ESTIMATION OF RED KING CRAB (*PARALITHODES CAMTSCHATICUS*) ABUNDANCE AND AVAILABLE HARVEST IN SOUTHEAST ALASKA FOR THE 2001/2002 SEASON USING A POT SURVEY

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ABSTRACT

The Southeast Alaska red king crab *(Paralithodes camtschaticus)* stock assessment survey began in 1978. The survey is used to collect data to estimate the abundance of mature and legal male crab in selected areas of Southeast Alaska, monitor the relative abundance of female and juvenile crab, evaluate the overall condition of stocks in the areas, and study the biology of crab resources. These data are combined with commercial and personal use catch data in a catch-survey analysis to estimate the total abundance of crab and establish the total allowable harvest of red king crab in Southeast Alaska.

In 2001, 441 pots were distributed in 8 areas capturing over 8,000 red king crab. The health and abundance of red king crab varies by area. Gambier Bay, Pybus Bay, and the Juneau area had high abundances of all sex and recruit classes of crab while Seymour Canal and Peril Strait had low abundances of crab. The results for Port Frederick, Excursion Inlet, and Lynn Canal were mixed but similar to recent years. Abundances in all areas were greater than the low abundances measured in the late 1980s and similar overall to the abundances estimated for the early 1980s. The increases in abundance have been more evident in northern areas, resulting in a larger fraction of the catch coming from these areas when compared to the early 1980s. The total allowable commercial harvest was estimated to be 302,000 pounds, just exceeding the 300,000 pound commercial fishery threshold.

Additional insight into a number of biological and fisheries related issues could significantly improve understanding of red king crab stock abundance and dynamics. These include pot soak time experiments, estimates of growth and mortality, movement, early life history, and spawner-recruit relationships. Other areas where information is lacking are unobserved fishing mortality, and development of optimum harvest rates and thresholds. Reduction in the variability of survey catches and estimation of abundances remains another focus of future investigations.

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INTRODUCTION

Red king crab (*Paralithodes camtschaticus*) are a highly valued component of both the personal use and commercial fisheries in Southeast Alaska. These crab are harvested primarily in the bays, inlets, and adjacent shorelines of the northern waters of Southeast Alaska at depths generally less than 150 fathoms (Koeneman and Botelho 1999). Small numbers of blue king crab (*P. platypus)* are also harvested in the red king crab fishery. The value of the fishery to Southeast Alaska communities is enhanced by the late fall timing of the fishery, which provides fishing opportunities during a time when the harvesting of other marine resources is limited.

In Southeast Alaska commercial fishing on all species of king crab began in the early 1960s. From 1962 through the 1969/1970 fishing season, total catches of all species of king crab surpassed 1 million pounds in 5 of the 9 seasons and averaged over 1.1 million pounds (Koeneman and Botelho 1999). Commercial catches of red, blue, and golden (*Lithodes aequispinus*) king crab have been recorded separately since the 1970/1971 season. Red king crab catches initially peaked in the 1973/1974 season at 758,000 pounds and subsequently in the 1979/1980 through 1981/1982 seasons averaging 572,000 pounds (Figure 1). Subsequent declines in the overall abundance and age class diversity of red king crab populations prompted the closure of the traditional red king crab commercial fishery from the 1985/1986 through the 1992/1993 seasons. For the 1993/1994 through 1999/2000 seasons (except the 1998/1999 season which was not opened to commercial fishing), commercial catches averaged over 300,000 pounds with an exvessel value of 1.5 million dollars annually. An average of 79 permits participated in recent fisheries. In addition to commercial fishery harvests, personal use catches have continued to increase in recent years and now exceed 100,000 pounds annually (Clark et al., 2002b).

Management of the red king crab resource is guided by the Alaska Board of Fisheries (BOF) policy on king and Tanner crab resource management (BOF 1990) and by guidelines and regulations specified in the Southeast Alaska Red King Crab Management Plan and general commercial shellfish regulations of the Alaska Department of Fish and Game (ADF&G) (ADF&G 2000). The red king crab resource is managed to maintain a broad spectrum of age and size classes of mature crab, to maintain adequate brood stock to ensure reproductive viability, and to provide a sustainable and reliable supply of product to fishers and the industry. A number of management tools have been developed to monitor the status of red king crab stocks and the conduct of the commercial and personal use fisheries. These include personal use permits, inseason creel census and phone surveys, commercial fishery logbooks, aerial surveys of the commercial fleet, fish ticket monitoring, and dockside sampling (Koeneman and Botelho 1999). However, the most important component of the stock assessment program is the annual red king crab stock assessment survey.

