# A BIOLOGICAL ASSESSMENT OF THE MINIMUM SIZE LIMIT

FOR BRISTOL BAY RED KING CRAB

by

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#### ABSTRACT

The current 6.5-inch carapace width minimum size limit for male red king crab is evaluated from yield-per-recruit and reproductive aspects. Recent increases in natural mortality indicate that significantly lower minimum size limits would be required to increase yield per recruitment. Effects of lower minimum size limits on stock reproduction are examined by 1) evaluating relationships between female clutch size and the sex and size ratios of the reproductive stock, and (2) a simulation of the 1986 Bristol Bay fishery which varies the minimum size limit and handling mortality on sublegal males. Results indicate that size limits down to 5 inches are not likely to adversely impact population egg production through sex ratio alterationsor through changes in the size of mating males relative to females. As the size limit was lowered, the catch increased and the average size of crabs in the catch decreased. Any handling mortality was converted to catch as the size limit was lowered. The effect of handling mortality on the female stock was not addressed, but distributional differences between males and females indicate that area regulation of the fishery may be effective in minimizing impacts on the **reproductive** stock when it is at low abundance.

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# INTRODUCTION

The most recent assessment of the appropriate minimum size limit for the harvest of Alaskan red king crab (Paralithodes camtschatica) is presented in Alverson (1980). That study indicated that a minimum size limit in the range of 5.5-6.0 inches carapace width was more appropriate than the 6.5-inch limit in effect at that time for the commercial fishery. This conclusion was based on yield-per-recruit analyses using growth and natural mortality parameters available at the time. Subsequent to that study, the status of the Bristol Bay stock has changed dramatically. Mortality has increased substantially (Fig. 11, bringing about a precipitous decline in the stock to an historic low point. As mortality is a key variable in yield-per-recruit studies, a re-evaluation is in order to determine the effect of increased mortality on the assessment of the size limit. Further, since yield-per-recruit analysis does not address the question of impacts on stock reproduction, and since the reproductive stock is at a low level, the effects of changes in the minimum size limit in the commercial fishery on reproduction must be examined. This study re-examines the yield-per-recruit basis for minimum size limits for Bristol Bay red king crab and assesses the impact of size limit variation on stock reproduction.

## YIELD PER RECRUIT

The yield to be harvested from a year class of crabs as it passes through the population, which is composed of this and other year classes, is dependent on the biomass of that year class at any given point in time. Yield occurs when the year class recruits to the fishable part of the population at some particular size limit, and exploitation is applied to the fishable stock. As

a year class ages, its members diminish in numbers due to mortality but the survivors grow in size. This interaction of growth and mortality results in a peak biomass of the year class at some point intermediate in its lifespan. If mortality is higher than growth, the biomass peak will occur earlier in the lifespan. Conversely, if growth exceeds mortality the peak will occur later in the lifespan. The maximum yield per recruitment occurs if exploitation can be applied rapidly at the age (or size) of peak biomass. This situation occurs infrequently because of economic constraints or due to the reproductive requirements of the stock. At lower exploitation rates, the maximum yield for a given rate occurs at a size less than the size at peak biomass for a year class. This is because fishing is applied more slowly and more crabs will die from natural mortality before they are caught. However, under yield-per-recruit theory, for any given rate of exploitation there is a minimum size limit that will provide the maximum yield from a year class. Thus, yield-per-recruit analysis provides a framework for choosing the appropriate size limit.

Under the 6.5-inch size limit regulation for Bristol Bay, red king crab males become subject to commercial exploitation at approximately 8 or 9 years of age. Evaluation of approximate age composition data from annual National Marine Fisheries Service surveys since 1968 (Appendix Table 11, using growth estimates of Balsiger (1974), provided estimates of mortality for Ages 4-9 which are for the most part free of fishing mortality (Appendix Table 2). Age j- and year i-specific mortality estimates were derived using

$$Z = -\ln \left( \begin{array}{c} N(i+1,j+1) \\ ----- \end{array} \right) .$$
(1)  
N(i,j)

Calculated average mortality over age is shown for the years 1970 to 1986 in Figure 1, where an increasing trend is noted through 1985. Mortalities

occurring in the 1980s are substantially higher than those during the 1970s. Mortality for Ages 4-8 was around .4 for the 1970-80 period, and about .7 for the 1981-86 period, exhibiting a 75% increase. Natural mortality for ages greater than 8 years was set at .6 based on estimates in Alverson (1980), although preliminary analysis of survey and fishery information suggests that mortality for these age groups may have increased as well since 1980. This mortality data, and weight-at-age data from Alverson (1980), are used in the current yield-per-recruit analysis and are shown in Table 1. Yield calculations were done using the Ricker equilibrium yield per recruitment model as

described by Paulik and Hayliff (1967).

Biomass distribution curves resulting from the interaction of growth and mortality estimates from Table 1 are depicted in Figure 2. Biomass peaks at Age 6 for the population during the 1970-80 period, and at an earlier age, for which mortality estimates are unavailable, during the 1980-86 period. This difference in age of peak biomass reflects the increased mortality in recent years. The practical implication for size limit regulation is that maximium yield per recruit can only be achieved at a lower minimum size limit than that now in effect. During the 1970-80 period, a 5.4-inch size limit would have been appropriate if fishing had been intense. However, during that period the exploitation rate was in the .3-.6 range, with an average of .4. This indicates that a size limit corresponding to Age 4 or 5 probably would have produced maximum yield per recruit. This in turn suggests an appropriate minimum size limit of 4 to 5 inches. During the 1980-86 period, even lower size limits are indicated based on yield-perrecruit analysis, because of the increase in natural mortality observed during that period.

Growth data used for the yield-per-recruit analysis were derived from parameters estimated from tagging studies on the population in the 1950s and 1960s (Balsiger 1974). Preliminary analyses of subsequent tagging experiments indicate that growth has not changed. However, no growth analyses have been carried out since mortality has increased and population density has decreased. Increased growth since 1980 could alter the balance between growth and mortality and cause a shift to the right for the biomass curve shown for the 1980-86 period in figure 2. To check for this possibility, weights at age in Table 1 were increased 50% and the yield-perrecruit analysis was repeated. The resulting biomass curve peaked at Age 5, which is one age less than the peak for the 1970-80 curve. A 50% increase in growth since 1980 is probably at the upper end of possible increases in growth. Thus, a minimum size limit corresponding to Age 5 (4.8 inches) is at the upper end of possibilities for a size limit under the higher mortality conditions of the 1980-86 period.

While natural mortality has been high in recent years, the latest estimates suggest that mortality may be moderating and that the biomass curve could shift to the right in the future. This, coupled with the fact that males mature around Age 5 suggests that a minimum size limit of 5 inch carapace width is the lowest feasible size limit for further analysis here.

# EFFECT ON REPRODUCTION

Yield-per-recruit theory provides a framework for selecting combinations of size limits and fishing rates which maximize yield. However, questions regarding the effect of such regulations on future reproductive viability of the stock are ignored. In fact, when pursuing a policy to maximize yield according to yield-per-recruit theory, one must be willing to

assume that future recruitment to the stock will not be jeopardized by the policy. For red king crab, this assumption cannot be made without examining the potential effects of lowered size limits on recruitment. Powell et al. (1974) has shown that while one mature male may mate successfully with several females, the male of mating pairs observed in nature tends to be larger than the female. Thus, the question arises as to whether this size differential is an integral part of successful mating, or merely the result of the fact that males grow to a larger size than females. Lowered size limits in the males-only king crab fishery might alter the sex ratio or the size ratio.of mating pairs. Such changes would, at some level, presumably affect the average clutch size (percentage of fertilized eggs per clutch) of the female spawning stock. The effect of lowered size limits on reproductive potential will be examined by first relating clutch size to sex and size ratios calculated from research survey data. Then, simulated changes in minimum size limits under current stock and exploitation conditions will be examined for effects on sex and size ratios.

Relationship of Clutch Size to Sex and Size Ratios Red king crab become sexually mature at about Age 5 (4.5-5.0 inches carapace width). While females are known to mate successfully at this size, there is some question based on underwater observations in natural habitat (Powell et al. 1974) regarding the size at which males enter into mating. Thus, dealing conservatively with this unknown parameter, it is assumed that the size of effective sexual maturity for males is 120 mm (about 5.7-inches ) and that males under this size do not take part in reproduction. Females are assumed to become sexually mature at 90 mm carapace length.

For each survey year from 1970 through 1986, sex ratios (number of mature females/number of mature males) and size ratios (mature male avg. wt./mature female avg. wt.) were calculated. In addition, estimates of average clutch fullness for mature females were calculated. These results are shown in Table 2. The details and results of calculations for average clutch size are given in Appendix Tables 3-18. Assuming that this survey information, collected primarily during June, is representative of the stock during the mating period one to two months earlier, scatterplots were developed to examine relationships between average clutch size, sex ratio, and size ratio. Average clutch size is related to sex ratio of females to males in Figure 3, and to male:female weight ratio in Figure 4. No relationship between these variables is apparent from examination of these scatterplots, and this is confirmed by linear regression estimates presented in the following Table:

| Ratio | Slope   | R2    | X range    |
|-------|---------|-------|------------|
| Sex   | 0.04    | 0.06  | 0. 4- 4. 2 |
| Size  | - 0. 10 | 0. Oİ | 2.4-3.2    |

In theory, a declining trend in clutch size would be expected as the sex ratio increased. In the case of the size ratio, an increasing trend in clutch size would be expected if the relative size of male to female mating pairs was an important factor. However, no relationship is apparent for either of these parameters, at least for the ranges examined.

Size Limit Effects on Sex and Size Ratios

The effect of lower minimum size limits on sex and size ratios under current stock conditions was examined by simulating the 1986 Bristol Bay stock and fishery. A range of size limits from 6.5 to 5.0 inches was imposed in .25-inch increments, and post-fishery sex and size ratios were calculated based on the stock remaining, as well as total catch and average size in the catch. Handling mortality on sublegal males was assigned values of 0, .3 and .7. Data used in the simulations are shown in Appendix Tables 19-39 for the various size limit-handling mortality combinations. Size-specific exploitation rates are applied to the male population, with the size group encompassing the minimum size limit taken as the group of full recruitment to the catch. The fraction of sublegal males caught that die from handling is assumed constant over size groups. The number of males remaining in each size group after fishing is calculated from

N - Nu - Nhm(ur - u), (2)
where: u = size group-specific exploitation
rate (ranges from 0 to .4 for 1986),
ur = exploitation rate at full recruitment
to the catch C.4 for 1986),
hm = fraction of captured sublegals
that are killed, and
N = population immediately prior to
fishing.

The second term in Equation 2 (Nu) represents the catch and the third term (Nhm ur-u)) represents handling deaths, which goes to zero at full recruitment and to .4Nhm when u = 0. Thus it is assumed that sublegals are caught by the gear at the same rate as legal crabs. Natural mortality from

the time of the survey through the fishing season is ignored, since no information is available as to possible values for it during this short interval, especially on differential rates between sexes. Sex and size ratios were calculated after fishing and are shown in Table 3 for the range of minimum size limits and for handling mortality fractions of 0, .3 and .7. These ,tabular results are summarized in Figures 5 and 6.

Sex ratios increase moderately as the size limit is lowered, but only to a point. The reasons for this are that the exploitation rate is moderate, and males below **120** mm carapace length do not enter into the mating population even though they are mature. Thus, below the minimum size limit of 5.5 inches, no further change is possible in the sex ratio. With the introduction of handling mortality, the sex ratio starts at a higher level but changes less. None of the simulations produced sex ratios outside of the range examined in relation to average clutch size (Fig. 3). Sex ratios increased 38%, 27%, and 12%, for cases with handling mortalities of 0, .3, and .7., respectively. However, from Figure 3 we see that no decline in average clutch size is evident for sex ratios as high as 4.

Size ratios also increase as the size limit is lowered, with handling mortality again exhibiting a moderating effect on the amount of change. The size ratio approaches an asymptote at a minimum size limit of 5.5 inches for the same reason as does the sex ratio (i.e., the size of 120 mm chosen for effective male mating). The fact that the size ratio of the stock remaining increases is interesting. Under higher size limits, more small males are left on the grounds. As the minimum size limit is lowered, fewer small males are left and the average size of mating males increases. The cropping of the stock becomes more uniform as the size limit is progressively lowered. This effect for a size limit reduction from 6.5 to 5.5 inches is illustrated

in Figure 7. From this result, it appears that a reduced average clutch size due to a reduced size ratio cannot occur because of a lower size limit, as long as the exploitation rate is relatively uniform across size groups.

Simulated catches and average weight per crab in the catch are shown as follows:

| Size<br>Limit | Catch<br>(mln.lbs.1 | Avg. Wt.<br>( <b>1bs.)</b> |
|---------------|---------------------|----------------------------|
| 6.50"         | 11.6                | 5.1                        |
| 6.25"         | 75.6                | 4.8                        |
| 6.00"         | 19.2                | 4.5                        |
| 5.75"         | 22.4                | 4.3                        |
| 5.50"         | 25.2                | 4.0                        |
| 5.25"         | 27.5                | 3.8                        |
| 5.00"         | 29.7                | 3.6                        |

As the size limit is reduced the exploitable stock increases and the average size of individuals in the stock decreases. The catch more than doubled in weight while the average size in the catch decreased by about 30% when the minimum size limit was reduced to 5.0 from 6.5-inches. Smaller reductions in the size limit resulted in smaller changes **in** catch and average size. To the extent that handling mortality was a factor, deaths declined as the size limit was reduced (see Table 3) because they were converted to catch. Thus, it is concluded that **a** lowering of the minimum size limit to some point within the range examined would increase the catch. Further, adverse impacts on population clutch size are not likely to result from such an action,

since sex and size ratios did not change to the point where clutch fullness might be affected.

It is not clear how handling mortality of female crabs might change as the size limit is reduced. However, since the female stock has been at all-time low abundance in recent years, handling mortality should be avoided at any size limit. The distribution of crabs in 1986 suggests that handling may be a less severe problem with females than with sublegal males. Figure 8 compares the distributions of females, sublegal males, and legal crabs. From this it is seen that distribution of females overlaps less with legal males than does sublegal male distribution. This has been corroborated by observations of catches aboard crab fishing vessels, where sublegal males were caught at seven times the rate of females (Griffin et al. 1983). Nevertheless, handling mortality at very low levels of female spawning stock may pose a substantial risk to future recovery. In order to reduce this risk and still provide for fishery production, areal segregation of the fleet from the female stock seems desirable. Data of the type found in Figure 8 may be used for this purpose. In 1986 for example, a boundary line drawn at longitude 162°30" should have protected about 90% of the female stock while providing access to 60% of the legal stock.

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Figure 1 .--Trend in mortality (2) for Age 4-8 male red king crab in Bristol Bay (numbers represent sample sizes 1.



Figure 2.--Biomass per recruit distribution for two natural mortality schedules for Bristol Bay red king crab.



Figure 3. --Average clutch fullness related to sex ratio for Bristol Bay red king crab.



Figure 4. --Average clutch fullness related to size ratio for Bristol Bay red king **crab**.



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Figure 5.--Changes in the sex ratio with decreasing minimum size limit, with and without handling mortality (hm).



Figure 6.--Changes in the size ratio with decreasing minimum size limit, with and without handling mortality (hm).



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Figure 8. --Comparison of legal male distribution vs female distribution (A), and sublegal male distribution (B).

| Approx.<br>age<br>(yrs) | Carapace<br>length<br>(mm) | Midpt.<br>width<br>(in) | Average<br>weight<br>(lbs) | Natural<br>1969-80 | Mortality<br>1981-86 |
|-------------------------|----------------------------|-------------------------|----------------------------|--------------------|----------------------|
| <br>4                   | 87                         | 4.1                     | 0.9                        | 0.4                | 0.7                  |
| 5                       | 102                        | 4.8                     | 1.6                        | 0.4                | 0.7                  |
| 6                       | 115                        | 5.4                     | 2.5                        | 0.4                | 0.7                  |
| 7                       | 125                        | 5.9                     | 3.4                        | 0.4                | 0.7                  |
| 8                       | 135                        | 6.4                     | 4.3                        | 0.4                | 0.7                  |
| 9                       | 1.45                       | 6.9                     | 5.2.                       | . 0.6              | . 0.6                |
| 10                      | 152                        | 7.2                     | 6.1                        | 0.6                | 0.6                  |
| 11                      | 157                        | 7.4                     | 6.9                        | 0.6                | 0.6                  |
| 12                      | 162                        | 7.7                     | 7.7                        | 0.6                | 0.6                  |
| 13                      | 167                        | 7.9                     | 8.3                        | 0.6                | 0.6                  |
| 14                      | 170                        | 8.0                     | 8.9                        |                    |                      |

Table 1 .--Parameters for yield-per-recruit analysis for Bristol Bay red king crab.

Males Females Size Clutch Sex Millions Average Ratio Millions Average Survey Ratio Size **wt.** (lbs) (M/F) >120 mm Wt.(lbs) >89 mm (F/M) (% full) Year 70 10.5 4.6 13.0 1.9 2.4 1.2 62% 10.1 12.1 72 4.7 2.9 1.2 53% 1.6 73 25.0 4.5 76.8 1.9 2.4 3.1 57% 40.9 72.0 2.6 74 4.5 1.8 88% 1.7 75 39.6 4.7 **58.9** 1.8 2.7 1.5 92% 63.4 1.l 76 4.6 71.8 1.9 2.5 63% 77 72.9 4.8 150.1 1.8 2.7 2.1 96% 78 77.5 5.1 128.4 3.0 1.7 **90%** 1.7 71.3 5.1 110.9 2.8 1.6 97% 79 1.9 51.4 5.4 1.3 80 67.6 1.7 3.2 42% 20.2 4.9 67.3 2.6 3.3 92% 81 1.9 4.2 83% 82 13. 2 4.2 **54.8** 2.4 1.8 2.4 1.5 91% 83 6.4 3.8 9.7 1.6 8.7 17.6 2.8 2.0 88% 84 4.1 1.5 85 8.2 4.0 6.8 1.4 2.8 0.8 84% 0.4 65% 86 13.5 4.3 5.3 1.6 2.7

Table 2.--National Marine Fisheries Service Survey data on the size ratio, sex ratio, and clutch size for red king crab in Bristol Bay, 1970-86.

Table 3.--Sex ratios, size ratios, and handling -mortalities resulting from the 1986 simulated fishery for red king crabs in Bristol Bay under minimum size limits ranging from 6.5 to 5.0-inches.

| Handlin       | g mortali    | ty = 0        | Handlin      | g mortali     | ty = .3                       | Handling mortality = .7 |               |                               |  |  |
|---------------|--------------|---------------|--------------|---------------|-------------------------------|-------------------------|---------------|-------------------------------|--|--|
| Size<br>Limit | Sex<br>Ratio | Size<br>Ratio | Sex<br>Ratio | Size<br>Ratio | Handling<br>Deaths<br>(mins.) | Sex<br>Ratio            | Size<br>Ratio | Handling<br>Deaths<br>(mins.) |  |  |
| 6.50"         | 0.48         | 2.62          | 0.52         | 2.65          | 2.5                           | 0.59                    | 2.69          | 5.90                          |  |  |
| 6.25"         | 0.52         | 2.62          | 0.56         | 2.65          | 2.2                           | 0.61                    | 2.69          | 5.10                          |  |  |
| 6.00"         | 0.58         | 2.65          | 0.60         | 2.67          | 1.9                           | 0.63                    | 2.71          | 4.50                          |  |  |
| 5.75"         | 0.64         | 2.71          | 0.65         | 2.72          | 1.6                           | 0.65                    | 2.73          | 3.80                          |  |  |
| 5.50"         | 0.66         | 2.74          | 0.66         | 2.74          | 1.3                           | 0.66                    | 2.74          | 3.00                          |  |  |
| 5.25"         | 0.66         | 2.74          | 0.66         | 2.74          | 1.0                           | 0.66                    | 2.74          | 2.40                          |  |  |
| 5.00"         | 0.66         | 2.74          | 0.66         | 2.74          | 0.7                           | 0.66                    | 2.74          | 1.70                          |  |  |

| Survey | Age   |       |        |        |        |        |  |  |  |  |  |  |
|--------|-------|-------|--------|--------|--------|--------|--|--|--|--|--|--|
| Year   | 4     | 5     | 6      | 7      | 8      | 9      |  |  |  |  |  |  |
|        | (80)* | (95)* | (110)* | (120)* | (130)* | (140)* |  |  |  |  |  |  |
| 68     | 5.9   | 9.5   | 4.0    | 3.4    | 2.7    | 2.7    |  |  |  |  |  |  |
| 69     | 9.7   | 15.9  | 9.1    | 5.3    | 4.1    | 3.1    |  |  |  |  |  |  |
| 70     | 3.7   | 3.4   | 3.1    | 3.4    | 3.5    | 2.5    |  |  |  |  |  |  |
| 71     | 5.5   | 3.5   | 3.4    | 3.4    | 3.4    | 2.4    |  |  |  |  |  |  |
| 72     | 7.3   | 7.4   | 3.6    | 3.4    | 3.2    | 2.3    |  |  |  |  |  |  |
| 73     | 14.0  | 19.2  | 11.7   | 10.0   | 7.3    | 4.7    |  |  |  |  |  |  |
| 74     | 19.7  | 14.7  | 11.3   | 13.5   | 12.3   | 8.5    |  |  |  |  |  |  |
| 75     | 25.0  | 18.3  | 13.1   | 12.8   | 10.9   | 9.5    |  |  |  |  |  |  |
| 76     | 33. 2 | 27.2  | 18.6   | 20. 9  | 19.3   | 13.4   |  |  |  |  |  |  |
| 77     | 23.7  | 45.6  | 28.5   | 24.1   | 22.5   | 14. 2  |  |  |  |  |  |  |
| 78     | 18.2  | 20. 5 | 16. 9  | 18.5   | 24.1   | 20. 2  |  |  |  |  |  |  |
| 79     | 13.9  | 10.6  | 10.3   | 18.1   | 19.7   | 17.7   |  |  |  |  |  |  |
| 80     | 17.8  | 14.9  | 8.6    | 9.6    | 12.1   | 13.6   |  |  |  |  |  |  |
| 81     | 16.8  | 16.7  | 9.6    | 6. 2   | 4.8    | 3.5    |  |  |  |  |  |  |
| 82     | 19.9  | 19.9  | 8.7    | 6.5    | 3.5    | 2.0    |  |  |  |  |  |  |
| 83     | 16.9  | 11.1  | 5.4    | 3.8    | 1.8    | 0.5    |  |  |  |  |  |  |
| 84     | 35.6  | 15.7  | 6.9    | 3. 9   | 2.7    | 1.0    |  |  |  |  |  |  |
| 85     | 6.3   | 5.7   | 4.5    | 4.0    | 2.7    | 1.0    |  |  |  |  |  |  |
| 86     | 2.7   | 7.4   | 4.8    | 5.0    | 5.0    | 2.9    |  |  |  |  |  |  |

| Appen | dix Ta | ble 1  | A    | pproxima | te ani | nual | age | -cara | apace | Ś    |
|-------|--------|--------|------|----------|--------|------|-----|-------|-------|------|
|       | length | 1 (mm) | com  | position | s for  | Bris | tol | Bay   | red   | king |
|       | crabs  | from   | NMFS | surveys  | (mill  | ions | of  | crab  | s).   |      |

\*(Lower size limit of length group)

|                       |         | Age     |         |               |         |                    |
|-----------------------|---------|---------|---------|---------------|---------|--------------------|
| Survey<br><b>Year</b> | 4-5     | 5-6     | 6- 7    | 7-8           | 8-9     | <b>4-8</b><br>Avg* |
| 69                    | -0.99   | 0. 04   | - 0. 28 | - 0. 19       | - 0. 14 |                    |
| 70                    | 1.05    | 1.63    | 0. 98   | 0.41          | 0.49    | 0. 91              |
| 71                    | 0.06    | 0       | - 0. 09 | 0             | 0.38    | 0.38               |
| 72                    | - 0. 3  | - 0. 03 | 0       | 0.06          | 0.39    | 0.39               |
| 73                    | - 0. 97 | - 0. 46 | - 1. 02 | - 0. 76       | - 0. 38 |                    |
| 74                    | - 0. 05 | 0.53    | - 0. 14 | - 0. 21       | - 0. 15 | 0. 53              |
| 75                    | 0.07    | 0.12    | - 0. 12 | 0. 21         | 0.26    | 0. 20              |
| 76                    | - 0. 08 | - 0. 02 | - 0. 47 | - <b>0k41</b> | - 0. 21 |                    |
| 77                    | - 0. 32 | - 0. 05 | - 0. 26 | - 0. 07       | 0.31    | 0.31               |
| 78                    | 0.15    | 0. 99   | 0.43    | 0.00          | 0.11    | 0.42               |
| 79                    | 0.54    | 0.69    | - 0. 07 | - 0. 06       | 0.31    | 0.51               |
| 80                    | - 0. 07 | 0. 21   | 0. 07   | 0.40          | 0.37    | 0. 33              |
| 81                    | 0.06    | 0.44    | 0.33    | 0.69          | 1.24    | 0.68               |
| 82                    | - 0. 17 | 0.65    | 0.39    | 0.57          | 0.88    | 0.62               |
| 83                    | 0.58    | 1.30    | 0.83    | 1.28          | 1.95    | 1.19               |
| 84                    | 0.07    | 0.48    | 0. 33   | 0.34          | 0.59    | 0.44               |
| 85                    | 1.83    | 1.25    | 0. 55   | 0.37          | 0. 99   | 1.00               |
| 86                    | - 0. 16 | 0.17    | - 0. 11 | - 0. 22       | - 0. 07 | 0.17               |
| <b>969-80</b> Avg*    | 0.58    | 0. 70   | 0. 71   | 0.34          | 0. 33   | 0.44               |
| 981-86 Avg*           | 1.21    | 0. 72   | 0.49    | 0.65          | 1.13    | 0.68               |

Appendix Table 2. --Annual age-specific instantaneous mortality rates (2) for Bristol Bay. red king crab, calculated from Appendix Table 1.

\* values < .1 omitted

### APPENDIX TABLES 3-18

Calculation of Average Population Clutch Size for Bristol Bay Red King Crabs for **1970** Through **1986** 

In these tables, which present clutch data by 5mm carapace length intervals, the number of crabs with empty clutches tends to be maximum around the size of first maturity. This suggests that field identification of empty versus immature crabs is difficult. To correct for this problem, the following approach was taken. For all crabs >99mm, a ratio of empty to "with eggs " was calculated. This ratio was applied to the number "with eggs" for each size interval <99mm to arrive at a calculated number of empty clutches. The calculated number of mature crabs for each of these size intervals came from adding **the crabs** in **all** fullness categories except empty to those calculated as empty. The average clutch size was then calculated mature crabs. Adjustment to full clutch divided by the number of calculated mature crabs. Adjustment to full clutch was accomplished by summing the crabs in each fullnes category after the number in each category was multiplied by the fraction representing the appropriate category, (i.e., **0,.125,.25,.5,.75,1**, and 1.125).

