St. Matthew fishery and the beginning of the other king crab fisheries. The Dutch Harbor and Adak opening dates were set earlier by 10 days to provide more fishing time prior to the winter and holiday season. None of the season adjustments conflict with the recognized biological seasons and therefore fall within the framework.

Area Registration

The Board adopted a proposal to classify the brown king crab fishery in the Dutch Harbor as non-exclusive. Exclusive registration for Dutch Harbor and Bristol Bay was initiated prior to the experimental brown crab fisheries in these areas and needlessly prevented fishermen from fishing brown king crab in both the areas. Seasons currently separate the red and brown king crab fisheries in the BS/AI and at present the red king crab fishery in the Dutch Harbor area is closed in order to rebuild the stocks. Adoption of this proposal will allow fishermen to fish in both areas.

Size Limits

The existing 6½" minimum size limit for brown king crab in the Adak management area is the largest for any brown king crab fishery under the FMP. This size limit was based on biological information on red king crab and was universal throughout the BS/AI at one time. As scientific information on brown king crab in other areas was collected, analysis showed that a lowering of the size limit to 6" was possible while still maintaining the reproductive potential of the stocks. By 1984, the brown king crab size limit was subsequently lowered to 6" in all areas but Adak, where information had yet to be collected. Little information exists for the Adak brown king crab stocks. ADF&G staff reported that there is now some limited information which supports the proposed decrease in that size limit. Additionally, they indicated that the Adak brown king crab stocks are probably biologically similar to brown king crab found in the Dutch Harbor area. Therefore, the Board felt a lowering of the brown king crab size limit to 6" was appropriate.

Bait-up Period

The Board rejected a proposal to establish a 5-day bait-up period prior to the opening of the king crab fisheries in Bristol Bay and the Bering Sea. The primary reason for this decision was the concern that given the very low harvests estimated for some of these areas, the optimum yield could be harvested during the bait-up period (i.e. one pull of gear). Catch data would

not be available until after the opening at which time the OY might be exceeded. In addition, the Board was concerned about use of the 5-day bait-up period to explore for prime crab areas.

Pot Storage

The Board adopted a proposal to allow pot storage on the grounds for seven days following a season closure of the Bering Sea (excluding Norton Sound) since the distances from processing plants and pot storage areas make it extremely difficult for fishermen to both unload their catches and remove their pots within the current 72-hour regulation.

Check-out Requirements

No action was taken on a proposal to require king crab vessels registered for the Bristol Bay or Bering Sea areas to check out of the areas by radio to ADF&G before landing their catch at King Cove. The ADF&G staff advised the Board that no regulation is necessary since the state can advise vessels by news releases to check out.

J

EXPECTED STOCK STATUS AND CATCH
FOR BRISTOL BAY RED KING CRAB

In 1985

by

J. E. Reeves

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March 1985

Expected Stock Status and Catch
for Bristol Bay Red King Crab in 1985

INTRODUCTION

Preliminary estimates of acceptable biological catch presented in this report are based on the procedure specified in the NPFMC Fisheries Management Plan for king crab in the Bristol Bay management area. The procedure calls for establishing the minimum female spawning stock required for maximizing future recruitment, and then determining the catches that can be taken without impacting the spawning stock. In the following sections, the details of these two components are discussed as they pertain to the 1985 season. The expected catch range given here should be considered tentative, and will be finalized when data from the 1985 NMFS trawl survey are analyzed.

STATUS OF THE FEMALE SPAWNING STOCK

Spawner-recruit data through 1984 for the Bristol Bay red king crab stock is shown in Figure 1. Analysis of the data indicates that the likelihood of strong future male recruitment is highest if fertilized female abundance is in the 24-47 million crab range. This range is shown as the shaded region of spawner abundances in Figure 1. Details of the analysis are given in Appendix 1.