Crabs categorized as "old shell" were excluded from the above calculations. This was done to avoid the problem of survey timing as it relates to molting and mating. To the extent that the incidence of old shell females in the catches relates to this timing, it was felt that the use of soft- and new shell crabs only in the calculations would better reflect the situation regarding population clutch size. With the exception of two years, **1977** and **1982**, calculations using all shell categories are quite similar to those shown in the following tables. Values associated with the row labeled "Calculated mature females with full clutches" are also presented in Table **2**.

|                     |        | <u> </u> | UTCH   |         | F U   | LLNE | SS      |          |          |       |        | i      | Adjusted |
|---------------------|--------|----------|--------|---------|-------|------|---------|----------|----------|-------|--------|--------|----------|
| Carapace            |        |          |        |         |       |      |         |          | Observed | Calcu | lated  | With   | to       |
| lg.group            | Empty  | 1/8      | 1/4    | 1/2     | 3/4   | Full | >Full 1 | [mmature | Mature   | Empty | Mature | Eggs   | "Full"   |
| 65 - 69             |        |          |        |         |       |      |         |          | 0        | 0.0   | 0.0    | 0      | 0.0      |
| 70 - 74             |        |          |        |         |       |      |         |          | 0        | 0.0   | 0.0    | 0<br>0 | 0.0      |
| 75 - 7 <del>9</del> |        |          |        |         |       |      |         |          | 0        | 0.0   | 0.0    | 0      | 0.0      |
| 80 - 84             | 1      |          |        |         |       | 5    |         | 97       | 6        | 2.1   | 7.1    | - 5    | 5.0      |
| 85 - 89             | . 2    | 1        | 2      |         |       | 29   |         | 76       | 34       | 13.2  | 45.2   | 32     | 29.6     |
| 90 - 94             | 58     | 7        |        | 1       | 1     | 68   |         | 2        | 135      | 31.8  | 108.8  | 77     | 70.1     |
| 95 - 99             | 49     | 13       | 1      | 1       |       | 76   |         |          | 140      | 37.6  | 128.6  | 91     | 78.4     |
| 100 -104            | 43     | 10       |        |         |       | 98   |         |          | 151      | 44.7  | 151.0  | 108    | 99.3     |
| 105 -109            | 36     | 9        |        | 1       |       | 51   |         |          | 97       | 25.2  | 97.0   | 61     | 52.6     |
| 110 -114            | 15     | 4        |        | 1       |       | 38   |         |          | 58       | 17.8  | 58.0   | 43     | 39.0     |
| 115 -119            | 16     | 6        | 1      |         |       | 35   |         |          | 58       | 17.4  | 58.0   | 42     | 36.0     |
| 120 -124            | 16     | 11       |        |         |       | 21   |         |          | 48       | 13.2  | 48.0   | 32     | 22.4     |
| 125 -129            | 15     | 3        |        |         |       | 24   |         |          | 42       | 11.2  | 42.0   | 27     | 24.4     |
| 130 -134            | 11     | 7        |        | 1       |       | 15   |         |          | 34       | 9.5   | 34.0   | 23     | 16.4     |
| 135 -139            | 7      | 5        |        |         |       | 21   |         |          | 33       | 10.8  | 33.0   | 26     | 21.6     |
| 140 -144            | 6      | 2        |        |         |       | 16   |         |          | 24       | 7.4   | 24.0   | 18     | 16.3     |
| 145 -149            | 1      | 3        |        | 1       |       | 12   | i       |          | 17       | 6.6   | 17.0   | 16     | 12.9     |
| 150 -154            | 2      |          |        |         |       | 10   |         |          | 12       | 4.1   | 12.0   | 10     | 10.0     |
| 155 -159            | 2      | 1        |        |         |       | 3    |         |          | 6        | 1.7   | 6.0    | 4      | 3.1      |
| 160 -164            |        |          |        |         |       | 1    |         |          | 1        | 0.4   | 1.0    | 1      | 1.0      |
| 165 –169            |        |          |        |         |       |      |         |          | 0        | 0.0   | 0.0    | 0      | 0.0      |
| TOTALS              |        |          |        |         |       |      |         |          | 896      |       | 870.8  |        | 538.0    |
| Calculated          | mature | females  | with f | ull clu | tches |      |         |          |          |       | 61.8   | 6      | <i>.</i> |

| Appendix | Table | 3Bristol | Вау | red | king | crab | clutch | size | data | from | the | 1970 | survey | (old | shells | excluded) |
|----------|-------|----------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|-----------|
|----------|-------|----------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|-----------|

Reeves 2.25.2

|  |          | СLU                 | тсн                  |                   | FUI    | FULLNESS |       |          |          |       |  | Adjusted   |        |
|--|----------|---------------------|----------------------|-------------------|--------|----------|-------|----------|----------|-------|--|------------|--------|
| Carapace                               |          |                     |                      |                   |        |          |       |          | Observed | Calcu | lated                                  | With       | to     |
| lg.group                               | Empty    | 1/8                 | 1/4                  | 1/2               | 3/4    | Full     | >Full | Immature | Mature   | Empty | Mature                                 | Eggs       | "Full" |
| 65 - 69                                |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 70 - 74                                |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 75 - 79                                | 48       |                     |                      | 1                 |        |          |       | 5        | 49       | 0.6   | 1.6                                    | 1          | 0.5    |
| 80 - 84                                | 63       |                     |                      | 2                 |        |          |       | 13       | 65       | 1.2   | 3.2                                    | 2          | 1.0    |
| 85 - 89                                | 67       |                     | 1                    | 8                 | 2      | 3        |       | 41       | 81       | 8.5   | 22.5                                   | 14         | 8.8    |
| 90 - 94                                | 36       | 1                   |                      | 8                 | 2      | 18       |       | 51       | 65       | 17.7  | 46.7                                   | 29         | 23.6   |
| 95 <b>-</b> 99                         | 21       |                     |                      | 6                 | 4      | 49       |       | 43       | 80       | 36.0  | 95.0                                   | 59         | 55.0   |
| 100 -104                               | 9        |                     | 1                    | 5                 | 2      | 35       |       | 28       | 80       | 26.2  | 80.0                                   | 43         | 39.3   |
| 105 -109                               | 4        | 1                   |                      | 3                 | 2      | 32       |       | 12       | 54       | 23.2  | 54.0                                   | 38         | 35.1   |
| 110 -114                               | 4        | 2                   |                      | 4                 | 1      | 10       |       | 3        | 24       | 10.4  | 24.0                                   | 17         | 13.0   |
| 115 -119                               | 2        |                     |                      | 2                 | 1      | 9        |       | 7        | 21       | 7.3   | 21.0                                   | 12         | 10.8   |
| 120 -124                               | 1        | •                   |                      | . 2               | 1      | 1        |       | 5        | 10       | 2.4   | 10.0                                   | 4          | 2.8    |
| 125 <b>-</b> 129                       | 2        |                     |                      | 3                 | 1      |          |       |          | 6        | 2.4   | 6.0                                    | 4          | 2.3    |
| 130 -134                               |          | 3                   |                      | 1                 | 1      | 2        |       |          | 7        | 4.3   | 7.0                                    | 7          | 3.6    |
| 135 -139                               |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 140 -144                               |          |                     |                      | 2                 |        |          |       | 1        | 3        | 1.2   | 3.0                                    | 2          | 1.0    |
| 145 -149                               |          |                     |                      | 1                 |        |          |       |          | 1        | 0.6   | 1.0                                    | 1          | 0.5    |
| 150 -154                               |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 155 -159                               |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 160 -164                               |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | 0          | 0.0    |
| 165 -169                               |          |                     |                      |                   |        |          |       |          | 0        | 0.0   | 0.0                                    | . <b>0</b> | 0.0    |
| TOTALS                                 |          |                     |                      |                   |        |          |       |          | 546      |       | 375.0                                  |            | 197.1  |
| Calculated<br>Observed m<br>Ratio of e | ature fe | females<br>emales v | s with f<br>with ful | ull ch<br>l cluto | itches | ,        | 70    |          | ,        |       | 52.6 <sup>3</sup><br>36.1 <sup>3</sup> | 96<br>96   |        |

Appendix Table 4.--Bristol Bay red king crab clutch size data from the 1972 survey (old shells excluded).

|                  |         | СLU      | ТСН      |          | FUI     | LNE  | SS    |          |          |       |        | Adjusted |        |
|------------------|---------|----------|----------|----------|---------|------|-------|----------|----------|-------|--------|----------|--------|
| Carapace         |         |          |          |          |         |      |       |          | Observed | Calcu | lated  | With     | to     |
| lg.group         | Empty   | 1/8      | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs     | "Full" |
| 65 - 69          |         |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0        | 0.0    |
| 70 - 74          |         |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0        | 0.0    |
| 75 <b>-</b> 79   | 40      |          |          |          | -       | 1    |       |          | 41       | 0.7   | 1.7    | 1        | 1.0    |
| 80 - 84          | 64      |          |          |          |         | 6    |       |          | 70       | 4.5   | 10.5   | 6        | 6.0    |
| 85 - 89          | 64      |          |          | 1        |         | 15   |       |          | 80       | 11.9  | 27.9   | 16       | 15.5   |
| 90 - 94          | 90      |          |          |          |         | 34   |       |          | 124      | 25.3  | 59.3   | 34       | 34.0   |
| 95 - 99          | 104     |          |          |          |         | 82   |       |          | 186      | 60.9  | 142.9  | 82       | 82.0   |
| 100 -104         | 133     |          |          | 2        |         | 77   |       |          | 212      | 58.7  | 212.0  | 79       | 78.0   |
| 105 -109         | 93      |          |          |          |         | 74   |       |          | 167      | 55.0  | 167.0  | 74       | 74.0   |
| 110 -114         | 61      |          |          | 1        |         | 84   |       |          | 146      | 63.1  | 146.0  | 85       | 84.5   |
| 115 -119         | 44      |          |          | 1        |         | 90   |       |          | 135      | 67.6  | 135.0  | 91       | 90.5   |
| 120 -124         | 34      |          |          |          |         | 72   |       |          | 106      | 53.5  | 106.0  | 72       | 72.0   |
| 125 -129         | 27      |          |          |          |         | 54   |       |          | 81       | 40.1  | 81.0   | 54       | 54.0   |
| 130 -134         | 17      |          |          |          |         | 49   |       |          | 66       | 36.4  | 66.0   | 49       | 49.0   |
| 135 -139         | 13      |          |          |          |         | 38   |       |          | 51       | 28.2  | 51.0   | 38       | 38.0   |
| 140 -144         | 5       |          | 1        | 2        |         | 17   |       |          | 25       | 14.9  | 25.0   | 20       | 18.3   |
| 145 -149         | 3       |          |          |          |         | 17   |       |          | 20       | 12.6  | 20.0   | 17       | 17.0   |
| 150 -154         | 2       |          |          |          |         | 2    |       |          | 4        | 1.5   | 4.0    | 2        | 2.0    |
| 155 -159         | 1       |          |          |          |         | 2    |       |          | 3        | 1.5   | 3.0    | 2        | 2.0    |
| 160 -164         |         |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0        | 0.0    |
| 165 <b>-</b> 169 |         |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0        | 0.0    |
| TOTALS           |         |          |          |          |         |      |       |          | 1517     |       | 1258.2 |          | 717.8  |
| Calculated       | mature  | females  | with t   | Eull clu | utches  |      |       |          |          |       | 57.0   | 6        |        |
| Observed m       | ature f | emales w | ith ful  | ll cluto | ches    |      |       |          |          |       | 47.39  | ò        |        |
| Ratio of e       | mpty to | "with e  | eggs" fo | or crabs | s >99mn | n (  | 433   | 583      | )        |       | 0.743  |          |        |

Appendix Table 5. --Bristol Bay red king crab clutch, size data from the 1973 survey (old shells excluded).

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|                  |          | CLU    | тсн      |          | FUL     | LNE   | S S   |          |                  |       |        | Ad         | ljusted |
|------------------|----------|--------|----------|----------|---------|-------|-------|----------|------------------|-------|--------|------------|---------|
| Carapace         |          |        |          |          |         |       |       |          | Observed         | Calcu | lated  | With       | to      |
| lg.group         | Empty    | 1/8    | 1/4      | 1/2      | 3/4     | Full  | >Full | Immature | Mature           | Empty | Mature | Eggs       | "Full"  |
| 65 - 69          |          |        |          |          |         |       |       |          | 0                | 0.0   | 0.0    | 0          | 0.0     |
| 70 - 74          |          |        |          |          |         |       |       |          | 0                | 0.0   | 0.0    | 0          | 0.0     |
| 75 - 79          | 93       |        |          |          |         | 1     |       |          | 94               | 0.1   | 1.1    | 1          | 1.0     |
| 80 - 84          | 87       |        |          |          |         | 7     |       |          | 94               | 0.9   | 7.9    | 7          | 7.0     |
| 85 - 89          | 84       |        |          |          |         | 23    |       |          | 107              | 3.0   | 26.0   | 23         | 23.0    |
| 90 - 94          | 70       |        |          | 1        |         | 77    |       |          | 148              | 10.2  | 88.2   | 78         | 77.5    |
| 95 - 99          | 35       |        |          | 1        |         | 153   |       |          | 189              | 20.2  | 174.2  | 154        | 153.5   |
| 100 -104         | 24       |        |          | 3        |         | 190   |       |          | 217              | 25.3  | 217.0  | 193        | 191.5   |
| 105 <b>-</b> 109 | .12      |        |          | 2        |         | 153   |       |          | <sup>`</sup> 167 | 20.3  | 167.0  | 155        | 154.0   |
| 110 -114         | 11       |        |          | 2        |         | 1 2 5 |       |          | 138              | 16.7  | 138.0  | 127        | 126.0   |
| 115 -119         | 12       |        |          | 1        |         | 60    |       |          | 73 -             | 8.0   | 73.0   | 61         | 60.5    |
| 120 -124         | 10       |        |          | 1        |         | 55    |       |          | 66               | 7.3   | 66.0   | 56         | 55.5    |
| 125 -129         | 9        |        |          |          |         | 30    |       |          | 39               | 3.9   | 39.0   | 30         | 30.0    |
| 130 -134         | 5        |        |          |          |         | 22    |       |          | 27               | 2.9   | 27.0   | 22         | 22.0    |
| 135 -139         | 2        |        |          |          |         | 14    |       |          | 16               | 1.8   | 16.0   | 14         | 14.0    |
| 140 -144         | 2        |        |          |          |         | 11    |       |          | 13               | 1.4   | 13.0   | 11         | 11.0    |
| 145 -149         | 1        |        |          |          |         | 1     |       |          | 2                | 0.1   | 2.0    | 1          | 1.0     |
| 150 -154         |          |        |          |          |         |       |       |          | 0                | 0.0   | 0.0    | 0          | 0.0     |
| 155 –159         |          |        |          |          | -       | 1     |       |          | 1                | 0.1   | 1.0    | 1          | 1.0     |
| 160 -164         |          |        |          |          |         |       |       |          | 0                | 0.0   | 0.0    | 0          | 0.0     |
| 165 -169         |          |        |          |          |         |       |       |          | 0                | 0.0   | 0.0    | 0          | 0.0     |
| TOTALS           |          |        |          |          |         |       |       |          | 1391             |       | 1056.5 |            | 928.5   |
| Calculated       | mature   | female | s with f | ull clu  | itches  |       |       |          |                  |       | 87.9   | 8          |         |
| Observed m       | ature fe | emales | with ful | ll cluto | ches    |       |       |          |                  |       | 66.8   | 0 <b>0</b> |         |
| Ratio of e       | mpty to  | "with  | eggs" fo | or crabs | 5 >99mm | (     | 88    | 671      | )                |       | 0.131  |            |         |

Appendix Table 6.--Bristol Bay red king crab clutch size data from the 1974 survey (old shells excluded).

|                |          | СЬИ      | тсн      |          | FUI     | LNE  | SS    |          |          |       |        | Ac   | djusted |
|----------------|----------|----------|----------|----------|---------|------|-------|----------|----------|-------|--------|------|---------|
| Carapace       |          |          |          |          |         |      |       |          | Observed | Calcu | lated  | With | to      |
| lg.group       | Empty    | 1/8      | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 55 - 59        |          |          |          | 4        |         |      |       | 175      | 4        | 0.1   | 4.1    | 4    | 2.0     |
| 70 - 74        | 157      |          |          |          | -       | 4    |       | 333      | 161      | 0.1   | 4.1    | 4    | 4.0     |
| 75 <b>-</b> 79 | 193      |          |          |          |         | 8    |       | 275      | 201      | 0.3   | 8.3    | 8    | 8.0     |
| 80 - 84        | 148      |          |          | 1        | 1       | 54   | 2     | 215      | 206      | 2.1   | 60.1   | 58   | 57.5    |
| 85 <b>-</b> 89 | 130      |          |          | 2        |         | 175  | 2     | 166      | 309      | 6.6   | 185.6  | 179  | 178.3   |
| 90 - 94        | 50       | •        |          | 8        | 1       | 218  | 2     | 74       | 279      | 8.4   | 237.4  | 229  | 225.0   |
| 95 - 99        | 9        |          |          | 26       | 6       | 274  |       | 5        | 315      | 11.2  | 317.2  | 306  | 291.5   |
| 100 -104       | 11       |          |          | 36       | 1       | 261  | 1     |          | 310      | 11.0  | 310.0  | 299  | 280.9   |
| 105 -109       | 5        |          |          | 24       |         | 183  | 8     |          | 220      | 7.9   | 220.0  | 215  | 204.0   |
| 110 -114       | 3        |          |          | 39       | 4       | 137  |       | 2        | 185      | 6.6   | 185.0  | 180  | 159.5   |
| 115 -119       |          |          | 1        | 12       | í       | 85   |       |          | 98       | 3.6   | 98.0   | 98   | 91.3    |
| 120 -124       | 4        |          | 1        | 13       | 1       | 64   |       |          | 83       | 2.9   | 83.0   | 79   | 71.5    |
| 125 -129       |          |          |          | 3        |         | 41   | 2     |          | 46       | 1.7   | 46.0   | 46   | 44.8    |
| 130 -134       | 3        |          |          | 1        |         | 15   | 1     | -        | 20       | 0.6   | 20.0   | 17   | 16.6    |
| 135 -139       |          |          |          | 1        | 1       | 6    |       |          | 8        | 0.3   | 8.0    | 8    | 7.3     |
| 140 -144       | 1        |          |          |          |         | 1    |       |          | 2        | 0.0   | 2.0    | 1    | 1.0     |
| 145 -149       |          | 1        |          |          |         |      |       |          | 1        | 0.0   | 1.0    | 1    | 0.1     |
| 150 -154       | 6        |          |          |          |         | 8    |       |          | 14       | 0.3   | 14.0   | 8    | 8.0     |
| 155 -159       |          |          |          |          |         | 1    |       |          | 1        | 0.0   | 1.0    | 1    | 1.0     |
| 160 -164       |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 165 -169       |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS         |          |          |          |          |         |      |       |          | 2463     |       | 1804.9 |      | 1652.1  |
| Calculated     | mature   | females  | s with f | ull ch   | utches  |      |       |          |          |       | 91.5   | *    |         |
| Observed m     | ature fe | emales w | with ful | ll clute | ches    |      |       |          |          |       | 67.1   | 8    |         |
| Ratio of e     | mpty to  | "with o  | eggs" fo | or crab  | s >99mm | (    | 35    | 953      | )        |       | 0.037  |      |         |

Appendix Table 7.--Bristol Bay red king crab clutch size data from the 1975 survey (old shells excluded).

|                |          | CLU      | тсн      |          | FUI     | LNE  | <u>s s</u> |          |          |       |        | A    | djusted |
|----------------|----------|----------|----------|----------|---------|------|------------|----------|----------|-------|--------|------|---------|
| Carapace       |          |          |          |          |         |      |            |          | Observed | Calcu | lated  | With | to      |
| lg.group       | Empty    | 1/8      | 1/4      | 1/2      | 3/4     | Full | >Full      | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 65 - 69        |          |          |          |          |         |      |            |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 70 - 74        |          |          |          |          |         |      |            |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 75 <b>-</b> 79 | 89       |          |          |          |         | 1    |            | 175      | 90       | 0.0   | 1.0    | 1    | 1.0     |
| 80 - 84        | 236      | 3        | 5        | 7        | 11      | 42   |            | 200      | 304      | 0.7   | 68.7   | 68   | 55.4    |
| 85 - 89        | 23 2     | 12       | 8        | 50       | 22      | 83   | 1          | 143      | 408      | 1.7   | 177.7  | 176  | 129.1   |
| 90 - 94        | 81       | 12       | 39       | 43       | 49      | 141  |            | 40       | 365      | 2.8   | 286.8  | 284  | 210.5   |
| 95 - 99        | 70       | 6        | 77       | 83       | 79      | 160  | 6          | 3        | 481      | 4.0   | 415.0  | 411  | 287.5   |
| 100 -104       | 17       | 29       | 154      | 136      | 88      | 101  | 5          |          | 530      | 5.0   | 530.0  | 513  | 282.8   |
| 105 -109       | 5        | 27       | 203      | 222      | 107     | 155  | 1          |          | 720      | 7.0   | 720.0  | 715  | 401.5   |
| 110 -114       | 3        | 29       | 149      | 263      | 176     | 156  | 8          |          | 784      | 7.6   | 784.0  | 781  | 469.4   |
| 115 -119       | 7        | 26       | _ 147    | 126      | 111     | 178  | 2          |          | 597      | 5.8   | 597.0  | 590  | 366.5   |
| 120 -124       | 1        | 2        | 79       | 160      | 156     | 166  | 2          |          | 566      | 5.5   | 566.0  | 565  | 385.3   |
| 125 -129       | 1        | 1        | 50       | 58       | 82      | 65   | 3          |          | 260      | 2.5   | 260.0  | 259  | 171.5   |
| 130 -134       |          | 1        |          | 34       | 15      | 25   |            |          | 75       | 0.7   | 75.0   | 75   | 53.4    |
| 135 -139       | 1        | ,        |          | 5        | 13      | 16   |            |          | 35       | 0.3   | 35.0   | 34   | 28.3    |
| 140 -144       | <b>`</b> | 1        | 3        | 1        | 24      | 7    |            |          | 36       | 0.4   | 36.0   | 36   | 26.4    |
| 145 -149       |          |          |          |          | 7       | 3    |            |          | 10       | 0.1   | 10.0   | 10   | 8.3     |
| 150 -154       |          |          |          |          | 1       | 6    |            |          | 7        | 0.1   | 7.0    | 7    | 6.8     |
| 155 -159       |          | 1        | 1        |          |         |      |            |          | 2        | 0.0   | 2.0    | 2    | 0.4     |
| 160 -164       |          |          |          |          | 1       |      |            |          | 1        | 0.0   | 1.0    | 1    | 0.8     |
| 185 -189       |          |          | 2        |          |         |      |            |          | 2        | 0.0   | 2.0    | 2    | 0.5     |
| TOTALS         |          |          |          |          |         |      |            |          | 5273     |       | 4574.2 |      | 2885.0  |
| Calculated     | mature   | females  | s with f | ull clu  | utches  |      |            |          |          |       | 63.19  | f    |         |
| Observed m     | ature fe | emales v | vith ful | l cluto  | ches    |      |            |          |          |       | 54.7   | ł    |         |
| Ratio of e     | mpty to  | "with e  | eggs" fo | or crabs | s >99mm | (    | 35         | 3590     | )        |       | 0.010  |      |         |

Appendix Table 8.--Bristol Bay red king crab clutch size data from the 1976 survey (old shells excluded).

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|                    |          | СЬИ      | тсн        |          | FUI     | LNE     | S S   |          |          |            |        | A    | djusted |
|--------------------|----------|----------|------------|----------|---------|---------|-------|----------|----------|------------|--------|------|---------|
| Carapace           |          |          |            |          |         |         | -     |          | Observed | Calcu      | lated  | With | to      |
| lg.group           | Empty    | 1/8      | 1/4        | 1/2      | 3/4     | Full    | >Full | Immature | Mature   | Empty      | Mature | Eggs | "Full"  |
| 65 60              |          |          |            |          |         |         |       |          |          |            | 0.0    | 0    |         |
| 03 - 03            | G        |          |            |          |         | n       |       | 65       | 0        | 0.0        | 0.0    | 0    | 0.0     |
| 76 - 74            | 5<br>E   |          |            |          |         | 2       |       | 65       |          | 0.0        | 2.0    | 2    | 2.0     |
| PO - 94            | 30       |          |            |          | 1       | י<br>רכ |       | 49       | 50       | 0.0        | · 1.0  | 20   | 0.1     |
|                    | 50       | 1        |            | 1        | 1       | 27      |       | 67       | 58       | 0.6        | 28.6   | 28   | 2/.8    |
| 85 - 89            | 02       | 4        |            | 1        | 1       | 211     |       | 20       | 150      | 2.0        | 90.0   | 205  | 210.0   |
| 90 - 94            | 94       | I        |            | 4<br>C   | 9       | 110     | 1     | 30       | 419      | /.4        | 332.4  | 325  | 319.9   |
| 95 - 99<br>100 104 | 40       |          |            | נ<br>ר   | 14      | 430     | I     | 10       | 498      | 10.3       | 460.3  | 450  | 444.1   |
| 100 -104           | 1        |          |            |          | 15      | 421     |       | I        | 451      | 10.1       | 451.0  | 443  | 435.8   |
| 103 -109           | 4<br>10  |          | 2          | С        | 12      | 270     | 1     |          | 260      | 0.J        | 280.0  | 276  | 2/4.5   |
| 110 -114           | 10       | 1        | 2          | 2<br>5   | 16      | 241     |       |          | 269      | 5.9        | 269.0  | 259  | 253.4   |
| 120 -124           | 1        | 1        | . <b>I</b> | 2        | 10      | 220     |       |          | 208      | ⊃•/<br>/ / | 258.0  | 251  | 242.9   |
| 120 -124           | 4        |          |            | 4        | 10      | 70      |       |          | 195      | 4.4        | 195.0  | 191  | 185.0   |
| 125 -129           | 1        |          |            |          | 13      | 79      |       |          | 92       | 2.1        | 92.0   | 92   | 88.8    |
| 130 -134           | I        |          |            |          | 5<br>F  | 59      |       |          | 65       | 1.5        | 65.0   | 64   | 62.8    |
| 135 -139           | 2        |          |            | 2        | 2       | 10      |       |          | 20       | 0.5        | 20.0   | 20   | 18.8    |
| 140 -144           | 3        |          |            | 3        | 4       | 10      |       |          | 20       | 0.4        | 20.0   | 17   | 14.5    |
| 145 -149           |          |          |            |          |         | 1       |       |          | 1        | 0.0        | 1.0    | 1    | 1.0     |
| 150 -154           |          |          |            |          | 2       | Z       |       |          | 2        | 0.0        | 2.0    | 2    | 2.0     |
| 155 -159           |          |          |            |          | 2       |         |       |          | 2        | 0.0        | 2.0    | 2    | 1.5     |
| 160 -164           |          |          |            |          |         |         |       |          | 0        | 0.0        | 0.0    | 0    | 0.0     |
| 165 -169           |          |          |            |          |         |         |       |          | 0        | 0.0        | 0.0    | 0    | 0.0     |
| TOTALS             |          |          |            |          |         |         |       |          | 2793     |            | 2569.4 |      | 2459.3  |
| Calculated         | mature   | females  | s with d   | full clu | tches   |         |       |          |          |            | 95.7   | \$   |         |
| Observed m         | ature fe | emales v | with fu    | ll cluto | ches    |         |       |          |          |            | 88.19  | ŧ.   |         |
| Ratio of e         | mpty to  | "with e  | eaas" fa   | or crabs | s >99mm | . (     | 37    | 1618     | )        |            | 0.023  |      |         |

Appendix Table 9.--Bristol Bay red king crab clutch size data from the 1977 survey (old shells excluded).

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|                         |         | сги    | тсн      |          | FUL     | LNE  | SS    |          |          |       |        | Ac   | ljusted |
|-------------------------|---------|--------|----------|----------|---------|------|-------|----------|----------|-------|--------|------|---------|
| Carapace                | •       |        |          |          |         |      |       |          | Observed | Calcu | lated  | With | to      |
| lg.group                | Empty   | 1/8    | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 55 - 59                 | i _     |        |          |          |         | 2    |       | 22       | 2        | 0.0   | 2.0    | 2    | 2.0     |
| 60 - 64                 | 1       |        |          |          |         | 2    |       | 19       | 3        | 0.0   | 2.0    | 2    | 2.0     |
| 80 - 84                 | 95      |        |          |          | 1       | 10   |       | 34       | 106      | 0.2   | 11.2   | 11   | 10.8    |
| 85 - 89                 | 83      |        | 1        | 1        | 19      | 37   |       | 27       | 141      | 1.0   | 59.0   | 58   | 52.0    |
| 90 - 94                 | 69      | 3      | 1        | 15       | 59      | 176  | 7     | 20       | 330      | 4.5   | 265.5  | 261  | 236.3   |
| 95 - 99                 | 59      |        | 2        | 47       | 146     | 549  | 17    | 13       | 820      | 13.1  | 774.1  | 761  | 701.6   |
| 100 -104                | 31      | 1      | 2        | 34       | 192     | 715  | 32    |          | 1007     | 16.8  | 1007.0 | 976  | 912.6   |
| 105 -109                | 7       | 1      | 7        | 26       | 135     | 461  | 20    |          | 657      | 11.2  | 657.0  | 650  | 599.6   |
| 110 -114                | 5       | 1      | 1        | 22       | 73      | 276  | 13    |          | 391      | 6.6   | 391.0  | 386  | 356.8   |
| 115 -119                | 1       | 1      | 2        | 19       | 48      | 147  | 3     |          | 221      | 3.8   | 221.0  | 220  | 196.5   |
| 120 -124                |         |        | 1        | 18       | 50      | 112  | 2     |          | 183      | 3.1   | 183.0  | 183  | 161.0   |
| 125 -129                | 1       | 1      |          | 5        | 26      | 87   | 1     |          | 121      | 2.1   | 121.0  | 120  | 110.3   |
| 130 -134                | 1       | 1      | 3        | 4        | 10      | 46   | 1     |          | 66       | 1.1   | 66.0   | 65   | 57.5    |
| 135 -139                |         |        | 1        | 3        | 4       | 24   | 1     |          | 33       | 0.6   | 33.0   | 33   | 29.9    |
| 140 -144                |         |        |          |          | 4       | 20   |       |          | 24       | 0.4   | 24.0   | 24   | 23.0    |
| 145 -149                |         |        |          |          | 2       | 4    |       |          | 6        | 0.1   | 6.0    | 6    | 5.5     |
| 150 -154                |         |        |          |          | 1       | 2    |       |          | 3        | 0.1   | 3.0    | 3    | 2.8     |
| 155 -159                |         |        |          |          |         | 3    |       |          | 3        | 0.1   | 3.0    | 3    | 3.0     |
| 160 -164                |         |        |          |          |         | 2    |       |          | 2        | 0.0   | 2.0    | 2    | 2.0     |
| 190 -194                |         |        | 1        |          |         | 1    |       |          | 2        | 0.0   | 2.0    | 2    | 1.3     |
| TOTALS                  |         |        |          |          |         |      |       |          | 4121     |       | 3832.8 |      | 3466.3  |
| Calculated              | mature  | female | s with t | full clu | utches  |      |       |          |          |       | 90.4   | 8    |         |
| Observed m              | ature f | emales | with fu  | ll clut  | ches    |      |       |          |          |       | 84.1   | 8    |         |
| Ratio <sup>:</sup> of e | mpty to | "with  | eggs" f  | or crab  | s >99mm | n (  | 46    | 2673     | )        |       | 0.017  |      |         |

|                |          | CLU              | тсн      |          | FUI     | LNE  | S S   |          |          |       |        | A    | djusted |
|----------------|----------|------------------|----------|----------|---------|------|-------|----------|----------|-------|--------|------|---------|
| Carapace       |          |                  |          |          |         |      |       |          | Observed | Calcu | lated  | With | to      |
| lg.group       | Empty    | 1/8              | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 55 - 59        |          |                  | 1        |          |         |      |       | 585      | 1        | 0.0   | 1.0    | 1    | 0.3     |
| 70 - 74        | 1        |                  |          |          |         | 1    |       | 90       | 2        | 0.0   | 1.0    | 1    | 1.0     |
| 75 - 79        | 4        |                  | 1        | 1        |         | 1    |       | 123      | 7        | 0.0   | 3.0    | 3    | 1.8     |
| 80 - 84        | 7        |                  | 1        |          | 1       | 17   |       | 201      | 26       | 0.0   | 19.0   | 19   | 18.0    |
| 85 - 89        | 10       |                  |          | 2        | 3       | 108  |       | 186      | 123      | 0.2   | 113.2  | 113  | 111.3   |
| 90 - 94        | 7        |                  |          | 2        | 11      | 237  |       | 91       | 257      | 0.4   | 250.4  | 250  | 246.3   |
| 95 <b>-</b> 99 | 8        |                  | 1        | 16       | 46      | 458  | 1     | 42       | 530      | 0.8   | 522.8  | 522  | 501.9   |
| 100 -104       |          |                  | 1        | 31       | 82      | 777  | 11    | 3        | 905      | 1.4   | 905.0  | 902  | 866.6   |
| 105 -109       | 1        | 1                | 2        | 26       | 92      | 977  | 13    | 3        | 1115     | 1.7   | 1115.0 | 1111 | 1074.3  |
| 110 -114       |          |                  | 2        | 22       | 73      | 939  | 28    |          | 1064     | 1.6   | 1064.0 | 1064 | 1036.8  |
| 115 -119       |          |                  | 6        | 13       | 36      | 518  | 15    |          | 588      | 0.9   | 588.0  | 588  | 569.9   |
| 120 -124       |          | 1                |          | 10       | 27      | 295  | 11    |          | 344      | 0.5   | 344.0  | 344  | 332.8   |
| 125 -129       |          | 3                |          | 4        | 25      | 251  | 7     |          | 290      | 0.4   | 290.0  | 290  | 280.0   |
| 130 -134       |          |                  | 1        |          | 10      | 89   | 12    |          | 112      | 0.2   | 112.0  | 112  | 110.3   |
| 135 -139       |          |                  | 2        | 3        | 7       | 46   | 1     |          | 59       | 0.1   | 59.0   | 59   | 54.4    |
| 140 -144       |          |                  |          | 1        | 3       | 25   | 2     |          | 31       | 0.0   | 31.0   | 31   | 30.0    |
| 145 -149       |          |                  |          |          | · 5     | 11   | 3     |          | 19       | 0.0   | 19.0   | 19   | 18.1    |
| 150 -154       |          |                  |          | 1        | 5       | 5    | 1     |          | 12       | 0.0   | 12.0   | 12   | 10.4    |
| 155 -159       |          |                  |          |          |         | 1    |       |          | 1        | 0.0   | 1.0    | 1    | 1.0     |
| 160 -164       |          |                  |          | 2        | 1       |      |       |          | 3        | 0.0   | 3.0    | 3    | 1.8     |
| 165 -169       |          |                  |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS         |          |                  |          |          |         |      |       |          | 5489     |       | 5453.4 |      | 5266.5  |
| Calculated     | mature   | females          | s with f | ull clu  | utches  |      |       |          |          |       | 96.69  | ł    |         |
| Observed m     | ature fe | emales v         | with ful | ll cluto | ches    |      |       |          |          |       | 95.9   | ł    |         |
| Ratio of e     | mpty to  | "with $\epsilon$ | eggs" fo | or crabs | s >99mm | (    | 7     | 4536     | ).       |       | 0.002  |      |         |

Appendix Table 11 .--Bristol Bay red king crab clutch size data from the 1979 survey (old shells excluded).

|            |           | сьи      | тсн      |         | FUL     | LNE  | SS    |          |          |       |        | Ac         | ljusted |
|------------|-----------|----------|----------|---------|---------|------|-------|----------|----------|-------|--------|------------|---------|
| Carapace   |           |          |          |         |         |      |       |          | Observed | Calcu | lated  | With       | to      |
| lg.group   | Empty     | 1/8      | 1/4      | 1/2     | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs       | "Full"  |
| 65 - 69    |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 70 - 74    |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 75 - 79    | 20        |          |          | 1       |         |      |       | 165      | 21       | 0.8   | 1.8    | 1          | 0.5     |
| 80 - 84    | 56        |          |          | 7       | 1       | 26   |       | 62       | 90       | 28.2  | 62.2   | 34         | 30.3    |
| 85 - 89    | 127       | 7        | 25       | 102     | -31     | 12   |       | 36       | 304      | 146.8 | 323.8  | 177        | 93.4    |
| 90 - 94    | 98        |          | 9        | 94      | 188     | 65   | 1     | 14       | 455      | 296.0 | 653.0  | 357        | 256.4   |
| 95 - 99    | 54        | 5        | . 8      | 9       | 81      | 77   | 2     | 2        | 236      | 150.9 | 332.9  | 182        | 147.1   |
| 100 -104   | 89        | 7        | 15       | 3       | 20      | 104  | 4     |          | 242      | 126.9 | 242.0  | 153        | 129.6   |
| 105 -109   | 74        | 1        | 1        | 14      | 55      | 55   | 6     |          | 206      | 109.5 | 206.0  | 132        | 110.4   |
| 110 -114   | 85        | 4        | 8        | 5       | 8       | 32   | 12    |          | 154      | 57.2  | 154.0  | 69         | 56.5    |
| 115 -119   | 67        |          | 1        |         | 12      | 21   | 6     |          | 107      | 33.2  | 107.0  | 40         | 37.0    |
| 120 -124   | 26        |          | 1        | 1       | 1       | 13   | 5     |          | 47       | 17.4  | 47.0   | 21         | 20.1    |
| 125 -129   | 20        |          | 1        | 2       | 1       | 13   | 2     |          | 39       | 15.8  | 39.0   | 19         | 17.3    |
| 130 -134   | 9         |          |          |         |         | 8    | 1     |          | 18       | 7.5   | 18.0   | 9          | 9.1     |
| 135 -139   | 3         |          |          |         | 1       | 4    |       |          | 8        | 4.1   | 8.0    | 5          | 4.8     |
| 140 -144   | 1         |          |          |         |         | 1    | 1     |          | 3        | 1.7   | 3.0    | 2          | 2.1     |
| 145 -149   |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 150 -154   |           |          |          |         |         | 1    |       |          | 1        | 0.8   | 1.0    | 1          | 1.0     |
| 155 -159   |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 160 -164   |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 165 -169   |           |          |          |         |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| TOTALS     |           |          |          |         |         |      |       |          | 1931     |       | 2198.8 |            | 915.5   |
| Calculated | l mature  | female   | s with : | full cl | utches  |      |       |          |          |       | 41.6   | 00         |         |
| Observed m | nature fo | emales v | with fu  | ll clut | ches    |      |       |          |          |       | 47.4   | <b>3</b> 6 |         |
| Ratio of e | empty to  | "with o  | eggs" f  | or crab | s >99mm | i (  | 374   | 451      | )        |       | 0.829  |            |         |

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|            |          | CLU      | тсн      |          | FUI     | LNE  | SS    |          |          |       |        | Ac         | ljusted |
|------------|----------|----------|----------|----------|---------|------|-------|----------|----------|-------|--------|------------|---------|
| Carapace   |          |          |          |          |         |      |       |          | Observed | Calcu | lated  | With       | to      |
| lg.group   | Empty    | 1/8      | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs       | "Full"  |
| 65 - 69    |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 70 - 74    |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 75 - 79    | 25       |          |          |          |         | 6    |       | 119      | 31       | 0.3   | 6.3    | 6          | 6.0     |
| 80 - 84    | 37       |          |          | 2        | 4       | 25   |       | 137      | 68       | 1.5   | 32.5   | 31         | 29.0    |
| 85 - 89    | 56       |          |          | 4        | 17      | 132  |       | 86       | 209      | 7.4   | 160.4  | 153        | 146.8   |
| 90 - 94    | 35       | 1        | 2        | 3        | 26      | 247  |       | 33       | 314      | 13.5  | 292.5  | 279        | 268.6   |
| 95 - 99    | 9        | 1        |          | 9        | 34      | 282  |       | 5        | 335      | 15.7  | 341.7  | 326        | 312.1   |
| 100 -104   | 19       | 1        | 1        | 8        | 29      | 276  |       |          | 334      | 15.2  | 334.0  | 315        | 302.1   |
| 105 -109   | 21       |          | 4        | 7        | 24      | 293  |       |          | 349      | 15.8  | 349.0  | 328        | 315.5   |
| 110 -114   | 15       | 2        | 3        | 4        | 45      | 354  |       | 1        | 424      | 19.7  | 424.0  | 408        | 390.8   |
| 115 -119   | 17       | 3        | . 1      | 9        | 33      | 355  |       |          | 418      | 19.3  | 418.0  | 401        | 384.9   |
| 120 -124   | 11       |          | 1        | 2        | 26      | 214  |       |          | 254      | 11.7  | 254.0  | 243        | 234.8   |
| 125 -129   | 6        |          | 2        | 3        | 8       | 94   |       |          | 113      | 5.2   | 113.0  | 107        | 102.0   |
| 130 -134   | 1        |          |          | 3        | 5       | 59   |       |          | 68       | 3.2   | 68.0   | 67         | 64.3    |
| 135 -139   | 1        |          |          |          | 3       | 16   |       | -        | 20       | 0.9   | 20.0   | 19         | 18.3    |
| 140 -144   |          |          |          |          | 1       | 12   |       |          | 13       | 0.6   | 13.0   | 13         | 12.8    |
| 145 -149   |          |          |          |          |         | 5    |       |          | 5        | 0.2   | 5.0    | 5          | 5.0     |
| 150 -154   |          |          |          |          |         | 1    |       |          | 1        | 0.0   | 1.0    | 1          | 1.0     |
| 155 -159   |          |          | 1        |          |         |      |       |          | 1        | 0.0   | 1.0    | 1          | 0.3     |
| 160 -164   |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| 165 -169   |          |          |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0          | 0.0     |
| TOTALS     |          |          |          |          |         |      |       |          | 2957     |       | 2833.3 |            | 2594.0  |
| Calculated | mature   | females  | s with f | Eull clu | utches  |      |       |          | ,        |       | 91.6   | <b>0</b> 0 |         |
| Observed m | ature fe | emales v | with fu  | ll clut  | ches    |      |       |          |          |       | 87.7   | 8          |         |
| Ratio of e | mpty to  | "with e  | eggs" fo | or crab  | s >99mm | 1 (  | 92    | 1908     | )        |       | 0.048  |            |         |

Appendix Table 13. --Bristol Bay red king crab clutch size data from the 1981 survey (old shells excluded).

|            |          | СLU      | тсн     |          | FUL    | LNE        | SS    |          |          |       |        | Ac   | ljusted |
|------------|----------|----------|---------|----------|--------|------------|-------|----------|----------|-------|--------|------|---------|
| Carapace   |          |          |         |          |        |            |       |          | Observed | Calcu | lated  | With | to      |
| lg.group   | Empty    | 1/8      | l/4     | 1/2      | 3/4    | Full       | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 65 - 69    |          |          |         |          |        | -          |       |          |          |       |        |      |         |
| 70 - 74    |          |          |         |          |        |            |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 75 - 79    | 270      |          |         | 2        | 1      | 2          |       | . 1      | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 90 - 94    | 107      |          |         | د        | - 4    | 17         |       | 41       | 388      | 1.0   | 11.0   | 10   | /.5     |
| 95 - 94    | 167      |          |         | 7        | 27     | 17         |       | 30       | 231      | 4.6   | 48.6   | 44   | 37.3    |
| 90 - 91    | 104      | 1        |         | ,        | 35     | 48         |       | 17       | 244      | 9.3   | 99.3   | 90   | 77.8    |
| 95 - 99    | 36       | 1        |         |          | 20     | 100        |       | 9        | 207      | 16.9  | 179.9  | 163  | 148.1   |
| 100 - 104  | ЭО<br>В  |          |         |          | 20     | 20         |       | 1 1      | 191      | 16.0  | 171.0  | 155  | 14/.6   |
| 105 -109   | 1        |          |         | С        | 11     | 22         |       | I        | 59       | 5.2   | 59.0   | 50   | 4/.3    |
| 110 -114   | 1        |          |         | 2        | د<br>۸ | 25         |       |          | 16       | 2.9   | 29.0   | 28   | 20.3    |
| 115 -119   | 1        |          |         |          |        | <b>1</b> 1 |       |          | 10       | 1.0   | 16.0   | 15   | 14.0    |
| 120 -124   | 1        |          |         |          | 2      | 10         |       |          | 10       | 1.4   | 13.0   | 14   | 12.8    |
| 125 -129   | י<br>י   |          |         |          | 2      | 10         |       |          | 13       | 1.2   | 13.0   | 12   | 11.5    |
| 130 -134   | 2        |          |         |          |        | 1          |       |          | 9        | 0.7   | 9.0    | /    | /.0     |
| 135 -139   |          |          |         |          |        | 2          |       |          | ו<br>כ   | 0.1   | 1.0    | 1    | 1.0     |
| 140 -144   |          |          |         |          | 1      | 5          |       |          | 4        | 0.2   | 2.0    | Ζ.   | 2.0     |
| 145 -149   |          |          |         |          | 1      | 5          |       |          | 6        | 0.6   | 6.0    | 6    | 5.8     |
| 150 -154   |          |          |         |          |        |            |       |          | 4        | 0.4   | 4.0    | 4    | 4.0     |
| 155 -159   |          |          |         |          |        | 41<br>1    |       |          | 4        | 0.4   | 4.0    | 4    | 4.0     |
| 160 -164   |          |          |         |          |        | 1          |       |          | 1        | 0.1   | 1.0    | 1    | 1.0     |
| 165 -169   |          |          |         |          |        | · · ·      |       |          | 1        | 0.1   | 1.0    | 1    | 1.0     |
| 105 105    |          |          |         |          |        |            |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS     |          |          |         |          |        |            |       |          | 1481     |       | 669.8  |      | 555.8   |
| Calculated | l mature | females  | s with  | full clu | itches |            |       |          |          |       | 83.0   | 8    |         |
| Observed m | ature f  | emales v | with fu | ll cluto | ches   |            |       |          |          |       | 37.5   | à    |         |
| Ratio of e | empty to | "with o  | eggs" f | or crabs | >99mm  | . (        | 15    | 145      | )        |       | 0.103  | •    |         |

Appendix Table 14.--Bristol Bay red king crab clutch size data from the 1982 survey (old shells excluded).

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|                  |          | сьи    | тсн     |          | FUL     | LNE  | S S   |          |                    |                |        |              |              |
|------------------|----------|--------|---------|----------|---------|------|-------|----------|--------------------|----------------|--------|--------------|--------------|
| Carapace         | Empty    | 1/8    | 1/4     | 1/2      | 3/4     | Full | >Full | Immature | Observed<br>Mature | Calcu<br>Empty | Mature | With<br>Eaas | to<br>"Full" |
|                  |          |        |         | ., -     |         |      |       |          |                    |                |        |              |              |
| 65 - 69          |          |        |         |          |         |      |       |          | 0                  | 0.0            | 0.0    | 0            | 0.0          |
| 70 - 74          |          |        |         |          |         | 1    |       | 86       | 1                  | 0.1            | 1.1    | 1            | 1.0          |
| 75 - 79          |          |        |         |          |         | 1    |       | 108      | 1                  | 0.1            | 1.1    | 1            | 1.0          |
| 80 - 84          |          |        |         |          |         | 10   |       | 131      | 10                 | 0.9            | 10.9   | 10           | 10.0         |
| 85 - 89          |          |        |         |          | 1       | 29   |       | 116      | 30                 | 2.6            | 32.6   | 30           | 29.8         |
| 90 - 94          |          |        |         | 2        | 2       | 40   |       | · 49     | 44                 | 3.7            | 47.7   | 44           | 42.5         |
| 95 <b>-</b> 99   | 2        |        |         | 1        |         | 59   |       | 13       | 62                 | 5.1            | 65.1   | 60           | 59.5         |
| 100 -104         | 2        |        |         |          |         | 30   |       | 1        | 33                 | 2.6            | 33.0   | 30           | 30.0         |
| 105 -109         |          |        |         |          | 1       | 17   |       |          | 18                 | 1.5            | 18.0   | 18           | 17.8         |
| 110 -114         | 1        |        |         |          |         | 8    |       |          | 9                  | 0.7            | 9.0    | 8            | 8.0          |
| 115 -119         | 3        |        |         |          |         | 12   |       |          | 15                 | 1.0            | 15.0   | 12           | 12.0         |
| 120 -124         |          |        |         | 1        |         | 7    |       |          | 8                  | 0.7            | 8.0    | 8            | 7.5          |
| 125 -129         | 1        |        |         |          |         | 10   |       |          | 11                 | 0.9            | 11.0   | 10           | 10.0         |
| 130 -134         |          |        |         |          |         | 2    | r     |          | 2                  | 0.2            | 2.0    | 2            | 2.0          |
| 135 -139         |          |        |         |          |         | 3    |       |          | 3                  | 0.3            | 3.0    | 3            | 3.0          |
| 140 -144         |          |        |         |          |         |      |       |          | 0                  | 0.0            | 0.0    | 0            | 0.0          |
| 145 -149         |          |        |         |          |         | 1    |       |          | 1                  | 0.1            | 1.0    | 1            | 1.0          |
| 150 -154         |          |        |         |          |         | 2    |       |          | 2                  | 0.2            | 2.0    | 2            | 2.0          |
| 155 <b>-</b> 159 |          |        |         |          |         |      |       |          | 0                  | 0.0            | 0.0    | 0            | 0.0          |
| 160 -164         |          |        |         |          |         |      |       |          | 0                  | 0.0            | 0.0    | 0            | 0.0          |
| 165 -169         |          |        |         |          |         |      |       |          | 0                  | 0.0            | 0.0    | 0            | 0.0          |
| TOTALS           |          |        |         |          |         |      |       |          | 250                |                | 260.4  |              | 237.0        |
| Calculated       | mature   | female | s with  | full clu | utches  |      |       |          |                    |                | 91.0   | 8            |              |
| Observed m       | ature fe | emales | with fu | ll cluto | ches    |      |       |          |                    |                | 94.8   | *            |              |
| Ratio of e       | mpty to  | "with  | eggs" f | or crabs | 5 >99mm | n (  | 8     | 94       | )                  |                | 0.085  |              |              |

Appendix Table 15. --Bristol Bay red king crab clutch size data from the 1983 survey (old shells excluded).