In recent years, the Bristol Bay female stock has declined rapidly because of high mortality. However, the 1984 NMFS trawl survey indicates some improvement in the stock, with abundance of fertilized females at 18 million compared to 10 million in 1983. This improving trend is the result of lower natural mortality between 1983 and 1984. The abundance of immature females appears to be increasing and if mortality remains lower, it is probable that the female spawning stock will move into the threshold range of 24-47

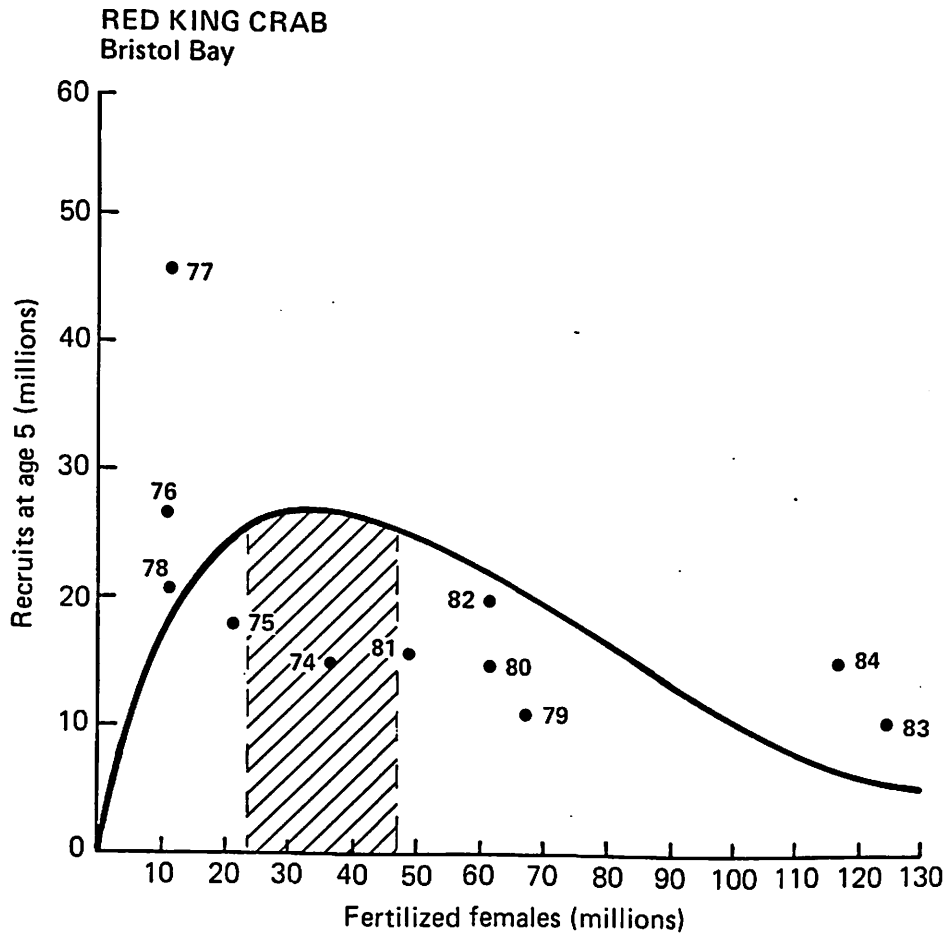


Figure 1.--Spawner-recruit relationship for Bristol Bay red king crab. Each point is designated by the year of the recruitment estimate.

million in 1985 and remain there during the 1986 mating season. If mortalities increase, however, then it is likely that spawning stock abundance will fall short of the threshold region. These possible outcomes are summarized in Table 1. A range of 31-40 million females is expected in 1985, and 24-37 million in 1986. If mortality is high as was the case during the 1980-83 period, then we will expect abundance at the lower end of this range; if mortality remains around the 1983-84 level, we will expect to be at the upper end of the range. Details of the predictive model are given in Appendix 2.

Table 1.--Predicted abundance of fertilized females on the mating grounds in 1985 and 1986.

Females	Survey Estimate	Instantaneous Natural		Model Predictions	
	1984 (millions of crabs)	Mortality Rate 1980-83	Mortality Rate 1983-84	(millions of crabs) 1985	1986
Mature, >89 mm ($F_{i,j}$)	17.5	1.5	1.0	31-40	24-37
Pre-recruit ones, 75-89 mm ($F_{i,j-1}$)	43.0	.7	.4	33 ⁽¹⁾	
Pre-recruit twos, 55-74 mm ($F_{i,j-2}$)	14.6				

1) Regression estimate: $a = 4.71$, $b = .0502$, $R^2 = .90$, $n = 11$

POSSIBLE CATCHES FOR 1985

The catch for the 1985 season is expected to be in the range of 2-7 million pounds. Mortality of males showed improvement in 1984 as it did with females, especially for the older sublegal crabs (Table 2). Since recruitment into the legal size range is not expected to improve much in 1985, the actual catch will depend on the level of mortality between 1984 and 1985. If mortality remains lower as it did in 1983-84, then we can expect a somewhat improved legal stock. If mortality is also lower for females, then we can expect the catch to be toward the upper end of the range. If mortalities increase again, the catch will be at the low end of the range. A summarization of possible catches is shown in Table 3.