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|                |          | CLU      | ТСН      |          | FUL     | LNE  | s s      |          |          |       |        | Ac   | ljusted |
|----------------|----------|----------|----------|----------|---------|------|----------|----------|----------|-------|--------|------|---------|
| Carapace       |          | •        |          |          |         |      |          |          | Observed | Calcu | lated  | With | to      |
| lg.group       | Empty    | 1/8      | 1/4      | 1/2      | 3/4     | Full | >Full    | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 65 - 69        |          |          |          |          |         | 1    | <u> </u> | 276      | 1        | 0.0   | 1.0    | 1    | 1.0     |
| 70 - 74        |          |          |          |          |         | 1    |          | 814      | 1        | 0.0   | 1.0    | 1    | 1.0     |
| 75 - 79        | 1        |          |          | 21       |         | 24   |          | 1446     | 46       | 0.4   | 45.4   | 45   | 34.5    |
| 80 - 84        | 25       |          |          | 27       | 1       | 42   |          | 1204     | 95       | 0.6   | 70.6   | 70   | 56.3    |
| 85 - 89        | 17       | 1        | 11       | 65       | 42      | 164  |          | 522      | 300      | 2.2   | 285.2  | 283  | 230.9   |
| 90 <b>- 94</b> | 15       | . 1      | 3        | 37       | 22      | 291  |          | 135      | 369      | 2.8   | 356.8  | 354  | 326.9   |
| 95 - 99        | 5        |          | 3        | 28       | 28      | 276  |          | 6        | . 340    | 2.6   | 337.6  | 335  | 311.8   |
| 100 -104       |          |          |          | 22       | 65      | 155  |          |          | 242      | 1.9   | 242.0  | 242  | 214.8   |
| 105 -109       |          |          |          | 4        | 5       | 76   |          |          | 85       | 0.7   | 85.0   | 85   | 81.8    |
| 110 -114       | 2        |          |          | 1        | 3       | 26   |          | 1        | 33       | 0.2   | 33.0   | 30   | 28.8    |
| 115 -119       |          |          |          | 1        | 2       | 11   |          |          | 14       | 0.1   | 14.0   | 14   | 13.0    |
| 120 -124       |          |          |          |          |         | 4    |          |          | 4        | 0.0   | 4.0    | 4    | 4.0     |
| 125 -129       |          |          |          |          | 1       | 2    |          |          | 3        | 0.0   | 3.0    | 3    | 2.8     |
| 130 -134       |          |          |          |          |         | 2    |          |          | 2        | 0.0   | 2.0    | 2    | 2.0     |
| 135 -139       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 140 -144       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 145 -149       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 150 -154       |          |          |          |          |         | 1    |          |          | 1        | 0.0   | 1.0    | 1    | 1.0     |
| 155 -159       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 160 -164       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 165 -169       |          |          |          |          |         |      |          |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS         |          |          |          |          |         |      |          |          | 1536     |       | 1481.6 |      | 1310.3  |
| Calculated     | mature   | females  | s with i | full clu | utches  |      |          |          |          |       | 88.4   | 98   |         |
| Observed m     | ature fo | emales v | with fu  | 11 clute | ches    |      | -        |          | ,        |       | 85.3   | 8    |         |
| Ratio of e     | mpty to  | "with o  | eggs" fo | or crabs | s >99mm | i (  | 3        | 381      | )        |       | 0.008  |      |         |

| Appendix | Table | 16 | Bristol | Вау | red | king | crab | clutch | size | data | from | the | 1984 | survey | (old | shells | excluded). |
|----------|-------|----|---------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|------------|
|----------|-------|----|---------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|------------|

|           |       | CLU | ЛТСН |     | FUI | LNE  | s s   |          |          |       |        | A    | ijusted |
|-----------|-------|-----|------|-----|-----|------|-------|----------|----------|-------|--------|------|---------|
| Carapace  |       |     |      |     |     |      |       |          | Observed | Calcu | lated  | With | to      |
| lg.group  | Empty | 1/8 | 1/4  | 1/2 | 3/4 | Full | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 65 - 69   |       |     |      |     |     |      |       |          | . 0      | 0.0   | 0.0    | 0    | 0.0     |
| 70 - 74   |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 75 - 79   |       |     |      | 1   |     |      |       | 46       | 1        | 0.1   | 1.1    | 1    | 0.5     |
| 80 - 84   | 4     |     |      |     | 2   | 9    |       | 48       | 15       | 1.5   | 12.5   | 11   | 10.5    |
| 85 - 89   | 1     |     |      | 2   | 11  | 41   |       | 23       | 55       | 7.4   | 61.4   | 54   | 50.3    |
| 90 - 94   | 2     |     |      | 2   | 9   | 49   |       | 4        | 62       | 8.2   | 68.2   | 60   | 56.8    |
| 95 - 99   | 1     |     | · 1  | 1   | 5   | 52   | 1     |          | 61       | 8.2   | 68.2   | 60   | 57.6    |
| 100 -104  | 4     |     |      | 3   |     | 40   |       |          | 47       | 5.9   | 47.0   | 43   | 41.5    |
| 105 -109  | 2     |     |      |     | 2   | 14   |       | 1        | 19       | 2.2   | 19.0   | 16   | 15.5    |
| 110 -114  | 1     |     |      |     |     | 7    |       |          | 8        | 1.0   | 8.0    | 7    | 7.0     |
| 115 -119  |       |     |      |     |     |      |       |          | . 0      | 0.0   | 0.0    | 0    | 0.0     |
| 120 -124  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 125 -129  | 1     |     |      |     |     |      |       |          | 1        | 0.0   | 1.0    | 0    | 0.0     |
| 130 -134  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 135 -139  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 140 -144  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 145 -149  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| .150 -154 |       |     |      |     |     | •    |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 155 -159  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 160 -164  |       |     |      |     |     |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 165 -169  |       |     |      |     | •   |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS    |       |     |      |     |     |      |       |          | 269      |       | 286.4  |      | 239.6   |

| Appendix | Table | 17 | Bristol | Bay | red | king | crab | clutch | size | data | from | the | 1985 | survey | (old | shells | excluded) |  |
|----------|-------|----|---------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|-----------|--|
|----------|-------|----|---------|-----|-----|------|------|--------|------|------|------|-----|------|--------|------|--------|-----------|--|

| Calculated mature females with full clutches  |   |   |      | 83.7% |
|---|---|---|------|-------|
| Observed mature females with full clutches    |   |   |      | 89.1% |
| Ratio of empty to "with eggs" for crabs >99mm | ( | 9 | 66 ) | 0.136 |

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|                    |          | CLU    | тсн      |          | FUL     | LNE  | SS    |          |          |       |        | А    | djusted |
|--------------------|----------|--------|----------|----------|---------|------|-------|----------|----------|-------|--------|------|---------|
| Carapace           |          |        |          |          |         |      |       |          | Observed | Calcu | lated  | With | to      |
| lg.group           | Empty    | 1/8    | 1/4      | 1/2      | 3/4     | Full | >Full | Immature | Mature   | Empty | Mature | Eggs | "Full"  |
| 65 - 69            |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 70 - 74            |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 75 - 79            |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 80 - 84            |          |        |          |          | 1       |      |       | 35       | 1.       | 0.5   | 1.5    | 1    | 0.8     |
| 85 <del>-</del> 89 |          |        |          |          | 4       | 10   |       | 23       | 14       | 6.7   | 20.7   | 14   | 13.0    |
| 90 - 94            | 3        |        |          |          |         | 23   |       | 17       | 26       | 11.0  | 34.0   | 23   | 23.0    |
| 95 - 99            | 1        |        |          | 1        | 6       | 23   |       | 2        | 31       | 14.3  | 44.3   | 30   | 28.0    |
| 100 -104           | 6        |        |          |          | 3       | 18   |       |          | 27       | 10.0  | 27.0   | 21   | 20.3    |
| 105 -109           | 8        |        |          |          | 3       | 10   |       | 1        | 22       | 6.2   | 22.0   | 13   | 12.3    |
| 110 -114           | 4        |        |          |          |         | 5    |       |          | 9        | 2.4   | 9.0    | 5    | 5.0     |
| 115 -119           | 2        |        |          |          |         | 2    |       |          | 4        | 1.0   | 4.0    | 2    | 2.0     |
| 120 -124           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 125 -129           |          |        |          |          |         | 1    |       |          | 1        | 0.5   | 1.0    | 1    | 1.0     |
| 130 -134           |          |        |          |          |         | 1    |       |          | 1        | 0.5   | 1.0    | 1    | 1.0     |
| 135 -139           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 140 -144           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 145 -149           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 150 -154           |          |        |          |          |         | 1    |       |          | 1        | 0.5   | 1.0    | 1    | 1.0     |
| 155 -159           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 160 -164           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| 165 -169           |          |        |          |          |         |      |       |          | 0        | 0.0   | 0.0    | 0    | 0.0     |
| TOTALS             |          |        |          |          |         |      |       |          | 137      |       | 165.5  |      | 107.3   |
| Calculated         | mature   | female | s with f | ull ch   | utches  |      |       |          |          |       | 64.8   | 00   |         |
| Observed m         | ature fe | emales | with ful | ll cluto | ches    |      |       |          |          |       | 78.3   | 1    |         |
| Ratio of e         | mpty to  | "with  | eggs" fo | or crabs | s >99mm | (    | 21    | - 44     | )        |       | 0.477  |      |         |

Appendix Table 18.--Bristol Bay red king crab clutch size data from the 1986 survey (old shells excluded).

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APPENDIX TABLES 19-39

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Simulations of the 1986 Bristol Bay Red King Crab Fishery and Stock, Using Minimum size Limits From 6.50" to 5.00", and Handling Mortality Fractions From 0 to .7.

The following tables give the data used and results obtained for simulations of the **1986** stock and fishery for red king crab in Bristol Bay. The size limit is lowered from 6.5" to 5.0' by .25" reductions, and handling mortality on sublegal males is set at either 0, .3 or .7. Each table shows a size limit-handling mortality combination. The top half of each table shows the catch and stock characteristics by 5mm size groups, before and after fishing. The bottom half of each table summarizes results over various larger size groupings: total catch and average size of landed crabs, total handling deaths for males >89mm, total stock and average weight of females >89mm, and total stock and average weight for males >**119mm** both before and after fishing. Sex and size ratios before and after fishing are also presented. Appendix Table 19. --Effect of a 6.5" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = 0.

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| CARAPACE             | M<br>BEFOF | ALES<br>RE FISHI | ING   |           | HAND- |           | MALES     | S REMAIN  | NING   | F        | EMAT.    | ES    | ₽ልጥፐ  | 09.   | ANDLING |
|----------------------|------------|------------------|-------|-----------|-------|-----------|-----------|-----------|--------|----------|----------|-------|-------|-------|---------|
| LG.GROUP             |            |                  | (wt./ | EXPLOIT.  | LING  | CATCH     |           |           | (wt./  |          |          | (wt./ | SEX   | SIZE  | DEATHS  |
| (mm)                 | (mlns.)(m  | nln.lb.)         | crab) | RATE      | MORT. | (mln.1b.) | (mlns.)   | (mln.lb.) | (crab) | (mlns.)( | mln.lbs. | crab) | (F:M) | (M:F) | (mlns.) |
| 90 - 94              | 0.93       | 1.19             | 1.28  | 0.00      | 0     | 0.00      | 0.93      | 1.19      | 1.28   | 1.13     | 1.39     | 1.23  | 1.22  | 1.04  | 0.00    |
| 95 - 99              | 2.04       | 3.09             | 1.51  | 0.00      | 0     | 0.00      | 2.04      | 3.09      | 1.51   | 1.18     | 1.63     | 1.38  | 0.58  | 1.09  | 0.00    |
| 100 -104             | 2.54       | 4.49             | 1.77  | 0.00      | 0     | 0.00      | 2.54      | 4.49      | 1.77   | 1.26     | 1.94     | 1.54  | 0.50  | 1.15  | 0.00    |
| 105 -109             | 2.78       | 5.72             | 2.06  | 0.00      | 0     | 0.00      | 2.78      | 5.72      | 2.06   | 1.04     | 1.79     | 1.73  | 0.37  | 1.19  | 0.00    |
| 110 -114             | 2.22       | 5.27             | 2.37  | 0.00      | 0     | 0.00      | 2.22      | 5.27      | 2.37   | 0.35     | 0.67     | 1.90  | 0.16  | 1.25  | 0.00    |
| 115 -119             | 2.54       | 6.95             | 2.73  | 0.00      | 0     | 0.00      | 2.54      | 6.95      | 2.73   | 0.29     | 0.61     | 2.10  | 0.11  | 1.30  | 0.00    |
| 120 -124             | 2.60       | 8.09             | 3.11  | 0.00      | 0     | 0.00      | 2.60      | 8.09      | 3.11   | 0.03     | 0.07     | 2.43  | 0.01  | 1.28  | 0.00    |
| 125 -129             | 2.37       | 8.37             | 3.53  | 0.00      | 0     | 0.00      | 2.37      | 8.37      | 3.53   | 0.03     | 0.08     | 2.57  | 0.01  | 1.38  | 0.00    |
| 130 -134             | 2.60       | 10.41            | 4.00  | 0.05      | 0     | 0.52      | 2.47      | 9.89      | 4.00   |          |          |       | 0.00  |       | 0.00    |
| 135 -139             | 2.34       | 10.54            | 4.50  | 0.30      | 0     | 3.16      | 1.64      | 7.38      | 4.50   | 0.03     | 0.09     | 3.01  | 0.02  | 1.49  | 0.00    |
| 140 -144             | 1.57       | 7.91             | 5.04  | 0.40      | 0     | 3.16      | 0.94      | 4.74      | 5.04   |          |          |       | 0.00  |       | 0.00    |
| 145 -149             | 1.28       | 7.16             | 5.60  | 0.40      | 0     | 2.87      | 0.77      | 4.30      | 5.60   |          |          |       | 0.00  |       | 0.00    |
| 150 -154             | 0.50       | 3.10             | 6.21  | 0.40      | 0     | 1.24      | 0.30      | 1.86      | 6.21   |          |          |       | 0.00  |       | 0.00    |
| 155 -159             | 0.14       | 0.95             | 6.75  | 0.40      | 0     | 0.38      | 0.08      | 0.57      | 6.75   |          |          |       | 0.00  |       | 0,00    |
| 160 -164             | 0.08       | 0.59             | 7.33  | 0.40      | 0     | 0.23      | 0.05      | 0.35      | 7.33   |          |          |       | 0.00  |       | 0.00    |
|                      |            |                  |       | TOTAL CAT | CH =  | 11.56     |           |           |        |          |          |       |       |       |         |
|                      |            |                  |       | AVERAGE V | ИТ. = | 5.12      |           |           |        |          |          |       |       |       |         |
|                      | BEFORE     | FISHING          | ;     |           |       |           | AFTER     | FISHING   | ;      |          |          |       |       |       |         |
| TOTALS:              |            |                  | -     |           |       |           |           |           |        |          |          |       |       |       |         |
| MALE>89<br>FEMALE>89 | ):<br>):   |                  |       |           |       |           |           |           |        | 5.34     | . 8.27   | 1.55  |       |       | 0.00    |
|                      |            |                  |       |           |       |           |           |           |        |          |          |       |       |       |         |
| MALE>119:            | 13.48      | 57.12            | 4.24  |           |       |           | 11.22     | 45.56     | 4.06   |          |          |       |       |       |         |
|                      | SEX RATIO  | (F:M):           | 0.40  |           |       |           | SEX RATIO | (F:M):    | 0.48   |          |          |       |       |       |         |
|                      | SIZE RATI  | O(M:F):          | 2.74  |           |       | 2         | SIZE RATI | O(M:F):   | 2.62   |          |          |       |       |       |         |

| СЛРАРАСЕ             | M<br>BFFOR | ALES<br>E FISHI     | NG             |                  | HAND-          |                    | MALES<br>AFTE | REMAIN:<br>R FISHIN  | ING<br>G       | F        | EMAL     | ES             | RATI         | IOS: 1     | HANDLING          |
|----------------------|------------|---------------------|----------------|------------------|----------------|--------------------|---------------|----------------------|----------------|----------|----------|----------------|--------------|------------|-------------------|
| LG.GROUP<br>(mm)     | (mlns.)(m  | ln.1b.)             | (wt./<br>crab) | EXPLOIT.<br>RATE | LING<br>MORT.  | CATCH<br>(mln.lb.) | (mlns.)       | (mln.lb.)            | (wt./<br>crab) | (mlns.)( | mln.lbs. | (wt./<br>crab) | SEX<br>(F:M) | SIZE)(M:F) | DEATHS<br>(mlns.) |
| 90 - 94              | 0.93       | 1.19                | 1.28           | 0.00             | 0.3            | 0.00               | 0.82          | 1.05                 | 1.28           | 1.13     | 1.39     | 1.23           | 1.38         | 1.04       | .0.11             |
| 95 - 99              | 2.04       | 3.09                | 1.51           | 0.00             | 0.3            | 0.00               | 1.80          | 2.72                 | 1.51           | 1.18     | 1.63     | 1.38           | 0.66         | 1.09       | 0.24              |
| 100 -104             | 2.54       | 4.49                | 1.77           | 0.00             | 0.3            | 0.00               | 2.24          | 3.95                 | 1.77           | 1.26     | 1.94     | 1.54           | 0.56         | 1.15       | 0.30              |
| 105 -109             | 2.78       | 5.72                | 2.06           | 0.00             | 0.3            | 0.00               | 2.45          | 5.03                 | 2.06           | 1.04     | 1.79     | 1.73           | 0.43         | 1.19       | 0.33              |
| 110 -114             | 2.22       | 5.27                | 2.37           | 0.00             | 0.3            | 0.00               | 1.95          | 4.64                 | 2.37           | 0.35     | 0.67     | 1.90           | 0.18         | 1.25       | 0.27              |
| 115 -119             | 2.54       | 6.95                | 2.73           | 0.00             | 0.3            | 0.00               | 2.24          | 6.11                 | 2.73           | 0.29     | 0.61     | 2.10           | 0.13         | 1.30       | 0.30              |
| 120 -124             | 2.60       | 8.09                | 3.11           | 0.00             | 0.3            | 0.00               | 2.29          | 7.12                 | 3.11           | 0.03     | 0.07     | 2.43           | 0.01         | 1.28       | 0.31              |
| 125 -129             | 2.37       | 8.37                | 3.53           | 0.00             | 0.3            | 0.00               | 2,09          | 7.37                 | 3.53           | 0.03     | 0.08     | 2.57           | 0.01         | 1.38       | 0.28              |
| 130 -134             | 2.60       | 10.41               | 4.00           | 0.05             | 0.3            | 0.52               | 2.20          | 8.80                 | 4.00           |          |          |                | 0.00         |            | 0.27              |
| 135 -139             | 2.34       | 10.54               | 4.50           | 0.30             | 0.3            | 3.16               | 1.57          | 7.06                 | 4.50           | 0.03     | 0.09     | 3.01           | 0.02         | 1.49       | 0.07              |
| 140 -144             | 1.57       | 7.91                | 5.04           | 0.40             | 0.3            | 3.16               | 0.94          | 4.74                 | 5.04           |          |          |                | 0.00         |            | 0.00              |
| 145 -149             | 1.28       | 7.16                | 5.60           | 0.40             | 0.3            | 2.87               | 0.77.         | 4.30                 | 5.60           |          |          |                | 0.00         |            | 0.00              |
| 150 -154             | 0.50       | 3,10                | 6.21           | 0.40             | 0.3            | 1.24               | 0.30          | 1.86                 | 6.21           |          |          |                | 0.00         |            | 0.00              |
| 155 -159             | 0.14       | 0.95                | 6.75           | 0.40             | 0.3            | • 0.38             | 0.08          | 0.57                 | 6.75           |          |          |                | 0.00         |            | 0.00              |
| 160 -164             | 0.08       | 0.59                | 7.33           | 0.40             | 0.3            | 0.23               | 0.05          | 0.35                 | 7.33           |          |          |                | 0.00         |            | 0.00              |
|                      | ·          |                     |                | TOTAL CA         | TCH =<br>WT. = | 11.56<br>5.12      |               |                      |                |          |          |                |              |            |                   |
|                      | BEFORE     | FISHING             | 3              |                  |                |                    | AFTER         | FISHING              |                |          |          |                |              |            |                   |
| TOTALS:              |            |                     | -              |                  |                |                    |               |                      |                |          |          |                |              |            |                   |
|                      |            |                     |                |                  |                |                    |               |                      |                |          |          |                |              |            |                   |
| MALE>89<br>FEMALE>89 | ):<br>):   |                     |                |                  |                |                    |               |                      |                | 5.34     | 8.27     | 1.55           |              |            | 2.51              |
| MALE>119:            | : 13.48    | 57.12               | 4.24           |                  |                |                    | 10.28         | 42.17                | 4.10           |          |          |                |              |            |                   |
|                      |            |                     |                |                  |                |                    |               |                      |                |          |          |                |              |            |                   |
|                      | SEX RATIC  | ) (F:M):<br>O(M:F): | 0.40<br>2.74   |                  |                |                    | SEX RATIC     | ) (F:M):<br>(O(M:F): | 0.52<br>2.65   |          |          |                |              |            |                   |

Appendix Table 20. --Effect of a 6.5" minimum size limit on sex and size ratios, red king crab, Bristol Bay, **1986** data, handling **mortality = .3**.

| CARAPACE             | . M<br>BEFOR | ALES<br>RE FISHI     | ING            |                  | HAND-          |                                  | MALES<br>AFTE | REMAIN<br>R FISHIN | IING<br>IG     | F        | EMAL     | ES             | RAT          | [0S: 1        | <b>lANDLING</b> |
|----------------------|--------------|----------------------|----------------|------------------|----------------|----------------------------------|---------------|--------------------|----------------|----------|----------|----------------|--------------|---------------|-----------------|
| LG.GROUP<br>(mm)     | (mlns.)(m    | ln.lb.)              | (wt./<br>crab) | EXPLOIT.<br>RATE | LING<br>MORT.  | CATCH<br>(mln.lb.)               | (mlns.)       | (mln.lb.)          | (wt./<br>crab) | (mlns.)( | mln.lbs. | (wt./<br>crab) | SEX<br>(F:M) | SIZE<br>(M:F) | DEATHS (mlns.)  |
| 90 - 94              | 0.93         | 1.19                 | 1.28           | 0.00             | 0.7            | 0.00                             | 0.67          | 0.86               | 1.28           | 1.13     | 1.39     | 1.23           | 1.69         | 1.04          | 0.26            |
| 95 - 99              | 2.04         | 3.09                 | 1.51           | 0.00             | 0.7            | 0.00                             | 1.47          | 2.22               | 1.51           | 1.18     | 1.63     | 1.38           | 0.80         | 1.09          | 0.57            |
| 100 -104             | 2.54         | 4.49                 | 1.77           | 0.00             | 0.7            | 0.00                             | 1.83          | 3.23               | 1.77           | 1.26     | 1.94     | 1.54           | 0.69         | 1.15          | 0.71            |
| 105 -109             | 2.78         | 5.72                 | 2.06           | 0.00             | 0.7            | 0.00                             | 2.00          | 4.12               | 2.06           | 1.04     | 1.79     | 1.73           | 0.52         | 1.19          | 0.78            |
| 110 -114             | 2.22         | 5.27                 | 2.37           | 0.00             | 0.7            | 0.00                             | 1.60          | 3.80               | 2.37           | 0.35     | 0.67     | 1.90           | 0.22         | 1.25          | 0.62            |
| 115 -119             | 2.54         | 6.95                 | 2.73           | 0.00             | 0.7            | 0.00                             | 1.83.         | 5.00               | 2.73           | 0.29     | 0.61     | 2.10           | 0.16         | 1.30          | 0.71            |
| 120 -124             | 2.60         | 8.09                 | 3.11           | 0.00             | 0.7.           | 0.00                             | 1.87          | 5.83               | 3.11           | 0.03     | 0.07     | 2.43           | 0.02         | 1.28          | 0.73            |
| 125 -129             | 2.37         | 8.37                 | 3.53           | 0.00             | 0.7            | 0.00                             | 1.71          | 6.03               | 3.53           | 0.03     | 0.08     | 2.57           | 0.02         | 1.38          | 0.66            |
| 130 -134             | 2.60         | 10.41                | 4.00           | 0.05             | 0.7            | 0.52                             | 1.83          | 7.34               | 4.00           |          |          |                | 0.00         |               | 0.64            |
| 135 -139             | 2.34         | 10.54                | 4.50           | 0.30             | 0.7            | 3.16                             | 1.47          | 6.64               | 4.50           | 0.03     | 0.09     | 3.01           | 0.02         | 1.49          | 0.16            |
| 140 -144             | 1.57         | 7.91                 | 5.04           | 0.40             | 0.7            | 3.16                             | 0.94          | 4.74               | 5.04           |          |          |                | 0.00         |               | 0.00            |
| 145 -149             | 1.28         | 7.16                 | 5.60           | 0.40             | 0.7            | 2.87                             | 0.77          | 4.30               | 5.60           |          |          |                | 0.00         |               | 0.00            |
| 150 -154             | 0.50         | 3.10                 | 6.21           | 0.40             | 0.7            | 1.24                             | 0.30          | 1.86               | 6.21           |          |          |                | 0.00         |               | 0.00            |
| 155 -159             | 0.14         | 0.95                 | 6.75           | 0.40             | 0.7            | 0.38                             | 0.08          | 0.57               | 6.75           |          |          |                | 0.00         |               | 0.00            |
| 160 -164             | 0.08         | 0.59                 | 7.33           | 0.40             | 0.7            | 0.23                             | 0.05          | 0.35               | 7.33           |          |          |                | 0.00         |               | 0.00            |
|                      |              |                      |                | TOTAL CA         | TCH =<br>WT. = | 11 <b>.</b> 56)<br>5 <b>.</b> 12 |               |                    |                |          |          |                |              |               |                 |
|                      | BEFORE       | FISHING              | ;              |                  |                |                                  | AFTER         | FISHING            | ;              |          |          |                |              |               |                 |
| TOTALS:              |              |                      |                |                  |                |                                  |               |                    |                |          |          |                |              |               |                 |
| MALE>89<br>FEMALE>89 | :            |                      |                |                  |                |                                  |               |                    |                | 5.34     | 8.27     | 1.55           |              |               | 5.85            |
|                      | -            |                      |                |                  |                |                                  |               |                    |                |          |          |                |              |               |                 |
| MALE>119:            | 13.48        | 57.12                | 4.24           |                  |                |                                  | 9.03          | 37.66              | 4.17           |          |          |                |              |               |                 |
| <b>_</b>             | SEX RATIC    | ) (F:M):<br>[O(M:F); | 0.40           |                  | -              |                                  | SEX RATIO     | (F:M):<br>O(M:F):  | 0.59           |          |          |                |              |               |                 |

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Appendix Table 21.--Effect of a 6.5" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .7.

|                      | M                   | ALES                 | INC            |          |               |               | MALES                  | REMAIN              | ING            | E 1       | гмат     | FC    | דידי בי | 09.1  | HANDI TNG |          |
|----------------------|---------------------|----------------------|----------------|----------|---------------|---------------|------------------------|---------------------|----------------|-----------|----------|-------|---------|-------|-----------|----------|
| CARAPACE             | BEFOR               | E FISH.              |                |          | HAND-         | റമനവ          | AF1E                   |                     | $\frac{1}{1}$  | £         |          | (wt./ | SEX     | STZE  | DEATHS    |          |
| (mm)                 | (mlns.)(m           | ln.lb.)              | (wc./<br>crab) | RATE     | MORT.         | (mln.lb.)     | (mlns.)                | (mln.1b.)           | (wc./<br>crab) | (mlns.)(1 | mln.lbs. | crab) | (F:M)   | (M:F) | (mlns.)   |          |
| 90 - 94              | 0.93                | 1.19                 | 1.28           | 0.00     | 0.0           | 0.00          | 0.93                   | 1.19                | 1.28           | 1.13      | 1.39     | 1.23  | 1.22    | 1.04  | 0.00      |          |
| 95 - 99              | 2.04                | 3.09                 | 1.51           | 0.00     | 0.0           | 0.00          | 2.04                   | 3.09                | 1.51           | 1.18      | 1.63     | 1.38  | 0.58    | 1.09  | 0.00      |          |
| 100 -104             | 2.54                | 4.49                 | 1.77           | 0.00     | 0.0           | 0.00          | 2.54                   | 4.49                | 1.77           | 1.26      | 1.94     | 1.54  | 0.50    | 1.15  | 0.00      |          |
| 105 -109             | 2.78                | 5.72                 | 2.06           | 0.00     | 0.0           | 0.00          | 2.78                   | 5.72                | 2.06           | 1.04      | 1.79     | 1.73  | 0.37    | 1.19  | 0.00      |          |
| 110 -114             | 2.22                | 5.27                 | 2.37           | 0.00     | 0.0           | 0.00          | 2.22                   | 5.27                | 2.37           | 0.35      | 0.67     | 1.90  | 0.16    | 1.25  | 0.00      |          |
| 115 -119             | 2.54                | 6.95                 | 2.73           | 0.00     | 0.0           | 0.00          | 2.54                   | 6.95                | 2.73           | 0.29      | 0.61     | 2.10  | 0.11    | 1.30  | 0.00      |          |
| 120 -124             | 2.60                | 8.09                 | 3.11           | 0.00     | 0.0           | 0.00          | 2.60                   | 8.09                | 3.11           | 0.03      | 0.07     | 2.43  | 0.01    | 1,28  | 0.00      |          |
| 125 -129             | 2.37                | 8.37                 | 3.53           | 0.05     | 0.0           | 0.42          | 2.25                   | 7.95                | 3.00           | 0.03      | 0.08     | 2.51  | 0.00    | 1.30  | 0.00      |          |
| 130 -134             | 2.60                | 10.41                | 4.00           | 0.30     | 0.0           | 3.12          | 1.82                   | 6.29                | 4.00           | 0.02      | 0 00     | 2 01  | 0.00    | 1 /0  | 0.00      |          |
| 135 -139             | 2.34                | 7 01                 | 4.50           | 0.40     | 0.0           | 4.22          | 0.94                   | 0.32<br>A 7A        | 4.50<br>5.04   | 0.03      | 0.09     | 3.01  | 0.02    | 1.45  | 0.00      |          |
| 140 - 144            | 1.57                | 7.91                 | 5.60           | 0.40     | 0.0           | 2 87          | 0.74                   | 4.74                | 5 60           |           |          |       | 0.00    |       | 0.00      |          |
| 145 -149             | 1.20                | 2 10                 | 5.00           | 0.40     | 0.0           | 2.07          | 0.30                   | 1 96                | 6 21           |           |          |       | 0.00    |       | 0.00      | r4a<br>⊾ |
| 150 -154             | 0.50                | 0.05                 | 6 75           | 0.40     | 0.0           | 0.38          | 0.30                   | 0.57                | 6.75           |           |          |       | 0.00    |       | 0.00      | 7        |
| 160 -164             | 0.08                | 0.59                 | 7.33           | 0.40     | 0.0           | 0.38          | 0.05                   | 0.35                | 7.33           |           |          |       | 0.00    |       | 0.00      |          |
|                      |                     |                      |                | TOTAL CA | TCH =<br>WT.= | 15.64<br>4.79 |                        |                     |                |           |          |       |         |       |           |          |
|                      | BEFORE              | FISHIN               | 3              |          |               |               | AFTER                  | FISHING             | 3              |           |          |       |         |       |           |          |
| TOTALS:              |                     |                      | _              |          |               |               |                        |                     |                |           |          |       |         |       |           |          |
| MALE>89<br>FEMALE>89 | ):<br>):            |                      |                |          |               |               |                        |                     |                | 5.34      | 8.27     | 1.55  |         |       | 0.00      |          |
| MATEN110.            | 13 /8               | 57 12                | Л ЭЛ           |          |               |               | 10.22                  | 41-48               | 4-06           |           |          |       |         |       |           |          |
|                      |                     |                      |                |          |               |               |                        |                     |                |           |          |       |         |       |           |          |
|                      | SEX RATIONSIZE RATI | ) (F:M):<br>(O(M:F): | 0.40<br>2.74   |          |               |               | SEX RATIC<br>SIZE RATI | ) (F:M):<br>O(M:F): | 0.52<br>2.62   |           |          |       |         |       |           |          |

Appendix Table 22.--Effect of a 6.25" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = 0.

| CARAPACE  | M                      | ALES<br>E FISH      | ING          |                      | HAND-          |               | MALES                  | REMAIN<br>R FISHIN | IING<br>IG   | I F       | ЕМАЦ     | ES    | RATI  | 08: 1 | IANDLING |
|-----------|------------------------|---------------------|--------------|----------------------|----------------|---------------|------------------------|--------------------|--------------|-----------|----------|-------|-------|-------|----------|
| LG.GROUP  |                        |                     | (wt./        | EXPLOIT.             | LING           | CATCH         |                        |                    | (wt./        |           |          | (wt./ | SEX   | SIZE  | DEATHS   |
| (mm)      | (mlns.)(m              | ln.lb.)             | crab)        | RATE                 | MORT.          | (mln.lb.)     | (mlns.)                | (mln.lb.)          | crab)        | (mlns.)(r | nln.lbs. | crab) | (F:M) | (M:F) | (mlns.)  |
| 90 - 94   | 0.93                   | 1.19                | 1.28         | 0.00                 | 0.3            | 0.00          | 0.82                   | 1.05               | 1.28         | 1.13      | 1.39     | 1.23  | 1.38  | 1.04  | 0.11     |
| 95 - 99   | 2.04                   | 3.09                | 1.51         | 0.00                 | 0.3            | 0.00          | 1.80                   | 2.72               | 1.51         | 1.18      | 1.63     | 1.38  | 0.66  | 1.09  | 0.24     |
| 100 -104  | 2.54                   | 4.49                | 1.77         | 0.00                 | 0.3            | 0.00          | 2.24                   | 3.95               | 1.77         | 1.26      | 1.94     | 1.54  | 0.56  | 1.15  | 0.30     |
| 105 -109  | 2.78                   | 5.72                | 2.06         | 0.00                 | 0.3            | 0.00          | 2.45                   | 5.03               | 2.06         | 1.04      | 1.79     | 1.73  | 0.43  | 1.19  | 0.33     |
| 110 -114  | 2.22                   | 5.27                | 2.37         | 0.00                 | 0.3            | 0.00          | 1.95                   | 4.64               | 2.37         | 0.35      | 0.67     | 1.90  | 0.18  | 1.25  | 0.27     |
| 115 -119  | 2.54                   | 6.95                | 2.73         | 0.00                 | 0.3            | 0.00          | 2.24                   | 6.11               | 2.73         | 0.29      | 0.61     | 2.10  | 0.13  | 1.30  | 0.30     |
| 120 -124  | 2.60                   | 8.09                | 3.11         | 0.00                 | 0.3            | 0.00          | 2.29                   | 7.12               | 3.11         | 0.03      | 0.07     | 2.43  | 0.01  | 1.28  | 0.31     |
| 125 -129  | 2.37                   | 8.37                | 3.53         | 0.05                 | 0.3            | 0.42          | 2.00                   | 7.08               | 3.53         | 0.03      | 0.08     | 2.57  | 0.01  | 1.38  | 0.25     |
| 130 -134  | 2.60                   | 10.41               | 4.00         | 0.30                 | 0.3            | 3.12          | 1.74                   | 6,98               | 4.00         |           |          |       | 0.00  |       | 0.08     |
| 135 -139  | 2.34                   | 10.54               | 4.50         | 0.40                 | 0.3            | 4.22          | 1.40                   | 6.32               | 4.50         | 0.03      | 0.09     | 3.01  | 0.02  | 1.49  | 0.00     |
| 140 -144  | 1.57                   | 7.91                | 5.04         | 0.40                 | 0.3            | 3.16          | 0.94                   | 4.74               | 5.04         |           |          |       | 0.00  |       | 0.00     |
| 145 -149  | 1.28                   | 7.16                | 5.60         | 0.40                 | 0.3            | 2.87          | 0.77                   | 4.30               | 5.60         |           |          |       | 0.00  |       | 0.00     |
| 150 -154  | 0.50                   | 3.10                | 6.21         | 0.40                 | 0.3            | 1.24          | 0.30                   | 1.86               | 6.21         |           |          |       | 0.00  |       | 0.00     |
| 155 -159  | 0.14                   | 0.95                | 6.75         | 0.40                 | 0.3            | 0.38          | 0.08                   | 0.57               | 6.75         |           |          |       | 0.00  |       | 0.00     |
| 160 -164  | 0.08                   | 0.59                | 7.33         | 0.40                 | 0.3            | 0.23          | 0.05                   | 0.35               | 7.33         |           |          |       | 0.00  |       | 0.00     |
|           |                        |                     |              | TOTAL CAT<br>AVERAGE | ГСН =<br>NT. = | 15.64<br>4.79 |                        |                    |              |           |          |       |       |       |          |
|           | BEFORE                 | FISHING             | ;            |                      |                |               | AFTER                  | FISHING            | :            |           |          |       |       |       |          |
| TOTALS:   |                        |                     | •            |                      |                |               |                        |                    | •            | ,         |          |       |       |       |          |
| MALE>89   | ):                     |                     |              |                      |                |               |                        |                    |              |           |          |       |       |       | 2.20     |
| FEMALE>89 | );                     |                     |              |                      |                |               |                        |                    |              | 5.34      | 8.27     | 1.55  |       |       |          |
| MALE>119: | 13.48                  | 57.12               | 4.24         |                      |                |               | 9.58                   | 39.32              | 4.10         |           |          |       |       |       |          |
|           | SEX RATIC<br>SIZE RATI | ) (F:M):<br>O(M:F): | 0.40<br>2.74 |                      |                |               | SEX RATIO<br>SIZE RATI | (F:M):<br>O(M:F):  | 0.56<br>2.65 |           |          |       |       |       |          |

Appendix Table 23.--Effect of a 6.25" minimum **size limit** on sex and size ratios, red king crab, Bristol Bay, **1986** data, handling mortality = .3.

| n.lb.)<br>1.19<br>3.09<br>4.49<br>5.72<br>5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16 | (wt./<br>crab)<br>1.28<br>1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60 | EXPLOIT.<br>RATE<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0. | LING<br>MORT.<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0. | CATCH<br>(mln.lb.)<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0 | (mlns.)<br>0.67<br>1.47<br>1.83<br>2.00<br>1.60<br>1.83<br>1.87<br>1.67 | (mln.lb.)<br>0.86<br>2.22<br>3.23<br>4.12<br>3.80<br>5.00<br>5.83<br>5.90 | (wt./<br>crab)<br>1.28<br>1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11  | (mlns.)(m<br>1.13<br>1.18<br>1.26<br>1.04<br>0.35<br>0.29  | 1.39<br>1.63<br>1.94<br>1.79<br>0.67<br>0.61  | (wt./<br>crab)<br>1.23<br>1.38<br>1.54<br>1.73<br>1.90<br>2.10  | SEX<br>(F:M)<br>1.69<br>0.80<br>0.69<br>0.52<br>0.22                                 | SIZE<br>(M:F)<br>1.04<br>1.09<br>1.15<br>1.19<br>1.25                                | DEATHS<br>(mlns.)<br>0.26<br>0.57<br>0.71<br>0.78<br>0.62                           |
|--|--|--|--|---|---|---|---|--|---|---|--|--|---|
| 1.19<br>3.09<br>4.49<br>5.72<br>5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16           | 1.28<br>1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60                   | 0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.05<br>0.30<br>0.40           | 0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7                        | 0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.42<br>3.12                    | 0.67<br>1.47<br>1.83<br>2.00<br>1.60<br>1.83<br>1.87<br>1.67            | 0.86<br>2.22<br>3.23<br>4.12<br>3.80<br>5.00<br>5.83<br>5.90              | 1.28<br>1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11  | 1.13<br>1.18<br>1.26<br>1.04<br>0.35<br>0.29   | 1.39<br>1.63<br>1.94<br>1.79<br>0.67<br>0.61  | 1.23<br>1.38<br>1.54<br>1.73<br>1.90<br>2.10  | 1.69<br>0.80<br>0.69<br>0.52<br>0.22   | 1.04<br>1.09<br>1.15<br>1.19<br>1.25   | 0.26<br>0.57<br>0.71<br>0.78<br>0.62  |
| 3.09<br>4.49<br>5.72<br>5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16                   | 1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60                           | 0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.05<br>0.30<br>0.40                   | 0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7                               | 0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.42<br>3.12                            | 1.47<br>1.83<br>2.00<br>1.60<br>1.83<br>1.87<br>1.67                    | 2.22<br>3.23<br>4.12<br>3.80<br>5.00<br>5.83<br>5.90                      | 1.51<br>1.77<br>2.06<br>2.37<br>2.73<br>3.11  | 1.18<br>1.26<br>1.04<br>0.35<br>0.29   | 1.63<br>1.94<br>1.79<br>0.67<br>0.61  | 1.38<br>1.54<br>1.73<br>1.90<br>2.10  | 0.80<br>0.69<br>0.52<br>0.22   | 1.09<br>1.15<br>1.19<br>1.25   | 0.57<br>0.71<br>0.78<br>0.62  |
| 4.49<br>5.72<br>5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16                           | 1.77<br>2.06<br>2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60                                   | 0.00<br>0.00<br>0.00<br>0.00<br>0.05<br>0.30<br>0.40                           | 0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7                               | 0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.42<br>3.12                            | 1.83<br>2.00<br>1.60<br>1.83<br>1.87<br>1.67                            | 3.23<br>4.12<br>3.80<br>5.00<br>5.83<br>5.90                              | 1.77<br>2.06<br>2.37<br>2.73<br>3.11  | 1.26<br>1.04<br>0.35<br>0.29   | 1.94<br>1.79<br>0.67<br>0.61  | 1.54<br>1.73<br>1.90<br>2.10  | 0.69<br>0.52<br>0.22   | 1.15<br>1.19<br>1.25   | 0.71<br>0.78<br>0.62  |
| 5.72<br>5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16                                   | 2.06<br>2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60   | 0.00<br>0.00<br>0.00<br>0.05<br>0.30<br>0.40<br>0.40                           | 0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7                                      | 0.00<br>0.00<br>0.00<br>0.42<br>3.12  | 2.00<br>1.60<br>1.83<br>1.87<br>1.67                                    | 4.12<br>3.80<br>5.00<br>5.83<br>5.90                                      | 2.06<br>2.37<br>2.73<br>3.11  | 1.04<br>0.35<br>0.29   | 1.79<br>0.67<br>0.61  | 1.73<br>1.90<br>2.10  | 0.52<br>0.22   | 1.19<br>1.25   | 0.78<br>0.62  |
| 5.27<br>6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16   | 2.37<br>2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60   | 0.00<br>0.00<br>0.05<br>0.30<br>0.40<br>0.40                                   | 0.7<br>0.7<br>0.7<br>0.7<br>0.7<br>0.7   | 0.00<br>0.00<br>0.42<br>3.12  | 1.60<br>1.83<br>1.87<br>1.67  | 3.80<br>5.00<br>5.83<br>5.90  | 2.37<br>2.73<br>3.11  | 0.35   | 0.67<br>0.61  | 1.90<br>2.10  | 0.22   | 1.25   | 0.62  |
| 6.95<br>8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16   | 2.73<br>3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60   | 0.00<br>0.00<br>0.05<br>0.30<br>0.40<br>0.40                                   | 0.7<br>0.7<br>0.7<br>0.7<br>0.7  | 0.00<br>0.00<br>0.42<br>3.12  | 1.83<br>1.87<br>1.67  | 5.00<br>5.83<br>5.90  | 2.73<br>3.11  | 0.29   | 0.61  | 2.10  |  |  |   |
| 8.09<br>8.37<br>10.41<br>10.54<br>7.91<br>7.16   | 3.11<br>3.53<br>4.00<br>4.50<br>5.04<br>5.60   | 0.00<br>0.05<br>0.30<br>0.40<br>0.40   | 0.7<br>0.7<br>0.7<br>0.7   | 0.00<br>0.42<br>3.12  | 1.87<br>1.67  | 5.83<br>5.90  | 3.11  | 0 07   | 0 07  |   | 0.16   | 1.30   | 0.71  |
| 8.37<br>10.41<br>10.54<br>7.91<br>7.16   | 3.53<br>4.00<br>4.50<br>5.04<br>5.60   | 0.05<br>0.30<br>0.40<br>0.40   | 0.7<br>0.7<br>0.7  | 0.42<br>3.12  | 1.67  | 5.90  |   | 0.03   | 0.07  | 2.43  | 0.02   | 1.28   | 0.73  |
| 10.41<br>10.54<br>7.91<br>7.16   | 4.00<br>4.50<br>5.04<br>5.60   | 0.30<br>0.40<br>0.40   | 0.7  | 3.12  | 1 64  |   | 3.53  | 0.03   | 0.08  | 2.57  | 0.02   | 1.38   | 0.58  |
| 10.54<br>7.91<br>7.16  | 4.50<br>5.04<br>5.60   | 0.40<br>0.40   | 0.7  |   | 1.04  | 6.56  | 4.00  |  |   |   | 0.00   |  | 0.18  |
| 7.91<br>7.16   | 5.04<br>5.60   | 0.40   |  | 4.22  | 1.40  | 6.32  | 4.50  | 0.03   | 0.09  | 3.01  | 0.02   | 1.49   | 0.00  |
| 7.16   | 5.60   |  | 0.7  | 3.16  | 0.94  | 4.74  | 5.04  |  |   |   | 0.00   |  | 0.00  |
|  |  | 0.40   | 0.7  | 2.87  | 0.77  | 4.30  | 5.60  |  |   |   | 0.00   |  | 0.00  |
| 3.10   | 6.21   | 0.40   | 0.7  | 1.24  | 0.30  | 1.86  | 6.21  |  |   |   | 0.00   |  | 0.00  |
| 0.95   | 6.75   | 0.40   | 0.7  | 0.38  | 0.08  | 0.57  | 6.75  |  |   |   | 0.00   |  | 0.00  |
| 0.59   | 7.33   | 0.40   | 0.7  | 0.23  | 0.05  | 0.35  | 7.33  |  |   |   | 0.00   |  | 0.00  |
|  |  | TOTAL CA<br>AVERAGE  | TCH =<br>WT. =   | 15.64<br>4.79   |   |   |   |  |   |   |  |  |   |
| FISHING  | ;  |  |  |   | AFTER   | FISHING   |   |  |   |   |  |  |   |
|  | -  |  |  |   |   |   |   |  |   |   |  |  |   |
|  |  |  |  |   |   |   |   | 5 34   | 0 <b>7</b> 7  | 1 55  |  |  | 5.14  |
|  |  |  |  |   |   |   |   | J•34<br>   | 0.27  |   |  |  |   |
| 57.12  | 4.24   |  |  |   | 8.73  | 36.44   | 4.18  |  |   |   |  |  |   |
|  | 0.40   |  |  |   | SEX RATIC   | ) (F:M):  | 0.61  |  |   |   |  |  |   |
| 5  | 57.12<br>(F:M):<br>(M:F):  | 57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74                                       | (F:M): 0.40<br>(M:F): 2.74   | 57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74  | 57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74                                | 57.12 4.24 8.73<br>(F:M): 0.40 SEX RATIO<br>(M:F): 2.74 SIZE RATI         | 57.12       4.24       8.73       36.44         (F:M):       0.40       SEX RATIO (F:M):         (M:F):       2.74       SIZE RATIO(M:F): | 57.12       4.24       8.73       36.44       4.18         (F:M):       0.40       SEX RATIO (F:M):       0.61         (M:F):       2.74       SIZE RATIO(M:F):       2.69 | 5.34         57.12       4.24         8.73       36.44       4.18         (F:M):       0.40         (M:F):       2.74       SIZE RATIO(M:F):       2.69 | 5.34 8.27<br>57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74<br>5.34 8.27<br>8.73 36.44 4.18<br>5EX RATIO (F:M): 0.61<br>SIZE RATIO(M:F): 2.69 | 5.34 8.27 1.55<br>57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74<br>SIZE RATIO (M:F): 2.69 | 5.34 8.27 1.55<br>57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74<br>SIZE RATIO (M:F): 2.69 | 5.34 8.27 1.55<br>57.12 4.24<br>(F:M): 0.40<br>(M:F): 2.74<br>SIZE RATIO(M:F): 2.69 |

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Appendix Table 24.--Effect of a 6.25" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .7.

| CARADACE  | M                    | ALES                 | INC          |          | רע אור <u></u> |               | MALES                  | REMAIN            | ING          | F        | ЕМЛТ     | E C          | רתגם  |       | JANDI INC |
|-----------|----------------------|----------------------|--------------|----------|----------------|---------------|------------------------|-------------------|--------------|----------|----------|--------------|-------|-------|-----------|
| LG_GROUP  | BEFU                 | KE FISH              | (wt./        | EXPLOTT. | LING           | Сатсн         |                        | K FISHIK          | (wt./        | F        |          | <u>(wt./</u> | SEX   | STZE  | DEATHS    |
| (mm)      | (mlns.)(             | mln.lb.)             | crab)        | RATE     | MORT.          | (mln.lb.)     | (mlns.)                | (mln.1b.)         | crab)        | (mlns.)( | mln.lbs. | crab)        | (F:M) | (M:F) | (mlns.)   |
| 90 - 94   | 0.93                 | 1.19                 | 1.28         | 0.00     | 0.0            | 0.00          | 0.93                   | 1.19              | 1.28         | 1.13     | 1.39     | 1.23         | 1.22  | 1.04  | 0.00      |
| 95 - 99   | 2.04                 | 3.09                 | 1.51         | 0.00     | 0.0            | 0.00          | 2.04                   | 3.09              | 1.51         | 1.18     | 1.63     | 1.38         | 0.58  | 1.09  | 0.00      |
| 100 -104  | 2.54                 | 4.49                 | 1.77         | 0.00     | 0.0            | 0.00          | 2.54                   | 4.49              | 1.77         | 1.26     | 1.94     | 1.54         | 0.50  | 1.15  | 0.00      |
| 105 -109  | 2.78                 | 5.72                 | 2.06         | 0.00     | 0.0            | 0.00          | 2.78                   | 5.72              | 2.06         | 1.04     | 1.79     | 1.73         | 0.37  | 1.19  | 0.00      |
| 110 -114  | 2.22                 | 5.27                 | 2.37         | 0.00     | 0.0            | 0.00          | 2.22                   | 5.27              | 2.37         | 0.35     | 0.67     | 1.90         | 0.16  | 1.25  | 0.00      |
| 115 -119  | 2.54                 | 6.95                 | 2.73         | 0.00     | 0.0            | 0.00          | 2.54                   | 6.95              | 2.73         | 0.29     | 0.61     | 2.10         | 0.11  | 1.30  | 0.00      |
| 120 -124  | 2.60                 | 8.09                 | 3.11         | 0.05     | 0.0            | 0.40          | 2.47                   | 7.69              | 3.11         | 0.03     | 0.07     | 2.43         | 0.01  | 1.28  | 0.00      |
| 125 -129  | 2.37                 | 8.37                 | 3.53         | 0.30     | 0.0            | 2.51          | 1.66                   | 5.86              | 3.53         | 0.03     | 0.08     | 2.57         | 0.02  | 1.38  | 0.00      |
| 130 -134  | 2.60                 | 10.41                | 4.00         | 0.40     | 0.0            | 4.16          | 1.56                   | 6.25              | 4.00         |          |          |              | 0.00  |       | 0.00      |
| 135 -139  | 2.34                 | 10.54                | 4.50         | 0.40     | 0.0            | 4.22          | 1.40                   | 6.32              | 4.50         | 0.03     | 0.09     | 3.01         | 0.02  | 1.49  | 0.00      |
| 140 -144  | 1.57                 | 7.91                 | 5.04         | 0.40     | 0.0            | 3.16          | 0.94                   | 4.74              | 5.04         |          |          |              | 0.00  |       | 0.00      |
| 145 -149  | 1.28                 | 7.16                 | 5.60         | 0.40     | 0.0            | 2.87          | 0.77                   | 4.30              | 5.60         |          |          |              | 0.00  |       | 0.00      |
| 150 -154  | 0.50                 | 3.10                 | 6.21         | 0.40     | 0.0            | 1.24          | 0.30                   | 1.86              | 6.21         |          |          |              | 0.00  |       | 0.00      |
| 155 -159  | 0.14                 | 0.95                 | 6.75         | 0.40     | 0.0            | 0.38          | 0.08                   | 0.57              | 6.75         |          |          |              | 0.00  |       | 0.00      |
| 160 -164  | 0.08                 | 0.59                 | 7.33         | 0.40     | 0.0            | 0.23          | 0.05                   | 0.35              | 7.33         |          |          |              | 0.00  |       | 0.00      |
|           |                      |                      |              | TOTAL CA | TCH =<br>WT. = | 19.18<br>4.52 |                        |                   |              |          |          |              |       |       |           |
|           | BEFORE               | FISHING              | 9            |          |                |               | AFTER                  | FISHING           | 1            |          |          |              |       |       |           |
| TOTALS:   |                      |                      | -            |          |                |               |                        |                   |              |          |          |              |       |       |           |
| MALE>89   | ):                   |                      |              |          |                |               |                        |                   |              |          |          |              |       |       | 0.00      |
| FEMALE>89 | ):                   |                      |              |          |                |               |                        |                   |              | 5.34     | 8.27     | 1.55         |       |       |           |
| MALE>119: | 13.48                | 57.12                | 4.24         |          |                |               | 9.24                   | 37.94             | 4.11         |          |          |              |       |       |           |
|           |                      |                      |              |          |                |               |                        |                   |              |          |          |              |       |       |           |
|           | SEX RATI<br>SIZE RAT | O (F:M):<br>IO(M:F): | 0.40<br>2.74 |          |                |               | SEX RATIO<br>SIZE RATI | (F:M):<br>O(M:F): | 0.58<br>2.65 |          |          |              |       |       |           |

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Appendix Table 25. --Effect of a 6.0" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .0