Table 2.--Annual percent mortality for sub-legal male red king crabs.

<u>Male age groups</u>	<u>1980-83 period</u>	<u>1983-84 period</u>
5 to 6	48	38
6 to 7	34	28
7 to 8	52	29
8 to 9	67	45

Table 3.--Possible 1985 catches of male red king crab 6.5" and greater by exploitation rate and natural mortality schedule.

Mortality	<u>Millions of Pounds by Exploitation Rate:</u>		
	<u>.2</u>	<u>.3</u>	<u>.4</u>
1983-84	4	6	7
1980-83	2	4	6(1)

(1) If the female stock is below the threshold region (shaded region of Figure 1), the exploitation rate will not exceed .35.

APPENDIX 1

Estimation of Spawner-Recruit Parameters

The model,

$$R_i + 6 = aS_i e^{-bS_i}$$

is used to estimate S_m , the abundance of female spawners producing maximum future recruitment of 5-year-old males, as follows:

$$S_m = b^{-1}$$

The approximate variance estimate

$$\text{Var}(b^{-1}) \approx \frac{\text{Var}(b)}{b^4}$$

is used to construct 95% confidence intervals on S_m .
Data through 1984 (Appendix Table 1) yield the following estimates:

$$a = 2.113$$

$$b^{-1} = 35.5$$

$$b = .0282$$

$$\text{Var}(b) = .00002$$

$$R^2 = .81$$

$$95\% \text{ CI}(b^{-1}) = (24.2, 46.8)$$

Appendix Table 1.--Data for NMFS surveys used to estimate spawner-recruit parameters.

Year	Fertilized Females (millions)	Year	Resulting 5-yr-old Males (millions)
68	37	74	15
69	21	75	18
70	11	76	27
71	11 ⁽¹⁾	77	46
72	11	78	21
73	67	79	11
74	61	80	15
75	49	81	17
76	61	82	20
77	126	83	11
78	117	84	16
79	122		
80	68		
81	67		
82	18 ⁽²⁾		
83	10		
84	18		

(¹) Estimated from values for adjacent years 1970 and 1972.

(²) Calculated based on 54 million mature females that had reduced or no egg clutches.

APPENDIX 2

Estimation of Mature Females on the Mating Grounds in Year $i + 2$

The model,

$$F_{i+2,j} = F_{i+1,j} e^{-M1} + F_{i+1,j-1} e^{-M2}, \quad \text{where}$$

$$F_{i+1,j} = F_{i,j} e^{-.75M1} + F_{i,j-1} e^{-.75M2} \quad \text{and}$$

$$F_{i+1,j-1} = a F_{i,j-2} e^{-b (F_{i,j-2})}$$

is defined as follows:

$F_{i,j}$ = estimated numbers of mature females from the i th survey.

$F_{i,j-1}$ = estimated numbers of pre-recruit one immature females from the i th survey.

$F_{i,j-2}$ = estimated numbers of pre-recruit two immature females from the i th survey.

$F_{i+1,j}$ = predicted numbers of mature females on mating grounds in year $i+1$.

$F_{i+1,j-1}$ = predicted numbers of pre-recruit one immature females in year $i+1$.

F

$i+2, j$ = predicted numbers of mature females on mating grounds in year $i+2$.

M1 = instantaneous annual natural mortality for mature females.

M2 = instantaneous annual natural mortality for pre-recruit one immature females.

a, b = regression parameter estimates

j denotes mature females, >89 mm

$j-1$ denotes prerecruit one females, 75-89 mm

$j-2$ denotes prerecruit two females, 55-74 mm

and was used to estimate the numbers of mature females on the mating grounds in 1986 as a range from 23.5 to 37.1 million, based on the above range of mortality estimates.