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| CARAPACE         | M<br>BEFOR | ALES<br>REFISH | ING            |                  | HAND-         |                    | MALES<br>AFTE | REMAI<br>R FISHI | NING            | F       | EMAT.     | FS             | ዋልጥ          | 09.           | HANDI TNG      |
|------------------|------------|----------------|----------------|------------------|---------------|--------------------|---------------|------------------|-----------------|---------|-----------|----------------|--------------|---------------|----------------|
| LG.GROUP<br>(mm) | (mlns.)(m  | ln.1b.)        | (wt./<br>crab) | EXPLOIT.<br>RATE | LING<br>MORT. | CATCH<br>(mln.lb.) | (mlns.)       | (mln.lb.         | (wt./<br>)crab) | (mlns.) | (mln.lbs. | (wt./<br>crab) | SEX<br>(F:M) | SIZE<br>(M:F) | DEATHS (mlns.) |
| 90 - 94          | 0.93       | 1.19           | 1.28           | 0.00             | 0.3           | 0.00               | 0.82          | 1.05             | 1.28            | 1.13    | 1.39      | 1.23           | 1.38         | 1.04          | 0.11           |
| 95 - 99          | 2.04       | 3.09           | 1.51           | 0.00             | 0.3           | 0.00               | 1.80          | 2.72             | 1.51            | 1.18    | 1.63      | 1.38           | 0.66         | 1.09          | 0.24           |
| 100 -104         | 2.54       | 4.49           | 1.77           | 0.00             | 0.3           | 0.00               | 2.24          | 3.95             | 1.77            | 1.26    | 1.94      | 1.54           | 0.56         | 1.15          | 0.30           |
| 105 -109         | 2.78       | 5.72           | 2.06           | 0.00             | 0.3           | 0.00               | 2.45          | 5.03             | 2.06            | 1.04    | 1.79      | 1.73           | 0.43         | 1.19          | 0.33           |
| 110 -114         | 2.22       | 5.27           | 2.37           | 0.00             | 0.3           | 0.00               | 1.95          | 4.64             | 2.37            | 0.35    | 0.67      | 1.90           | 0.18         | 1.25          | 0.27           |
| 115 -119         | 2.54       | 6.95           | 2.73           | 0.00             | 0.3           | 0.00               | 2.24          | 6.11             | 2.73            | 0.29    | 0.61      | 2.10           | 0.13         | 1.30          | 0.30           |
| 120 -124         | 2.60       | 8.09           | 3.11           | 0.05             | 0.3           | 0.40               | 2.20          | 6.84             | 3.11            | 0.03    | 0.07      | 2.43           | 0.01         | 1.28          | 0.27           |
| 125 –129         | 2.37       | 8.37           | 3.53           | 0.30             | 0.3           | 2.51               | 1.59          | 5.61             | 3.53            | 0.03    | 0.08      | 2.57           | 0.02         | 1.38          | 0.07           |
| 130 -134         | 2.60       | 10.41          | 4.00           | 0.40             | 0.3           | 4.16               | 1.56          | 6.25             | 4.00            |         |           |                | 0.00         |               | 0.00           |
| 135 -139         | 2.34       | 10.54          | 4.50           | 0.40             | 0.3           | 4.22               | 1.40          | 6.32             | 4.50            | 0.03    | 0.09      | 3.01           | 0.02         | 1.49          | 0.00           |
| 140 -144         | 1.57       | 7.91           | 5.04           | 0.40             | 0.3           | 3.16               | 0.94          | 4.74             | 5.04            |         |           |                | 0.00         |               | 0.00           |
| 145 -149         | 1.28       | 7.16           | 5.60           | 0.40             | 0.3           | 2.87               | 0.77          | 4.30             | 5.60            |         |           |                | 0.00         |               | 0.00           |
| 150 -154         | 0.50       | 3.10           | 6.21           | 0.40             | 0.3           | 1.24               | 0.30          | 1.86             | 6.21            |         |           |                | 0.00         |               | 0.00           |
| 155 -159         | 0.14       | 0.95           | 6.75           | 0.40             | 0.3           | 0.38               | 0.08          | 0.57             | 6.75            |         |           |                | 0.00         |               | 0.00           |
| 160 -164         | 0.08       | 0.59           | 7.33           | 0.40             | 0.3           | 0.23               | 0.05          | 0.35             | 7.33            |         |           |                | 0.00         |               | 0.00           |
|                  |            |                |                | TOTAL CA         | ГСН =         | 19.18              |               |                  |                 |         |           |                |              |               |                |
|                  |            |                |                | AVERAGE          | ₩T. =         | 4.52               |               |                  |                 |         |           |                |              |               |                |
|                  | BEFORE     | FISHING        | 3              |                  |               |                    | AFTER         | FISHIN           | G               |         |           |                |              |               |                |
| TOTALS:          |            |                | -              |                  |               |                    |               |                  | -               |         |           |                |              |               |                |
|                  |            |                |                |                  |               |                    |               |                  |                 |         |           |                |              |               |                |
| MALE>89          | ):         |                |                |                  |               |                    |               |                  |                 |         |           |                |              |               | 1.91           |
| FEMALE>89        | ):         |                |                |                  |               |                    |               |                  |                 | 5.34    | 8.27      | 1.55           |              |               |                |
| MAT.E.119.       | 13 /9      | 57 12          | 1 24           |                  |               |                    | 0 00          | 26 94            | 4 1 4           |         |           |                |              |               |                |
|                  |            |                | 4.24           |                  | •             |                    | 0.09          | 30.84<br>        | 4 • 1 4         |         |           |                |              |               |                |
|                  | SEX RATIO  | (F:M):         | 0.40           |                  |               | :                  | SEX RATIO     | (F:M):           | 0.60            |         |           |                |              |               |                |
|                  | SIZE RATI  | 0(M:F):        | 2.74           |                  |               | :                  | SIZE RATI     | O(M:F):          | 2.67            |         |           |                |              | 4             |                |

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Appendix Table 26. --Effect of a 6.0" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .3.

| CARAPACE  | MALES<br>BEFORE FISHING<br>(wt.<br>(mlns.)(mln.lb.) crab |          |       | EVDIAT    | HAND-   | САЩОН     | MALES<br>AFTE        | REMAIN<br>R FISHIN | NING<br>NG | F       | EMAL      | ES             | RATI         | :0S: 1     | HANDLING       |
|-----------|--|----------|-------|-----------|---------|-----------|----------------------|--------------------|------------|---------|-----------|----------------|--------------|------------|----------------|
| (mm)      | (mlns.)(r  | mln.lb.) | (wt./ | RATE      | MORT.   | (mln.lb.) | (mlns.) <sup>.</sup> | (mln.lb.)          | (wt./      | (mlns.) | (mln.lbs. | (wt./<br>crab) | SEX<br>(F:M) | SIZE (M:F) | DEATHS (mlns.) |
|           |  |          |       |           | <u></u> |           |                      |                    |            |         | ·····     | ,              |              |            |                |
| 90 - 94   | 0.93   | 1.19     | 1.28  | 0.00      | 0.7     | 0.00      | 0.67                 | 0.86               | 1,28       | 1.13    | 1.39      | 1 23           | 1 69         | 1 04       | 0.26           |
| 95 - 99   | 2.04   | 3.09     | 1.51  | 0.00      | 0.7     | 0.00      | 1.47                 | 2.22               | 1.51       | 1.18    | 1.63      | 1.38           | 0 80         | 1 09       | 0.20           |
| 100 -104  | 2.54   | 4.49     | 1.77  | 0.00      | 0.7     | 0.00      | 1.83                 | 3.23               | 1.77       | 1.26    | 1.94      | 1.54           | 0.69         | 1.15       | 0.71           |
| 105 -109  | 2.78   | 5.72     | 2.06  | 0.00      | 0.7     | 0.00      | 2.00                 | 4.12               | 2.06       | 1.04    | 1.79      | 1.73           | 0.52         | 1.19       | 0.78           |
| 110 -114  | 2.22   | 5.27     | 2.37  | 0.00      | 0.7     | 0.00      | 1.60                 | 3.80               | 2.37       | 0.35    | 0.67      | 1.90           | 0.22         | 1.25       | 0.62           |
| 115 -119  | 2.54   | 6.95     | 2.73  | 0.00      | 0.7     | 0.00      | 1.83                 | 5.00               | 2.73       | 0.29    | 0.61      | 2.10           | 0.16         | 1.30       | 0.71           |
| 120 -124  | 2.60   | 8.09     | 3.11  | 0.05      | 0.7     | 0.40      | 1.83                 | 5.71               | 3.11       | 0.03    | 0.07      | 2.43           | 0.02         | 1.28       | 0.64           |
| 125 -129  | 2.37   | 8.37     | 3.53  | 0.30      | 0.7     | 2.51      | 1.49                 | 5,27               | 3.53       | 0.03    | 0.08      | 2.57           | 0.02         | 1.38       | 0.17           |
| 130 -134  | 2.60   | 10.41    | 4.00  | 0.40      | 0.7     | 4.16      | 1.56                 | 6.25               | 4.00       |         |           |                | 0.00         |            | 0.00           |
| 135 -139  | 2.34   | 10.54    | 4.50  | 0.40      | 0.7     | 4.22      | 1.40                 | 6.32               | 4.50       | 0.03    | 0.09      | 3.01           | 0.02         | 1.49       | 0.00           |
| 140 -144  | 1.57   | 7.91     | 5.04  | 0.40      | 0.7     | 3.16      | 0.94                 | 4.74               | 5.04       |         |           |                | 0.00         |            | 0.00           |
| 145 -149  | 1.28   | 7.16     | 5.60  | 0.40      | 0.7     | 2.87      | 0.77                 | 4.30               | 5.60       |         |           |                | 0.00         |            | 0.00           |
| 150 -154  | 0.50   | 3.10     | 6.21  | 0.40      | 0.7     | 1.24      | 0.30                 | 1.86               | 6.21       |         |           |                | 0.00         |            | 0.00           |
| 155 -159  | 0.14   | 0.95     | 6.75  | 0.40      | 0.7     | 0.38      | 0.08                 | 0.57               | 6.75       |         |           |                | 0.00         |            | 0.00           |
| 160 -164  | 0.08   | 0.59     | 7.33  | 0.40      | 0.7     | 0.23      | 0.05                 | 0.35               | 7.33       |         |           |                | 0.00         |            | 0.00           |
|           |  |          |       | መረመል፤ ሮአሜ | עריע    | 10 10     |                      |                    |            |         |           |                |              |            |                |
|           |  |          |       | AVERAGE V | ICH =   | 4.52      |                      |                    |            |         |           |                |              |            |                |
|           |  |          |       |           |         |           |                      |                    |            |         |           |                |              |            |                |
|           | BEFORE   | FISHING  | 5     |           |         |           | AFTER                | FISHING            | i          |         |           |                |              |            |                |
| TOTALS:   |  |          | •     |           |         |           |                      |                    |            |         |           |                |              |            |                |
| MALE>89   | ):   |          |       |           |         |           |                      |                    |            |         |           |                |              |            | 1 16           |
| FEMALE>89 | ):   |          |       |           |         |           |                      |                    |            | 5.34    | 8.27      | 1.55           |              |            | 4.40           |
|           |  |          |       |           |         |           |                      |                    |            |         |           |                |              |            |                |
| MALE>119: | 13.48  | 57.12    | 4.24  |           |         |           | 8.43                 | 35.37              | 4.20       |         |           |                |              |            |                |
|           | SEX RATIC  | ) (F:M): | 0.40  |           |         | 9         | SEX RATIO            | (F:M):             | 0.63       |         |           |                |              |            |                |
|           | SIZE RATI  | O(M:F):  | 2.74  |           |         | -         | SIZE RATIC           | (M:F):             | 2.71       |         |           |                |              |            |                |
|           |  |          |       |           |         | -         |                      |                    |            |         |           |                |              |            |                |

Appendix Table 27. --Effect of a 6.0" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .7.

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| CADADACE         | M         | ALES           | INC   |                  | HAND_         |                    | MALES     | REMAIN<br>R FISHIN | ING            | F        | EM ÅT.   | ES             | ዋልጥን | 05. 1 | ANDL. ING      |
|------------------|-----------|----------------|-------|------------------|---------------|--------------------|-----------|--------------------|----------------|----------|----------|----------------|------|-------|----------------|
| LG.GROUP<br>(mm) | (mlns.)(r | mln.lb.)       | (wt./ | EXPLOIT.<br>RATE | LING<br>MORT. | CATCH<br>(mln.lb.) | (mlns.)   | (mln.lb.)          | (wt./<br>crab) | (mlns.)( | mln.lbs. | (wt./<br>crab) | SEX  | SIZE  | DEATHS (mlns.) |
|                  |           |                |       |                  |               |                    |           |                    |                |          | <u></u>  |                |      |       |                |
| 90 - 94          | 0.93      | 1.19           | 1.28  | 0.00             | 0.0           | 0.00               | 0.93      | 1,19               | 1.28           | 1.13     | 1.39     | 1.23           | 1.22 | 1.04  | 0.00           |
| 95 - 99          | 2.04      | 3.09           | 1.51  | 0.00             | 0.0           | 0.00               | 2.04      | 3.09               | 1.51           | 1.18     | 1.63     | 1.38           | 0.58 | 1.09  | 0.00           |
| 100 -104         | 2.54      | 4.49           | 1.77  | 0.00             | 0.0           | 0.00               | 2.54      | 4.49               | 1.77           | 1.26     | 1.94     | 1.54           | 0.50 | 1.15  | 0.00           |
| 105 -109         | 2.78      | 5.72           | 2.06  | 0.00             | 0.0           | 0.00               | 2.78      | 5.72               | 2.06           | 1.04     | 1.79     | 1.73           | 0.37 | 1.19  | 0.00           |
| 110 -114         | 2.22      | 5.27           | 2.37  | 0.00             | 0.0           | 0.00               | 2.22      | 5.27               | 2.37           | 0.35     | 0.67     | 1.90           | 0.16 | 1.25  |                |
| 115 -119         | 2.54      | 6.95           | 2.73  | 0.05             | 0.0           | 0.35               | 2.41      | 6.60               | 2.73           | 0.29     | 0.61     | 2.10           | 0.12 | 1.30  | 0.00           |
| 120 -124         | 2.60      | 8.09           | 3.11  | 0.30             | 0.0           | 2.43               | 1.82      | 5.66               | 3.11           | 0.03     | 0.07     | 2.43           | 0.02 | 1.28  | 0.00           |
| 125 -129         | 2.37      | 8.37           | 3.53  | 0.40             | 0.0           | 3.35               | 1.42      | 5.02               | 3.53           | 0.03     | 0.08     | 2.57           | 0.02 | 1.38  | 0.00           |
| 130 -134         | 2.60      | 10.41          | 4.00  | 0.40             | 0.0           | 4.16               | 1.56      | 6.25               | 4.00           |          |          |                | 0.00 |       | 0.00           |
| 135 -139         | 2.34      | 10.54          | 4.50  | 0.40             | 0.0           | 4.22               | 1.40      | 6.32               | 4.50           | 0.03     | 0.09     | 3.01           | 0.02 | 1.49  | 0.00           |
| 140 -144         | 1.57      | 7.91           | 5.04  | 0.40             | 0.0           | 3.16               | 0.94      | 4.74               | 5.04           |          |          |                | 0.00 |       | 0.00           |
| 145 -149         | 1.28      | 7.16           | 5.60  | 0.40             | 0.0           | 2.87               | 0.77      | 4.30               | 5.60           |          |          |                | 0.00 |       | 0.00           |
| 150 -154         | 0.50      | 3.10           | 6.21  | 0.40             | 0.0           | 1.24               | 0.30      | 1.86               | 6.21           |          |          |                | 0.00 |       | 0.00           |
| 155 -159         | 0.14      | 0.95           | 6.75  | 0.40             | 0.0           | 0.38               | 0.08      | 0.57               | 6.75           |          |          |                | 0.00 |       | 0.00           |
| 160 -164         | 0.08      | 0.59           | 7.33  | 0.40             | 0.0           | 0.23               | 0.05      | 0.35               | 7.33           |          |          |                | 0.00 |       | 0.00           |
|                  |           |                |       | TOTAL CA         | тсн =         | 22.39              |           |                    |                |          |          |                |      |       |                |
|                  |           |                |       | AVERAGE          | WT. =         | 4.26               | ,         |                    |                |          |          |                |      |       |                |
|                  | BEFORE    | FISHIN         | G     |                  |               |                    | AFTER     | FISHING            |                |          |          |                |      |       |                |
| TOTALS:          |           |                | -     |                  |               |                    |           |                    |                |          |          |                |      |       |                |
| MALE>8           | 9:        |                |       |                  |               |                    |           |                    |                |          |          |                |      |       | 0.00           |
| FEMALE>8         | 9:        |                |       |                  |               |                    |           |                    |                | 5.34     | 8.27     | 1.55           |      |       |                |
|                  |           |                |       |                  |               |                    |           |                    |                |          |          |                |      |       |                |
| MALE>119         | : 13.48   | 57 <b>.</b> 12 | 4.24  |                  |               |                    | 8.35      | 35.08              | 4.20           |          |          |                |      |       |                |
|                  | SEX RATI  | O (F:M):       | 0.40  |                  |               |                    | SEX RATIC | ) (F:M):           | 0.64           |          |          |                |      |       |                |
|                  | SIZE RAT  | IO(M:F):       | 2.74  |                  |               |                    | SIZE RATI | O(M:F):            | 2.71           |          |          |                |      |       |                |
|                  |           | , -            |       |                  |               |                    |           |                    |                |          |          |                |      |       |                |

Appendix Table 28. --Effect of **a 5.75" minimum size limit** on sex and size ratios, red king crab, Bristol Bay, **1986** data, handling mortality = 0.

| CARAPACE         | M<br>BEFO | ALES<br>RE FISHI         | ING            |                        | HAND-          |                    | MALES<br>AFTE | S REMAIN<br>ER FISHIN | NING<br>NG      | F        | EMAL     | E S            | RAT         | IOS:       | HANDLING          |
|------------------|-----------|--------------------------|----------------|------------------------|----------------|--------------------|---------------|-----------------------|-----------------|----------|----------|----------------|-------------|------------|-------------------|
| LG.GROUP<br>(mm) | (mlns.)(  | mln.ĺb.)                 | (wt./<br>crab) | EXPLOIT.<br>RATE       | LING<br>MORT.  | CATCH<br>(mln.lb.) | (mlns.)       | (mln.lb.)             | (wt./<br>)crab) | (mlns.)( | mln.lbs. | (wt./<br>crab) | SEX<br>(F:M | SIZE)(M:F) | DEATHS<br>(mlns.) |
| 90 - 94          | 0.93      | 1.19                     | 1.28           | 0.00                   | 0.3            | 0.00               | 0,82          | 1.05                  | 1.28            | 1.13     | 1.39     | 1.23           | 1.38        | 1.04       | 0.11              |
| 95 - 99          | 2.04      | 3.09                     | 1.51           | 0.00                   | 0.3            | 0.00               | 1.80          | 2.72                  | 1.51            | 1.18     | 1.63     | 1.38           | 0.66        | 1.09       | 0.24              |
| 100 -104         | 2.54      | 4.49                     | 1.77           | 0.00                   | 0.3            | 0.00               | 2.24          | 3.95                  | 1.77            | 1.26     | 1.94     | 1.54           | 0.56        | 1.15       | 0.30              |
| 105 -109         | 2.78      | 5.72                     | 2.06           | 0.00                   | 0.3            | 0.00               | 2.45          | 5.03                  | 2.06            | 1.04     | 1.79     | 1.73           | 0.43        | 1.19       | 0.33              |
| 110 -114         | 2.22      | 5.27                     | 2.37           | 0.00                   | 0.3            | 0.00               | 1.95          | 4.64                  | 2.37            | 0.35     | 0.67     | 1.90           | 0.18        | 1.25       | 0.27              |
| 115 -119         | 2.54      | 6.95                     | 2.73           | 0.05                   | 0.3            | 0.35               | 2.15          | 5.87                  | 2.73            | 0.29     | 0.61     | 2.10           | 0.14        | 1.30       | 0.27              |
| 120 -124         | 2.60      | 8.09                     | 3.11           | 0.30                   | 0.3            | 2.43               | 1.74          | 5.42                  | 3.11            | 0.03     | 0.07     | 2.43           | 0.02        | 1.28       | 0.08              |
| 125 -129         | 2.37      | 8.37                     | 3.53           | 0.40                   | 0.3            | 3.35               | 1.42          | 5.02                  | 3.53            | 0.03     | 0.08     | 2.57           | 0.02        | 1.38       | 0.00              |
| 130 -134         | 2.60      | 10.41                    | 4.00           | 0.40                   | 0.3            | 4.16               | 1.56          | 6.25                  | 4.00            |          |          |                | 0.00        |            | 0.00              |
| 135 -139         | 2.34      | 10.54                    | 4.50           | 0.40                   | 0.3            | 4.22               | 1.40          | 6.32                  | 4.50            | 0.03     | 0.09     | 3.01           | 0.02        | 1.49       | 0.00              |
| 140 -144         | 1.57      | 7.91                     | 5.04           | 0.40                   | 0.3            | 3.16               | 0.94          | 4.74                  | 5.04            |          |          |                | 0.00        |            | 0.00              |
| 145 -149         | 1.28      | 7.16                     | 5.60           | 0.40                   | 0.3            | 2.87               | 0.77          | 4.30                  | 5.60            |          |          |                | 0.00        |            | 0.00              |
| 150 -154         | 0.50      | 3.10                     | 6.21           | 0.40                   | 0.3            | 1.24               | 0.30          | 1.86                  | 6.21            |          |          |                | 0.00        |            | 0.00              |
| 155 -159         | 0.14      | 0.95                     | 6.75           | 0.40                   | 0.3            | 0.38               | 0.08          | 0.57                  | 6.75            |          |          |                | 0.00        |            | 0.00              |
| 160 -164         | 0.08      | 0.59                     | 7.33           | 0.40                   | 0.3            | 0.23               | 0.05          | 0.35                  | 7.33            |          |          |                | 0.00        |            | 0.00              |
|                  |           |                          |                | TOTAL CAS<br>AVERAGE V | [CH =<br>√T. = | 22.39<br>4.26      |               |                       |                 |          |          |                |             |            |                   |
|                  | BEFORE    | FISHING                  | ;              |                        |                |                    | AFTER         | FISHING               | G               |          |          |                |             |            |                   |
| TOTALS:          |           |                          | •              |                        |                |                    |               |                       | -               |          |          |                |             |            |                   |
| <br>MALE>89      | ):        |                          |                |                        |                |                    |               |                       |                 |          |          |                |             |            | 1.61              |
| FEMALE>89        | ):        |                          |                |                        |                |                    |               |                       |                 | 5.34     | 8.27     | 1.55           |             |            |                   |
| MALE>119:        | 13.48     | 57.12                    | 4.24           |                        |                |                    | 8.27          | 34.84                 | 4.21            |          |          |                |             |            |                   |
|                  | SEX RATI  | <br>O (F:M):<br>IO(M:F): | 0.40           | s                      |                |                    | SEX RATIC     | ) (F:M):<br>(M:F):    | 0.65            |          |          |                |             |            |                   |

Appendix Table 29.--Effect of a 5.75" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .3.

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|             | м        | ALES     |       |           |                |               | MALES     | REMAIN    | IING     |          |          |       |       |        |          |
|-------------|----------|----------|-------|-----------|----------------|---------------|-----------|-----------|----------|----------|----------|-------|-------|--------|----------|
| CARAPACE    | BEFO     | RE FISHI | ING   |           | HAND-          |               | AFTE      | R FISHIN  | IG       | F        | EMAL     | ES    | RATI  | los:   | HANDLING |
| LG.GROUP    |          |          | (wt./ | EXPLOIT.  | LING           | CATCH         |           | <u> </u>  | (wt./    |          |          | (wt./ | SEX   | SIZE   | DEATHS   |
| (mm)        | (mlns.)( | mln.lb.) | crab) | RATE      | MORT.          | (mln.lb.)     | (mlns.)   | (mln.lb.) | (crab)   | (mlns.)( | mln.lbs. | crab) | (F:M) | )(M:F) | (mlns.)  |
| 90 - 94     | 0.93     | 1.19     | 1.28  | 0.00      | 0.7            | 0.00          | 0.67      | 0.86      | 1.28     | 1.13     | 1.39     | 1.23  | 1.69  | 1.04   | 0.26     |
| 95 - 99     | 2.04     | 3.09     | 1.51  | 0.00      | 0.7            | 0.00          | 1.47      | 2.22      | 1.51     | 1.18     | 1.63     | 1.38  | 0.80  | 1.09   | 0.57     |
| 100 -104    | 2.54     | 4.49     | 1.77  | 0.00      | 0.7            | 0.00          | 1.83      | 3.23      | 1.77     | 1.26     | 1.94     | 1.54  | 0.69  | 1.15   | 0.71     |
| 105 -109    | 2.78     | 5.72     | 2.06  | 0.00      | 0.7            | 0.00          | 2.00      | 4.12      | 2.06     | 1.04     | 1.79     | 1.73  | 0.52  | 1.19   | 0.78     |
| 110 -114    | 2.22     | 5.27     | 2.37  | 0.00      | 0.7            | 0.00          | 1.60      | 3.80      | 2.37     | 0.35     | 0.67     | 1.90  | 0.22  | 1.25   | 0.62     |
| 115 -119    | 2.54     | 6.95     | 2.73  | 0.05      | 0.7            | 0.35          | 1.79      | 4.90      | 2.73     | 0.29     | 0.61     | 2.10  | 0.16  | 1.30   | 0.62     |
| 120 -124    | 2.60     | 8.09     | 3.11  | 0.30      | 0.7            | 2.43          | 1.64      | 5.10      | 3.11     | 0.03     | 0.07     | 2.43  | 0.02  | 1.28   | 0.18     |
| 125 -129    | 2.37     | 8.37     | 3.53  | 0.40      | 0.7            | 3.35          | 1.42      | 5.02      | 3.53     | 0.03     | 0.08     | 2.57  | 0.02  | 1.38   | 0.00     |
| 130 -134    | 2.60     | 10.41    | 4.00  | 0.40      | 0.7            | 4.16          | 1.56      | 6.25      | 4.00     |          |          |       | 0.00  |        | 0.00     |
| 135 -139    | 2.34     | 10,54    | 4.50  | 0.40      | 0.7            | 4.22          | 1.40      | 6.32      | 4.50     | 0.03     | 0.09     | 3.01  | 0.02  | 1.49   | 0.00     |
| 140 -144    | 1.57     | 7.91     | 5.04  | 0.40      | 0.7            | 3.16          | 0.94      | 4.74      | 5.04     |          |          |       | 0.00  |        | 0.00     |
| 145 -149    | 1.28     | 7.16     | 5.60  | 0.40      | 0.7            | 2.87          | 0.77      | 4.30      | 5.60     |          |          |       | 0.00  |        | 0.00     |
| 150 -154    | 0.50     | 3.10     | 6.21  | 0.40      | 0.7            | 1.24          | 0.30      | 1.86      | 6.21     |          |          |       | 0.00  |        | 0.00     |
| 155 -159    | 0.14     | 0.95     | 6.75  | 0.40      | 0.7            | 0.38          | 0.08      | 0.57      | 6.75     |          |          |       | 0.00  |        | 0.00     |
| 160 -164    | 0.08     | 0.59     | 7.33  | , 0.40    | 0.7            | 0.23          | 0.05      | 0.35      | 7.33     |          |          |       | 0.00  |        | 0.00     |
|             |          |          |       | TOTAL CAT | ГСН =<br>NT. = | 22.39<br>4.26 |           |           |          |          |          |       |       |        |          |
|             | BEFORE   | FISHING  | ;     |           |                |               | AFTER     | FISHING   | ;        |          |          |       |       |        |          |
| TOTALS:     |          |          | -     |           |                |               | **        |           | •        |          |          |       |       |        |          |
| <br>MALE>89 | ):       |          |       |           |                |               |           |           |          |          |          |       |       |        | 3.75     |
| FEMALE>89   | ):       |          |       |           |                |               |           |           |          | 5.34     | 8.27     | 1.55  |       |        |          |
| MALE>119:   | 13.48    | 57.12    | 4.24  |           |                |               | 8.17      | 34.52     | 4.23     |          |          |       |       |        |          |
|             |          |          |       |           |                |               |           |           | <u>-</u> |          |          |       |       |        |          |
|             | SIZE RAT | IO(M:F): | 2.74  |           |                |               | SEX RATIO | O(M:F):   | 2.73     |          |          |       |       |        |          |

Appendix Table 30. --Effect of a 5.75" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .7.

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| Appendix | Table | 31Effect | of   | а   | 5.5"  | minimum | size | limit | on | sex | and | size | ratios, | red | king | crab, | Bristol | Bay, | 1986 | data, |
|----------|-------|----------|------|-----|-------|---------|------|-------|----|-----|-----|------|---------|-----|------|-------|---------|------|------|-------|
|          |       | handli   | ng r | nor | talit | y = 0.  |      |       |    |     |     |      |         |     |      |       |         |      |      |       |

|           | MALES<br>CARAPACE <u>BEFORE FISHING</u> |                      |       |           |                |           | MALES                  | S REMAIN             | ING          |           |          |       |       |        |          |
|-----------|---|----------------------|-------|-----------|----------------|-----------|------------------------|----------------------|--------------|-----------|----------|-------|-------|--------|----------|
| CARAPACE  | BEFOR                                   | RE FISHI             | ING   |           | HAND-          |           | AFTE                   | ER FISHIN            | G            | F         | EMAL     | ES    | RATI  | [OS: ] | HANDLING |
| LG.GROUP  |   |                      | (wt./ | EXPLOIT.  | LING           | CATCH     | / -                    |                      | (wt./        |           |          | (wt./ | SEX   | SIZE   | DEATHS   |
| (mm)      | (mlns.)(m                               | n1n.1b.)             | crab) | RATE      | MORT.          | (min.16.) | (mins.)                | (min.15.)            | crab)        | (mins.)(i | min.ibs. | crab) | (F:M) | )(M:F) | (mins.)  |
| 90 - 94   | 0.93                                    | 1.19                 | 1.28  | 0.00      | 0.0            | 0.00      | 0.93                   | 1.19                 | 1.28         | 1.13      | 1.39     | 1.23  | 1.22  | 1.04   | 0.00     |
| 95 - 99   | 2.04                                    | 3.09                 | 1.51  | 0.00      | 0.0            | 0.00      | 2.04                   | 3.09                 | 1.51         | 1.18      | 1.63     | 1.38  | 0.58  | 1.09   | 0.00     |
| 100 -104  | 2.54                                    | 4.49                 | 1.77  | 0.00      | 0.0            | 0.00      | 2.54                   | 4.49                 | 1.77 🗲       | 1.26      | 1.94     | 1.54  | 0.50  | 1.15   | 0.00     |
| 105 -109  | 2.78                                    | 5.72                 | 2.06  | 0.00      | 0.0            | 0.00      | 2.78                   | 5.72                 | 2.06         | 1.04      | 1.79     | 1.73  | 0.37  | 1.19   | 0.00     |
| 110 -114  | 2.22                                    | 5.27                 | 2.37  | 0.05      | 0.0            | 0.26      | 2.11                   | 5.01                 | 2.37         | 0.35      | 0.67     | 1.90  | 0.17  | 1.25   | 0.00     |
| 115 -119  | 2.54                                    | 6.95                 | 2.73  | 0.30      | 0.0            | 2.08      | 1.78                   | 4.86                 | 2.73         | 0.29      | 0.61     | 2.10  | 0.16  | 1.30   | 0.00     |
| 120 -124  | 2.60                                    | 8.09                 | 3.11  | 0.40      | 0.0            | 3.24      | 1.56                   | 4.86                 | 3.11         | 0.03      | 0.07     | 2.43  | 0.02  | 1.28   | 0.00     |
| 125 -129  | 2.37                                    | 8.37                 | 3.53  | 0.40      | 0.0            | 3.35      | 1.42                   | 5.02                 | 3.53         | 0.03      | 0.08     | 2.57  | 0.02  | 1.38   | 0.00     |
| 130 -134  | 2.60                                    | 10.41                | 4.00  | 0.40      | 0.0            | 4.16      | 1.56                   | 6.25                 | 4.00         |           |          |       | 0.00  |        | 0.00     |
| 135 -139  | 2.34                                    | 10.54                | 4.50  | 0.40      | 0.0            | 4.22      | 1.40                   | 6.32                 | 4.50         | 0.03      | 0.09     | 3.01  | 0.02  | 1.49   | 0.00     |
| 140 -144  | 1.57                                    | 7.91                 | 5.04  | 0.40      | 0.0            | 3.16      | 0.94                   | 4.74                 | 5.04         |           |          |       | 0.00  |        | 0.00     |
| 145 -149  | 1.28                                    | 7.16                 | 5.60  | 0.40      | 0.0            | 2.87      | 0.77                   | 4.30                 | 5.60         |           |          |       | 0.00  |        | 0.00     |
| 150 -154  | 0.50                                    | 3.10                 | 6.21  | 0.40      | 0.0            | 1.24      | 0.30                   | 1.86                 | 6.21         |           |          |       | 0.00  |        | 0.00     |
| 155 -159  | 0.14                                    | 0.95                 | 6.75  | 0.40      | 0.0            | 0.38      | 0.08                   | 0.57                 | 6.75         |           |          |       | 0.00  |        | 0.00     |
| 160 -164  | 0.08                                    | 0.59                 | 7.33  | 0.40      | 0.0            | 0.23      | 0.05                   | 0.35                 | 7.33         |           |          |       | 0.00  |        | 0.00     |
|           |   |                      |       | TOTAL CAT | сн =           | 25.20     |                        |                      |              |           |          |       |       |        |          |
|           |   |                      |       | AVERAGE V | v <b>T</b> . = | 4.02      |                        |                      |              |           |          |       |       |        |          |
|           | BEFORE                                  | FISHING              | 6     |           |                |           | AFTER                  | R FISHING            |              |           |          |       |       |        |          |
|           |   |                      | -     |           |                |           |                        |                      |              |           |          |       |       |        |          |
| TOTALS:   |   |                      |       |           |                |           |                        |                      |              |           |          |       |       |        |          |
| MALE>89   | ):                                      |                      |       |           |                |           |                        |                      |              |           |          |       |       |        | 0.00     |
| FEMALE>89 | ):                                      |                      |       |           |                |           |                        |                      |              | 5.34      | 8.27     | 1.55  |       |        |          |
|           |   |                      |       |           |                |           |                        |                      |              |           |          |       |       |        |          |
| MALE>119: | 13.48                                   | 57.12                | 4.24  |           |                |           | 8.09                   | 34.27                | 4.24         |           |          |       |       |        |          |
|           | SEX RATIC                               | D (F:M):<br>CO(M:F): | 0.40  |           |                | -         | SEX RATIC<br>SIZE RATI | ) (F:M):<br>[O(M:F): | 0.66<br>2.74 |           |          |       |       |        |          |

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| CARAPACE  | M<br>BEFO | ALES<br>RE FISHI | ING   |                     | HAND-          |                | MALES<br>AFTE | REMAIN<br>R FISHIN | ING<br>G | FJ        | EMAL     | ES    | RATI  | (OS: 1 | ANDLING |
|-----------|-----------|------------------|-------|---------------------|----------------|----------------|---------------|--------------------|----------|-----------|----------|-------|-------|--------|---------|
| LG.GROUP  |           |                  | (wt./ | EXPLOIT.            | LING           | CATCH          |               |                    | (wt./    |           |          | (wt./ | SEX   | SIZE   | DEATHS  |
| (mm)      | (mlns.)(  | mln.lb.)         | crab) | RATE                | MORT.          | (mln.lb.)      | (mlns.)       | (mln.lb.)          | crab)    | (mlns.)(r | nln.lbs. | crab) | (F:M) | )(M:F) | (mlns.) |
| 90 - 94   | 0.93      | 1.19             | 1.28  | 0.00                | 0.3            | 0.00           | 0.82          | 1.05               | 1.28     | 1.13      | 1.39     | 1.23  | 1.38  | 1.04   | 0.11    |
| 95 - 99   | 2.04      | 3.09             | 1.51  | 0.00                | 0.3            | ·0 <b>.</b> 00 | 1.80          | 2.72               | 1.51     | 1.18      | 1.63     | 1.38  | 0.66  | 1.09   | 0.24    |
| 100 -104  | 2.54      | 4.49             | 1.77  | 0.00                | 0.3            | 0.00           | 2.24          | 3.95               | 1.77     | 1.26      | 1.94     | 1.54  | 0.56  | 1.15   | 0.30    |
| 105 -109  | 2.78      | 5.72             | 2.06  | 0.00                | 0.3            | 0.00           | 2.45          | 5.03               | 2.06     | 1.04      | 1.79     | 1.73  | 0.43  | 1.19   | 0.33    |
| 110 -114  | 2.22      | 5.27             | 2.37  | 0.05                | 0.3            | 0.26           | 1.88          | 4.45               | 2.37     | 0.35      | 0.67     | 1.90  | 0.19  | 1.25   | 0.23    |
| 115 -119  | 2.54      | 6.95             | 2.73  | 0.30                | 0.3            | 2.08           | 1.70          | 4.65               | 2.73     | 0.29      | 0.61     | 2.10  | 0.17  | 1.30   | 0.08    |
| 120 -124  | 2.60      | 8.09             | 3.11  | 0.40                | 0.3            | 3.24           | 1.56          | 4.86               | 3.11     | 0.03      | 0.07     | 2.43  | 0.02  | 1.28   | 0.00    |
| 125 -129  | 2.37      | 8.37             | 3.53  | 0.40                | 0.3            | 3.35           | 1.42          | 5.02               | 3.53     | 0.03      | 0.08     | 2.57  | 0.02  | 1.38   | 0.00    |
| 130 -134  | 2.60      | 10.41            | 4.00  | 0.40                | 0.3            | 4.16           | 1.56          | 6.25               | 4.00     |           |          |       | 0.00  |        | 0.00    |
| 135 -139  | 2.34      | 10.54            | 4.50  | 0.40                | 0.3            | 4.22           | 1.40          | 6.32               | 4.50     | 0.03      | 0.09     | 3.01  | 0.02  | 1.49   | 0.00    |
| 140 -144  | 1.57      | 7.91             | 5.04  | 0.40                | 0.3            | 3.16           | 0.94          | 4.74               | 5.04     |           |          |       | 0.00  |        | 0.00    |
| 145 -149  | 1.28      | 7.16             | 5.60  | 0.40                | 0.3            | 2.87           | 0.77          | 4.30               | 5.60     |           |          |       | 0.00  |        | 0.00    |
| 150 -154  | 0.50      | 3.10             | 6.21  | 0.40                | 0.3            | 1.24           | 0.30          | 1.86               | 6.21     |           |          |       | 0.00  |        | 0.00    |
| 155 -159  | 0.14      | 0.95             | 6.75  | 0.40                | 0.3            | 0.38           | 0.08          | 0.57               | 6.75     |           |          |       | 0.00  |        | 0.00    |
| 160 -164  | 0.08      | 0.59             | 7.33  | 0.40                | 0.3            | 0.23           | 0.05          | 0.35               | 7.33     |           |          |       | 0.00  |        | 0.00    |
|           |           |                  |       | TOTAL CA<br>AVERAGE | TCH =<br>WT. = | 25.20<br>4.02  |               |                    |          |           |          |       |       |        |         |
|           | BEFORE    | FISHIN           | 3     |                     |                |                | AFTER         | FISHING            |          |           |          |       |       |        |         |
|           |           |                  | -     |                     |                |                |               |                    |          |           |          |       |       |        |         |
| TOTALS:   | -         |                  |       |                     |                |                |               |                    |          |           |          |       |       |        |         |
| MALE>89   | 9:        |                  |       |                     |                |                |               |                    |          |           |          |       |       | •      | 1.30    |
| FEMALE>89 | 9:        |                  |       |                     |                |                |               |                    |          | 5.34      | 8.27     | 1.55  |       |        |         |
|           |           |                  |       |                     |                |                |               |                    |          |           |          |       |       |        |         |
| MALE>119: | : 13.48   | 57.12            | 4.24  |                     |                |                | 8.09          | 34.27              | 4.24     |           |          |       |       |        |         |
|           | SEX RATI  | O (F:M):         | 0.40  |                     |                |                | SEX RATIO     | (F:M):             | 0.66     |           |          |       |       |        |         |
|           | SIZE RAT  | 'IO(M:F):        | 2.74  |                     |                |                | SIZE RATI     | O(M:F):            | 2.74     |           |          |       |       |        |         |

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Appendix Table **32.** --Effect of a 5.5" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .3.

| MALES<br>CARAPACE BEFORE FISHING |           |          |       |          |       |           | MALES     | REMAIN    | IING  |          |          |       |      |        |          |
|----------------------------------|-----------|----------|-------|----------|-------|-----------|-----------|-----------|-------|----------|----------|-------|------|--------|----------|
| CARAPACE                         | BEFO      | RE FISH  | ING   |          | HAND- | •         | AFTE      | R FISHIN  | IG    | F        | EMAL     | ES    | RAT  |        | HANDLING |
| LG.GROUP                         |           |          | (wt./ | EXPLOIT. | LING  | CATCH     |           |           | (wt./ |          |          | (wt./ | SEX  | SIZE   | DEATHS   |
| (mm)                             | (mlns.)(  | mln.lb.) | crab) | RATE     | MORT. | (min.1b.) | (mins.)   | (mln.1b.) | crab) | (mins.)( | mln.1bs. | crab) | (F:M | )(M:F) | (mlns.)  |
| 90 - 94                          | 0.93      | 1.19     | 1.28  | 0.00     | 0.7   | 0.00      | 0.67      | 0.86      | 1.28  | 1.13     | 1.39     | 1.23  | 1.69 | 1.04   | 0.26     |
| 95 - 99                          | 2.04      | 3.09     | 1.51  | 0.00     | 0.7   | 0.00      | 1.47      | 2.22      | 1.51  | 1.18     | 1.63     | 1.38  | 0.80 | 1.09   | 0.57     |
| 100 -104                         | 2.54      | 4.49     | 1.77  | 0.00     | 0.7   | 0.00      | 1.83      | 3.23      | 1.77  | 1.26     | 1.94     | 1.54  | 0.69 | 1.15   | 0.71     |
| 105 -109                         | 2.78      | 5.72     | 2.06  | 0.00     | 0.7   | 0.00      | 2.00      | 4.12      | 2.06  | 1.04     | 1.79     | 1.73  | 0.52 | 1.19   | 0.78     |
| 110 -114                         | 2.22      | 5.27     | 2.37  | 0.05     | 0.7   | 0.26      | 1.57      | 3.72      | 2.37  | 0.35     | 0.67     | 1.90  | 0.22 | 1.25   | 0.54     |
| 115 -119                         | 2.54      | 6.95     | 2.73  | 0.30     | 0.7   | 2.08      | 1.60      | 4.38      | 2.73  | 0.29     | 0.61     | 2.10  | 0.18 | 1.30   | 0.18     |
| 120 -124                         | 2.60      | 8.09     | 3.11  | 0.40     | 0.7   | 3.24      | 1.56      | 4.86      | 3.11  | 0.03     | 0.07     | 2.43  | 0.02 | 1.28   | 0.00     |
| 125 -129                         | 2.37      | 8.37     | 3.53  | 0.40     | 0.7   | 3.35      | 1.42      | 5.02      | 3.53  | 0.03     | 0.08     | 2.57  | 0.02 | 1.38   | 0.00     |
| 130 -134                         | 2.60      | 10.41    | 4.00  | 0.40     | 0.7   | 4.16      | 1.56      | 6.25      | 4.00  |          |          |       | 0.00 |        | 0.00     |
| 135 -139                         | 2.34      | 10.54    | 4.50  | 0.40     | 0.7   | 4.22      | 1.40      | 6.32      | 4.50  | 0.03     | 0.09     | 3.01  | 0.02 | 1.49   | 0.00     |
| 140 -144                         | 1.57      | 7.91     | 5.04  | 0.40     | 0.7   | 3.16      | 0.94      | 4.74      | 5.04  |          |          |       | 0.00 |        | 0.00     |
| 145 -149                         | 1.28      | 7.16     | 5.60  | 0.40     | 0.7   | 2.87      | 0.77      | 4.30      | 5.60  |          |          |       | 0.00 |        | 0.00     |
| 150 -154                         | 0.50      | 3.10     | 6.21  | 0.40     | 0.7   | 1.24      | 0.30      | 1.86      | 6.21  |          |          |       | 0.00 |        | 0.00     |
| 155 -159                         | 0.14      | 0.95     | 6.75  | 0.40     | 0.7   | 0.38      | 0.08      | 0.57      | 6.75  |          |          |       | 0.00 |        | 0.00     |
| 160 -164                         | 0.08      | 0.59     | 7.33  | 0.40     | 0.7   | 0.23      | 0.05      | 0.35      | 7.33  |          |          |       | 0.00 |        | 0.00     |
|                                  | i.        |          |       | TOTAL CA | гсн = | 25.20     |           |           |       |          |          |       |      |        |          |
|                                  |           |          |       | AVERAGE  | VT. = | 4.02      |           |           |       |          |          |       |      |        |          |
|                                  | BEFORE    | FISHING  | 3     |          |       |           | AFTER     | FISHING   | ;     |          |          |       |      |        |          |
| TOTALS:                          |           |          | -     |          |       |           |           |           |       |          |          |       |      |        |          |
|                                  |           |          |       |          |       |           |           |           |       |          |          |       |      |        |          |
| MALE>89                          | ):<br>)-  |          |       |          |       |           |           |           |       | 5 31     | 8 27     | 1 55  |      |        | 3.04     |
| r EMALE 203                      |           |          |       |          |       |           |           |           |       |          |          |       |      |        |          |
| MALE>119:                        | 13.48     | 57.12    | 4.24  |          |       |           | 8.09      | 34.27     | 4.24  |          |          |       |      |        |          |
|                                  | SEX RATIO | O (F:M): | 0.40  |          |       |           | SEX RATIO | (F:M):    | 0.66  |          |          |       |      |        |          |

Appendix Table 33.--Effect of **a 5.5" minimum size limit** on sex and size ratios, red king crab, Bristol Bay, **1986** data, handling mortality = .7.

| (ADADAGE)   | М                      | ALES                 |              |          |                |               | MALES                  | S REMAIN             | ING            | _        |          |                |       |            |          |
|-------------|------------------------|----------------------|--------------|----------|----------------|---------------|------------------------|----------------------|----------------|----------|----------|----------------|-------|------------|----------|
| LC CROUP    | BEFUE                  | CE FISH              |              | EVDIAT   | HAND-          | CATCH         | AFT                    | SR FISHIN            | j<br>/···      | F        | EMAL     | ES             | RATI  | los:       | HANDLING |
| (mm)        | (mlns.)(m              | aln.lb.)             | (wt./        | RATE     | MORT.          | (mln.lb.)     | (mlns.)                | (mln.lb.)            | (wL•/<br>crab) | (mlns.)( | mln.lbs. | (wt./<br>crab) | (F:M) | 51ZE)(M:F) | (mlns.)  |
|             |                        |                      |              |          |                |               |                        |                      | ·····          |          |          |                |       |            |          |
| 90 - 94     | 0.93                   | 1.19                 | 1.28         | 0.00     | 0.0            | 0.00          | 0.93                   | 1.19                 | 1.28           | 1.13     | 1.39     | 1.23           | 1.22  | 1.04       | 0.00     |
| 95 - 99     | 2.04                   | 3.09                 | 1.51         | 0.00     | 0.0            | 0.00          | 2.04                   | 3.09                 | 1.51           | 1.18     | 1.63     | 1.38           | 0.58  | 1.09       | 0.00     |
| 100 -104    | 2.54                   | 4.49                 | 1.77         | 0.00     | 0.0            | 0.00          | 2.54                   | 4.49                 | 1.77           | 1.26     | 1.94     | 1.54           | 0.50  | 1.15       | 0.00     |
| 105 109     | 2.78                   | 5.72                 | 2.06         | 0.05     | 0.0            | 0.29          | 2.64                   | 5.43                 | 2.06           | 1.04     | 1.79     | 1.73           | 0.39  | 1.19       | 0.00     |
| 110 -114    | 2.22                   | 5.27                 | 2.37         | 0.30     | 0.0            | 1.58          | 1.55                   | 3.69                 | 2.37           | 0.35     | 0.67     | 1.90           | 0.23  | 1.25       | 0.00     |
| 115 -119    | 2.54                   | 6 <b>₊</b> 95 ∘      | 2.73         | 0.40     | 0.0            | 2.78          | 1.52                   | 4.17                 | 2.73           | 0.29     | 0.61     | 2.10           | 0.19  | 1.30       | 0.00     |
| 120 -124    | 2.60                   | 8.09                 | 3.11         | 0.40     | 0.0            | 3.24          | 1.56                   | 4.86                 | 3.11           | 0.03     | 0.07     | 2.43           | 0.02  | 1.28       | 0.00     |
| 125 -129    | 2.37                   | 8.37                 | 3.53         | 0.40     | 0.0            | 3.35          | 1.42                   | 5.02                 | 3.53           | 0.03     | 0.08     | 2.57           | 0.02  | 1.38       | 0.00     |
| 130 -134    | 2.60                   | 10.41                | 4.00         | 0.40     | 0.0            | 4.16          | 1.56                   | 6.25                 | 4.00           |          |          |                | 0.00  |            | 0.00     |
| 135 -139    | 2.34                   | 10.54                | 4.50         | 0.40     | 0.0            | 4.22          | 1.40                   | 6.32                 | 4.50           | 0.03     | 0.09     | 3.01           | 0.02  | 1.49       | 0.00     |
| 140 -144    | 1.57                   | 7.91                 | 5.04         | 0.40     | 0.0            | 3.16          | 0.94                   | 4.74                 | 5.04           |          |          |                | 0.00  |            | 0.00     |
| 145 -149    | 1.28                   | 7.16                 | 5.60         | 0.40     | 0.0            | 2.87          | 0.77                   | 4.30                 | 5.60           |          |          |                | 0.00  |            | 0.00     |
| 150 -154    | 0.50                   | 3.10                 | 6.21         | 0.40     | 0.0            | 1.24          | 0.30                   | 1.86                 | 6.21           |          |          |                | 0.00  |            | 0.00     |
| 155 -159    | 0.14                   | 0.95                 | 6.75         | 0.40     | 0.0            | 0.38          | 0.08                   | 0.57                 | 6.75           |          |          |                | 0.00  |            | 0.00     |
| 160 -164    | 0.08                   | 0.59                 | 7.33         | 0.40     | 0.0            | 0.23          | 0.05                   | 0.35                 | 7.33           |          |          |                | 0.00  |            | 0.00     |
|             |                        |                      |              | TOTAL CA | TCH =<br>WT. = | 27.49<br>3.81 |                        |                      |                |          |          |                |       |            |          |
|             | BEFORE                 | FISHING              | 3            |          |                |               | AFTEF                  | R FISHING            |                |          |          |                | ,     |            |          |
| TOTALS:     |                        |                      | -            |          |                |               |                        |                      |                |          |          |                |       |            |          |
| <br>MALE>89 | ):                     |                      |              |          |                |               |                        |                      |                |          |          |                |       |            | 0.00     |
| FEMALE>89   | ):                     |                      |              |          |                |               |                        |                      |                | 5.34     | 8.27     | 1.55           |       |            |          |
|             |                        |                      |              |          |                |               |                        |                      |                |          |          |                |       |            |          |
| MALE>119:   | : 13.48                | 57.12                | 4.24         |          |                |               | 8.09                   | 34.27                | 4.24           |          |          |                |       |            |          |
|             | SEX RATIC<br>SIZE RATI | ) (F:M):<br>(O(M:F): | 0.40<br>2.74 |          |                |               | SEX RATIC<br>SIZE RATI | ) (F:M):<br>[O(M:F): | 0.66<br>2.74   |          |          |                |       |            |          |

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Appendix Table 34.--Effect of a 5.25" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = 0.

|                  | MALES<br>CARAPACE <u>BEFORE FISHING</u> |          |                |                     | UNID           |               | MALES     | REMAIN     | ING            | P I       | 7 M D T 1 | r c   | • • • • • • |       | ANDI ING |
|------------------|---|----------|----------------|---------------------|----------------|---------------|-----------|------------|----------------|-----------|-----------|-------|-------------|-------|----------|
| CARAPACE         | BEFOR                                   | E FISH.  | ING            | EVDI OTM            | HAND-          | САЛСИ         | AFTE      | R FISHIN   | <u>(ut (</u>   | F         |           | (wt / | SEX         |       | DEATHS   |
| LG.GROUP<br>(mm) | (mlns.)(m                               | ln.lb.)  | (wt./<br>crab) | RATE                | MORT.          | (mln.lb.)     | (mlns.)   | (mln.lb.)  | (wc./<br>crab) | (mlns.)(n | aln.lbs.  | (wc./ | (F:M)       | (M:F) | (mlns.)  |
| 90 - 94          | 0.93                                    | 1.19     | 1.28           | 0.00                | 0.3            | 0.00          | 0.82      | 1.05       | 1.28           | 1.13      | 1.39      | 1.23  | 1.38        | 1.04  | 0.11     |
| 95 - 99          | 2.04                                    | 3.09     | 1.51           | 0.00                | 0.3            | 0.00          | 1.80      | 2.72       | 1.51           | 1.18      | 1.63      | 1.38  | 0.66        | 1.09  | 0.24     |
| 100 -104         | 2.54                                    | 4.49     | 1.77           | 0.00                | 0.3            | 0.00          | 2.24      | 3.95       | 1.77           | 1.26      | 1.94      | 1.54  | 0.56        | 1.15  | 0.30     |
| 105 -109         | 2.78                                    | 5.72     | 2.06           | 0.05                | 0.3            | 0.29          | 2.35      | 4.83       | 2.06           | 1.04      | 1.79      | 1.73  | 0.44        | 1.19  | 0.29     |
| 110 -114         | 2.22                                    | 5.27     | 2.37           | 0.30                | 0.3            | 1.58          | 1.49      | 3.53       | 2.37           | 0.35      | 0.67      | 1.90  | 0.24        | 1.25  | 0.07     |
| 115 -119         | 2.54                                    | 6.95     | 2.73           | 0.40                | 0.3            | 2.78          | 1.52      | 4.17       | 2.73           | 0.29      | 0.61      | 2.10  | 0.19        | 1.30  | 0.00     |
| 120 -124         | 2.60                                    | 8.09     | 3.11           | 0.40                | 0.3            | 3.24          | 1.56      | 4.86       | 3.11           | 0.03      | 0.07      | 2.43  | 0.02        | 1.28  | 0.00     |
| 125 -129         | 2.37                                    | 8.37     | 3.53           | 0.40                | 0.3            | 3.35          | 1.42      | 5.02       | 3.53           | 0.03      | 0.08      | 2.57  | 0.02        | 1.38  | 0.00     |
| 130 -134         | 2.60                                    | 10.41    | 4.00           | 0.40                | 0.3            | 4.16          | 1.56      | 6.25       | 4.00           |           |           |       | 0.00        |       | 0.00     |
| 135 -139         | 2.34                                    | 10.54    | 4.50           | 0.40                | 0.3            | 4.22          | 1.40      | 6.32       | 4.50           | 0.03      | 0.09      | 3.01  | 0.02        | 1.49  | 0.00     |
| 140 -144         | 1.57                                    | 7.91     | 5.04           | 0.40                | 0.3            | 3.16          | 0.94      | 4.74       | 5.04           |           |           |       | 0.00        |       | 0.00     |
| 145 -149         | 1.28                                    | 7.16     | 5.60           | 0.40                | 0.3            | 2.87          | 0.77      | 4.30       | 5.60           |           |           |       | 0.00        |       | 0,00     |
| 150 -154         | 0.50                                    | 3.10     | 6.21           | 0.40                | 0.3            | 1.24          | 0.30      | 1.86       | 6.21           |           |           |       | 0.00        |       | 0.00     |
| 155 -159         | 0.14                                    | 0.95     | 6.75           | 0.40                | 0.3            | 0.38          | 0.08      | 0.57       | 6.75           |           |           |       | 0.00        |       | 0.00     |
| 160 -164         | 0.08                                    | 0.59     | 7.33           | 0.40                | 0.3            | 0.23          | 0.05      | 0.35       | 7.33           |           |           |       | 0.00        |       | 0.00     |
|                  |   |          |                | TOTAL CA<br>AVERAGE | TCH =<br>WT. = | 27.49<br>3.81 |           |            |                |           |           |       |             |       |          |
|                  | BEFORE                                  | FISHING  | G              |                     |                |               | AFTER     | FISHING    | ;              |           |           |       |             |       |          |
| TOTALS:          |   |          | -              |                     |                |               |           |            |                |           |           |       |             |       |          |
| MALE>8           | 9:                                      |          |                |                     |                |               |           |            |                |           |           |       |             |       | 1.02     |
| FEMALE>8         | 9:                                      |          |                |                     |                |               |           |            |                | 5.34      | 8.27      | 1.55  |             |       |          |
|                  |   |          |                |                     |                |               |           |            |                |           |           |       |             |       |          |
| MALE>119         | : 13.48                                 | 57.12    | 4.24           |                     |                |               | 8.09      | 34.27      | 4.24           |           |           |       |             |       |          |
|                  | SEX RATIO                               | ) (F:M): | 0.40           |                     |                |               | SEX RATIO | ) (F:M): ( | 0.66           |           |           |       |             |       |          |
|                  | SIZE RATI                               | [O(M:F): | 2.74           |                     |                |               | SIZE RATI | .U(M:F):   | 2.14           |           |           |       |             |       |          |

Appendix Table 35.--Effect of a 5.25" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .3.

|                  | MALES<br>ARAPACE BEFORE FISHING |          |       |          |                |               | MALES     | REMAIN    | IING  |            |         |       |       |        |          |   |
|------------------|---------------------------------|----------|-------|----------|----------------|---------------|-----------|-----------|-------|------------|---------|-------|-------|--------|----------|---|
| CARAPACE         | BEFOR                           | E FISH   | ING   |          | HAND-          |               | AFTE      | R FISHIN  | IG    | <u> </u>   | MAL     | ES    | RATI  | .0S: 1 | HANDLING |   |
| LG.GROUP         |                                 |          | (wt./ | EXPLOIT. | LING           | CATCH         |           |           | (wt./ |            |         | (wt./ | SEX   | SIZE   | DEATHS   |   |
| ( mm )           | (mlns.)(m                       | ln.lb.)  | crab) | RATE     | MORT.          | (mln.lb.)     | (mlns.)   | (mln.lb.) | crab) | (mlns.)(ml | ln.lbs. | crab) | (F:M) | (M:F)  | (mlns.)  |   |
| 90 - 94          | 0.93                            | 1.19     | 1.28  | 0.00     | 0.7            | 0.00          | 0.67      | 0,86      | 1.28  | 1.13       | 1.39    | 1.23  | 1.69  | 1.04   | 0.26     |   |
| 95 - 99          | 2.04                            | 3.09     | 1.51  | 0.00     | 0.7            | 0.00          | 1.47      | 2.22      | 1.51  | 1.18       | 1.63    | 1.38  | 0.80  | 1.09   | 0.57     |   |
| 100 -104         | 2.54                            | 4.49     | 1.77  | 0.00     | 0.7            | 0.00          | 1.83      | 3.23      | 1.77  | 1.26       | 1.94    | 1.54  | 0.69  | 1.15   | 0.71     |   |
| 105 -109         | 2.78                            | 5.72     | 2.06  | 0.05     | 0.7            | 0.29          | 1.96      | 4.03      | 2.06  | 1.04       | 1.79    | 1.73  | 0.53  | 1.19   | 0.68     |   |
| 110 -114         | 2.22                            | 5.27     | 2.37  | 0.30     | 0.7            | 1.58          | 1.40      | 3.32      | 2.37  | 0.35       | 0.67    | 1.90  | 0.25  | 1.25   | 0.16     |   |
| 115 -119         | 2.54                            | 6.95     | 2.73  | 0.40     | 0.7            | 2.78          | 1.52      | 4.17      | 2.73  | 0.29       | 0.61    | 2.10  | 0.19  | 1.30   | 0.00     |   |
| 120 -124         | 2.60                            | 8.09     | 3.11  | 0.40     | 0.7            | 3.24          | 1.56      | 4.86      | 3.11  | 0.03       | 0.07    | 2.43  | 0.02  | 1.28   | 0.00     |   |
| 125 -129         | 2,37                            | 8.37     | 3.53  | 0.40     | 0.7            | 3.35          | 1.42      | 5.02      | 3.53  | 0.03       | 0.08    | 2.57  | 0.02  | 1.38   | 0.00     |   |
| 130 -134         | 2.60                            | 10.41    | 4.00  | 0.40     | 0.7            | 4.16          | 1.56      | 6.25      | 4.00  |            |         |       | 0.00  |        | 0.00     |   |
| 135 -139         | 2.34                            | 10.54    | 4.50  | 0.40     | 0.7            | 4.22          | 1.40      | 6.32      | 4.50  | 0.03       | 0.09    | 3.01  | 0.02  | 1.49   | 0.00     |   |
| 140 –144         | 1.57                            | 7.91     | 5.04  | 0.40     | 0.7            | 3.16          | 0.94      | 4.74      | 5.04  |            |         |       | 0.00  |        | 0.00     |   |
| 145 -149         | 1.28                            | 7.16     | 5.60  | 0.40     | 0.7            | 2.87          | 0.77      | 4.30      | 5.60  |            |         |       | 0.00  |        | 0.00     | თ |
| 150 -154         | 0.50                            | 3.10     | 6.21  | 0.40     | 0.7            | 1.24          | 0.30      | 1.86      | 6.21  |            |         |       | 0.00  |        | 0.00     | Ч |
| 155 <b>-</b> 159 | 0.14                            | 0.95     | 6.75  | 0.40     | 0.7            | 0.38          | 0.08      | 0.57      | 6.75  |            |         |       | 0.00  |        | 0.00     |   |
| 160 -164         | 0.08                            | 0.59     | 7.33  | 0.40     | 0.7            | 0.23          | 0.05      | 0.35      | 7.33  |            |         |       | 0.00  |        | 0.00     |   |
|                  |                                 |          |       | TOTAL CA | TCH =<br>WT. = | 27.49<br>3.81 |           |           |       |            |         |       |       |        |          |   |
|                  | BEFORE                          | FISHING  | 3     |          |                | ~~~~~~        | AFTER     | FISHING   | 6     |            |         |       |       |        |          |   |
|                  |                                 |          | -     |          |                |               |           |           | -     |            |         |       |       |        |          |   |
| TOTALS:          |                                 |          |       |          |                |               |           |           |       |            |         |       |       |        |          |   |
| MALE>89          | ):                              |          |       |          |                |               |           |           |       |            |         |       |       |        | 2.38     |   |
| FEMALE>89        | €:                              |          |       |          |                |               |           |           |       | 5.34       | 8.27    | 1.55  |       |        |          |   |
|                  |                                 |          |       |          |                |               |           |           |       |            |         |       |       |        |          |   |
| MALE>119:        | : 13.48                         | 57.12    | 4.24  |          |                |               | 8.09      | 34.27     | 4.24  |            |         |       |       |        |          |   |
|                  | SEX RATIC                       | ) (F:M): | 0.40  |          |                |               | SEX RATIO | ) (F:M):  | 0.66  |            |         |       |       |        |          |   |
|                  | SIZE RATI                       | LO(M:F): | 2.74  |          |                |               | SIZE RATI | U(M:F):   | 2.74  |            |         |       |       |        |          |   |

Appendix Table 36. --Effect of a 5.25" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = .7.

| CARAPACE  | M<br>BEFO | ALES<br>RE FISHI | ING   |          | HAND- |           | MALES<br>AFTI | S REMAIN<br>ER FISHIN | ING<br>G | F         | EMAL     | RATIOS: HANDLING |       |       |         |
|-----------|-----------|------------------|-------|----------|-------|-----------|---------------|-----------------------|----------|-----------|----------|------------------|-------|-------|---------|
| LG.GROUP  |           |                  | (wt./ | EXPLOIT. | LING  | CATCH     |               |                       | (wt./    |           |          | (wt./            | SEX   | SIZE  | DEATHS  |
| (mm)      | (mlns.)(  | mln.lb.)         | crab) | RATE     | MORT. | (mln.lb.) | (mlns.)       | (mln.lb.)             | crab)    | (mlns.)(1 | mln.lbs. | crab)            | (F:M) | (M:F) | (mlns.) |
| 90 - 94   | 0.93      | 1.19             | 1.28  | 0.00     | 0.0   | 0.00      | 0,93          | 1.19                  | 1.28     | 1.13      | 1.39     | 1.23             | 1.22  | 1.04  | 0.00    |
| 95 - 99   | 2.04      | 3.09             | 1.51  | 0.00     | 0.0   | 0.00      | 2.04          | 3.09                  | 1.51     | 1.18      | 1.63     | 1.38             | 0.58  | 1.09  | 0.00    |
| 100 -104  | 2.54      | 4.49             | 1.77  | 0.05     | 0.0   | 0.22      | 2.41          | 4.26                  | 1.77     | 1.26      | 1.94     | 1.54             | 0.52  | 1.15  | 0.00    |
| 105 -109  | 2.78      | 5.72             | 2.06  | 0.30     | 0.0   | 1.72      | 1.95          | 4.00                  | 2.06     | 1.04      | 1.79     | 1.73             | 0.53  | 1.19  | 0.00    |
| 110 -114  | 2.22      | 5.27             | 2.37  | 0.40     | 0.0   | 2.11      | 1.33          | 3.16                  | 2.37     | 0.35      | 0.67     | 1.90             | 0.26  | 1.25  | 0.00    |
| 115 -119  | 2.54      | 6.95             | 2.73  | 0.40     | 0.0   | 2.78      | 1.52          | 4.17                  | 2.73     | 0.29      | 0.61     | 2.10             | 0.19  | 1.30  | 0.00    |
| 120 -124  | 2.60      | 8.09             | 3.11  | 0.40     | 0.0   | 3.24      | 1.56          | 4.86                  | 3.11     | 0.03      | 0.07     | 2.43             | 0.02  | 1.28  | 0.00    |
| 125 -129  | 2.37      | 8.37             | 3.53  | 0.40     | 0.0   | 3.35      | 1.42          | 5.02                  | 3.53     | 0.03      | 0.08     | 2.57             | 0.02  | 1.38  | 0.00    |
| 130 -134  | 2.60      | 10.41            | 4.00  | 0.40     | 0.0   | 4.16      | 1.56          | 6.25                  | 4.00     |           |          |                  | 0.00  |       | 0.00    |
| 135 -139  | 2.34      | 10.54            | 4.50  | 0.40     | 0.0   | 4.22      | 1.40          | 6.32                  | 4.50     | 0.03      | 0.09     | 3.01             | 0.02  | 1.49  | 0.00    |
| 140 -144  | 1.57      | 7.91             | 5.04  | 0.40     | 0.0   | 3.16      | 0.94          | 4.74                  | 5.04     |           |          |                  | 0.00  |       | 0.00    |
| 145 -149  | 1.28      | 7.16             | 5.60  | 0.40     | 0.0   | 2.87      | 0.77          | 4.30                  | 5.60     |           |          |                  | 0.00  |       | 0.00    |
| 150 -154  | 0.50      | 3.10             | 6.21  | 0.40     | 0.0   | 1.24      | 0.30          | 1.86                  | 6.21     |           |          |                  | 0.00  |       | 0.00    |
| 155 -159  | 0.14      | 0.95             | 6.75  | 0.40     | 0.0   | 0.38      | 0.08          | 0.57                  | 6.75     |           |          |                  | 0.00  |       | 0.00    |
| 160 -164  | 0.08      | 0.59             | 7.33  | 0.40     | 0.0   | 0.23      | 0.05          | 0.35                  | 7.33     |           |          |                  | 0.00  |       | 0.00    |
|           |           |                  |       | TOTAL CA | ICH = | 29.68     |               |                       |          |           |          |                  |       |       |         |
|           |           |                  |       | AVERAGE  | • T•  | 3.59      |               |                       |          |           |          |                  |       |       |         |
| -         | BEFORE    | FISHING          | ;     |          |       |           | AFTER         | R FISHING             | 1        |           |          |                  |       |       |         |
|           |           |                  | -     |          |       |           |               |                       |          |           |          |                  |       |       |         |
| TOTALS:   |           |                  |       |          |       |           |               |                       |          |           |          |                  |       |       |         |
| MALE>89   | ):        |                  |       |          |       |           |               |                       |          |           |          |                  |       |       | 0.00    |
| FEMALE>89 | ):        |                  |       |          |       |           |               |                       |          | 5.34      | 8.27     | 1.55             |       |       |         |
|           | 12 10     | 53.40            |       |          |       |           | 0.00          | 24.07                 | 4 2 4    |           |          |                  |       |       |         |
| MALE>119: | 13.48     | 57.12            | 4.24  |          |       |           | 8.09          | 34.27                 | 4.24     |           |          |                  |       |       |         |
|           | SEX RATI  | O (F:M):         | 0.40  |          |       | :         | SEX RATIC     | ) (F:M):              | 0.66     |           |          |                  |       |       |         |
|           | SIZE RAT  | IO(M:F):         | 2.74  |          |       |           | SIZE RATI     | CO(M:F):              | 2.74     |           |          |                  |       |       |         |

Appendix Table 37.--Effect of a 5.0" minimum size limit on sex and size ratios, red king crab, Bristol Bay, 1986 data, handling mortality = 0.

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| Appendix | Table | 38. | Effect  | of   | а    | 5.0"   | minimum size   | limit | on | sex | and | size | ratios, | red | king | crab, | Bristol | Bay, | 1986 | data, |
|----------|-------|-----|---------|------|------|--------|----------------|-------|----|-----|-----|------|---------|-----|------|-------|---------|------|------|-------|
|          |       |     | handlir | ng i | mort | tality | <i>y</i> = .3. |       |    |     |     |      |         |     |      |       |         |      |      |       |

| CARAPACE             | M<br>BEFOI             | ALES<br>RE FISH     | ING          | HAND-     |                |               | MALES REMAINING<br>AFTER FISHING |                      |              | F        | ЕМАЦ     | RATTOS, HANDLING |       |       |         |
|----------------------|------------------------|---------------------|--------------|-----------|----------------|---------------|----------------------------------|----------------------|--------------|----------|----------|------------------|-------|-------|---------|
| LG.GROUP             |                        |                     | (wt./        | EXPLOIT.  | LING           | САТСН         |                                  |                      | (wt./        |          |          | (wt./            | SEX   | SIZE  | DEATHS  |
| (mm)                 | (mlns.)(m              | nln.lb.)            | crab)        | RATE      | MORT.          | (mln.lb.)     | (mlns.)                          | (mln.lb.)            | crab)        | (mlns.)( | mln.lbs. | crab)            | (F:M) | (M:F) | (mlns.) |
| 90 - 94              | 0.93                   | 1.19                | 1.28         | 0.00      | 0.3            | 0.00          | 0.82                             | 1.05                 | 1.28         | 1.13     | 1.39     | 1.23             | 1.38  | 1.04  | 0.11    |
| 95 - 99              | 2.04                   | 3.09                | 1.51         | 0.00      | 0.3            | 0.00          | 1.80                             | 2.72                 | 1.51         | 1.18     | 1.63     | 1.38             | 0.66  | 1.09  | 0.24    |
| 100 -104             | 2.54                   | 4.49                | 1.77         | 0.05      | 0.3            | 0.22          | 2.15                             | 3.79                 | 1.77         | 1.26     | 1.94     | 1.54             | 0.59  | 1.15  | 0.27    |
| 105 -109             | 2.78                   | 5.72                | 2.06         | 0.30      | 0.3            | 1.72          | 1.86                             | 3.83                 | 2.06         | 1.04     | 1.79     | 1.73             | 0.56  | 1.19  | 0.08    |
| 110 -114             | 2.22                   | 5.27                | 2.37         | 0.40      | 0.3            | 2.11          | 1.33                             | 3.16                 | 2.37         | 0.35     | 0.67     | 1.90             | 0.26  | 1.25  | 0.00    |
| 115 -119             | 2.54                   | 6.95                | 2.73         | 0.40      | 0.3            | 2.78          | 1.52                             | 4.17                 | 2.73         | 0.29     | 0.61     | 2.10             | 0.19  | 1.30  | 0.00    |
| 120 -124             | 2,60                   | 8.09                | 3.11         | 0.40      | 0.3            | 3.24          | 1.56                             | 4.86                 | 3.11         | 0.03     | 0.07     | 2.43             | 0.02  | 1.28  | 0.00    |
| 125 –129             | 2.37                   | 8.37                | 3.53         | 0.40      | 0.3            | 3.35          | 1.42                             | 5.02                 | 3.53         | 0.03     | 0.08     | 2.57             | 0.02  | 1.38  | 0.00    |
| 130 -134             | 2.60                   | 10.41               | 4.00         | 0.40      | 0.3            | 4.16          | 1.56                             | 6.25                 | 4.00         |          |          |                  | 0.00  |       | 0.00    |
| 135 -139             | 2.34                   | 10.54               | 4.50         | 0.40      | 0.3            | 4.22          | 1.40                             | 6.32                 | 4.50         | 0.03     | 0.09     | 3.01             | 0.02  | 1.49  | 0.00    |
| 140 -144             | 1.57                   | 7.91                | 5.04         | 0.40      | 0.3            | 3.16          | 0.94                             | 4.74                 | 5.04         |          |          |                  | 0.00  |       | 0.00    |
| 145 -149             | 1.28                   | 7.16                | 5.60         | 0.40      | 0.3            | 2.87          | 0.77                             | 4.30                 | 5.60         |          |          |                  | 0.00  |       | 0.00    |
| 150 -154             | 0.50                   | 3.10                | 6.21         | 0.40      | 0.3            | 1.24          | 0.30                             | 1.86                 | 6.21         |          |          |                  | 0.00  |       | 0.00    |
| 155 -159             | 0.14                   | 0.95                | 6.75         | 0.40      | 0.3            | 0.38          | 0.08                             | 0.57                 | 6.75         |          |          |                  | 0.00  |       | 0.00    |
| 160 -164             | 0.08                   | 0.59                | 7.33         | 0.40      | 0.3            | 0.23          | 0.05                             | 0.35                 | 7.33         |          | -        |                  | 0.00  |       | 0.00    |
|                      |                        |                     |              | TOTAL CAN | ICH =<br>NT. = | 29.68<br>3.59 |                                  |                      |              |          |          |                  |       |       |         |
|                      | BEFORE                 | FISHING             | G            |           |                |               | AFTER                            | FISHING              |              |          |          |                  |       |       |         |
| TOTALS:              |                        |                     | -            |           |                |               |                                  |                      |              |          |          |                  |       |       |         |
| MALE>89<br>FEMALE>89 | ):<br>):               |                     |              |           |                |               |                                  |                      |              | 5.34     | 8.27     | 1.55             |       |       | 0.71    |
|                      | ,                      |                     |              |           |                |               |                                  |                      |              |          |          |                  |       |       |         |
| MALE>119:            | 13.48                  | 57.12               | 4.24         |           |                |               | 8.09                             | 34.27                | 4.24         |          |          |                  |       |       |         |
|                      | SEX RATIC<br>SIZE RATI | ) (F:M):<br>O(M:F): | 0.40<br>2.74 |           |                | :             | SEX RATIC                        | ) (F:M):<br>CO(M:F): | 0.66<br>2.74 |          |          |                  |       |       |         |

| CARAPACE   | M<br>BEFOF | ALES<br>RE FISHI | ING   |           | HAND-         |               | MALES<br>AFTE | REMAIN<br>R FISHIN | IING<br>IG | FI        | EMAL     | RATIOS: HANDLING |       |       |         |
|------------|------------|------------------|-------|-----------|---------------|---------------|---------------|--------------------|------------|-----------|----------|------------------|-------|-------|---------|
| LG.GROUP   |            |                  | (wt./ | EXPLOIT.  | LING          | CATCH         |               |                    | (wt./      |           |          | (wt./            | SEX   | SIZE  | DEATHS  |
| (mm)       | (mlns.)(m  | aln.lb.)         | crab) | RATE      | MORT.         | (mln.lb.)     | (mlns.)       | (mln.lb.)          | crab)      | (mlns.)(n | nln.lbs. | crab)            | (F:M) | (M:F) | (mlns.) |
| 90 - 94    | 0.93       | 1.19             | 1.28  | 0.00      | 0.7           | 0.00          | 0.67          | 0.86               | 1.28       | 1.13      | 1.39     | 1.23             | 1,69  | 1.04  | 0.26    |
| 95 - 99    | 2.04       | 3.09             | 1.51  | 0.00      | 0.7           | 0.00          | 1.47          | 2.22               | 1.51       | 1.18      | 1.63     | 1.38             | 0.80  | 1.09  | 0.57    |
| 100 -104   | 2.54       | 4.49             | 1.77  | 0.05      | 0.7           | 0.22          | 1.79          | 3.16               | 1.77       | 1.26      | 1.94     | 1.54             | 0.70  | 1.15  | 0.62    |
| 105 -109   | 2.78       | 5.72             | 2.06  | 0.30      | 0.7           | 1.72          | 1.75          | 3.60               | 2.06       | 1.04      | 1.79     | 1.73             | 0.59  | 1.19  | 0.19    |
| 110 -114   | 2.22       | 5.27             | 2.37  | 0.40      | 0.7           | 2.11          | 1.33          | 3.16               | 2.37       | 0.35      | 0.67     | 1.90             | 0.26  | 1.25  | 0.00    |
| 115 -119   | 2.54       | 6.95             | 2.73  | 0.40      | <b>0.7</b>    | 2.78          | 1.52          | 4.17               | 2.73       | 0.29      | 0.61     | 2.10             | 0.19. | 1.30  | 0.00    |
| 120 -124   | 2.60       | 8.09             | 3.11  | 0.40      | 0.7           | 3.24          | 1.56          | 4.86               | 3.11       | 0.03      | 0.07     | 2.43             | 0.02  | 1.28  | 0.00    |
| 125 -129   | 2.37       | 8.37             | 3.53  | 0.40      | 0.7           | 3.35          | 1.42          | 5.02               | 3.53       | 0.03      | 0.08     | 2.57             | 0.02  | 1.38  | 0.00    |
| 130 -134   | 2.60       | 10.41            | 4.00  | 0.40      | 0.7           | 4.16          | 1.56          | 6.25               | 4.00       |           |          |                  | 0.00  |       | 0.00    |
| 135 -139   | 2.34       | 10.54            | 4.50  | 0.40      | 0.7           | 4.22          | 1.40          | 6.32               | 4.50       | 0.03      | 0.09     | 3.01             | 0.02  | 1.49  | 0.00    |
| 140 -144   | 1.57       | 7.91             | 5.04  | 0.40      | 0.7           | 3.16          | 0.94          | 4.74               | 5.04       |           |          |                  | 0.00  |       | 0.00    |
| 145 -149   | 1.28       | 7.16             | 5.60  | 0.40      | 0.7           | 2.87          | 0.77          | 4.30               | 5.60       |           |          |                  | 0.00  |       | 0.00    |
| 150 -154   | 0.50       | 3.10             | 6.21  | 0.40      | 0.7           | 1.24          | 0.30          | 1.86               | 6.21       |           |          |                  | 0.00  |       | 0.00    |
| 155 -159   | 0.14       | 0.95             | 6.75  | 0.40      | 0.7           | 0.38          | 0.08          | 0.57               | 6.75       |           |          |                  | 0.00  |       | 0.00    |
| 160 -164   | 0.08       | 0.59             | 7.33  | 0.40      | 0.7           | 0.23          | 0.05          | 0.35               | 7.33       |           |          |                  | 0.00  |       | 0.00    |
|            | ن.         |                  |       | TOTAL CAT | CH =<br>VT. = | 29.68<br>3.59 |               |                    |            |           |          |                  |       |       |         |
|            | BEFORE     | FISHING          | ;     |           |               | · · · · · ·   | AFTER         | FISHING            |            |           |          |                  |       |       |         |
| መረጣል ፣ ድ . |            |                  |       |           |               |               |               |                    |            |           |          |                  |       |       |         |
| TOTALS:    |            |                  |       |           |               |               |               |                    |            |           |          |                  |       |       |         |
| MALE>89    | ):         |                  |       |           |               |               |               |                    |            |           |          |                  |       |       | 1.65    |
| FEMALE>89  | ):         |                  |       |           |               |               |               |                    |            | 5.34      | 8.27     | 1.55             |       |       |         |
|            |            |                  |       |           |               |               |               |                    |            |           |          |                  |       |       |         |
| MALE>119:  | 13.48      | 57.12            | 4.24  |           |               |               | 8.09          | 34.27              | 4.24       |           |          |                  |       |       |         |
|            | SEX RATIO  | ) (F:M):         | 0.40  |           |               |               | SEX RATIO     | (F:M):             | 0.66       |           |          |                  |       |       |         |
|            | SIZE RATI  | O(M:F):          | 2.74  |           |               | 2             | SIZE RATI     | O(M:F):            | 2.74       |           |          |                  |       |       |         |

Appendix Table 39.--Effect of a 5.0" minimum **size limit** on sex and size ratios, red king crab, Bristol Bay, **1986** data, handling **mortality = .7.**