The principal goal of the red king crab stock assessment program is to obtain a relative measure of abundance and overall condition of mature male ($\geq$ 129 mm carapace length or CL) and large female crab ($\geq$ 114 mm CL) in areas where the majority of red king crab are harvested in the personal use and commercial fisheries. These relative abundances, estimated as an average catch per pot day for each area, are used to evaluate the overall health and abundance of red king crab stocks in Southeast Alaska and to determine the total guideline harvest. The abundance and condition of smaller red king crab also provide a qualitative assessment of the future health and abundance of the resource and may be used to adjust guideline harvests. Information is also collected on other species of commercially important crab, including blue king crab (*P. platypus*), golden king crab (*Lithodes aequispinus*), and Tanner crab (*Chionoecetes bairdi*).

In this report we detail the methods and analyses used to plan, implement, and summarize the red king crab stock assessment surveys conducted since 1978. We summarize catch rates and stock conditions from the 1978 through 2001 surveys and discuss some of the changes in survey methods from previous years. We document some of the supporting analyses, such as length-weight conversions and classification of crab into recruit classes. Elements necessary for estimation of total allowable catch are discussed and the process is illustrated using the 2001 survey results. This report is a compilation and summary of the red king crab survey methods and results. It is intended to provide fishers, researchers, department staff, and interested general public with an understanding of how the survey is conducted, what we have learned from survey catches over the last 24 years, and how we may improve the survey and overall red king crab management.

RED KING CRAB STOCK ASSESSMENT METHODS

The red king crab stock assessment survey began in 1978 with the pilot examination of Pybus, Gambier, and Farragut bays. The survey has been conducted annually since then except 1990 and 1992, deploying and retrieving a total of almost 9,000 pots (Table 1). The survey currently deploys over 400 crab pots across 8 areas, which are defined as either a single bay or a collection of waters in nearby bays and adjacent shorelines of straits and sounds (Figure 2). These areas range in size from 31 km^2 for the Lynn Canal area to 326 km^2 for the Juneau area (Table 2). Pots are generally set at depths greater than 20 fathoms and less than 100 fathoms, but some depths may exceed 120 fathoms. These areas are divided into strata based on bathymetry and 1978–1985 survey catches. The number of strata range from 4 (Excursion Inlet and Seymour Canal) to 13 (Juneau Area, Table 2). Appendix Figures 1–8 show the boundaries and stratification designation for the waters in each of the areas currently surveyed.

The type of pot and pot placement methods have changed significantly since the early survey years. From 1978 through 1985, 2.06 x 2.06 meter (7 x 7 feet) square pots were set at fixed locations each year. Beginning in 1986, pot locations were randomly generated each year for each stratum within each area. Currently, the number of pots within each stratum is based on a Neyman allocation (Cochran 1977) using the relative area of the stratum and variability of red king crab survey catch in the stratum. The Neyman allocation is calculated as:

$$n_h = \frac{W_h S_h}{\sum W_h S_h} n \qquad (1)$$

where n_h is the number of pots allocated to stratum h, W_h is the area of stratum h, S_h is the standard deviation of catch per pot day of either mature male crab or juvenile male and female crab, n is the total number of pots to be set in the area, and the sum is the sum of $W_h S_h$ over all strata in the area. All segments of the red king crab population are caught, but usually strata with higher abundances of mature male crab have more weight than strata with lower abundances of mature males. The allocation of pots across strata for all areas in the 2001 survey is shown in Appendix Tables 1a-1c. Beginning in 1995, a small number of conical pots were set with the square pots initially to compare the catchability of conical pots with square pots. Preliminary analysis of paired square and conical pot catches indicate that the catchability of these two types of pots is very similar. Consequently, beginning in the 2000 survey, conical pots were used exclusively in the survey (Figure 3).

The survey is currently conducted from mid June through July, which is consistent with the timing of the survey in most years (Figure 4). However, in 1987 and 1988, part of the survey was completed in the fall months of September and October, and in 1989 all of the survey was conducted from mid September through October (Figures 3 and 4). Catches in the fall months were found to be comparable to catches in the summer months.

Sampling methods have remained consistent over the years. Generally from 18 to 24 pots are set in the afternoon and retrieved the following day, resulting in 16 to 24 hour soak times. Catches are sorted and commercially important species of crab are counted and completely sampled if the catch is not prohibitively large, or subsampled if required by time constraints. Data are recorded for sex, carapace length measured to the nearest millimeter, shell and leg condition, presence of parasites, and reproductive status. Catches are standardized by dividing the catch of each pot by the fraction of a day pots are in the water. Latitude and longitude to the nearest 1/1000 of a decimal degree, miscellaneous species caught in the pot, observations on type of substrate, and water depth to the nearest fathom (uncorrected for tidal stage) are also noted. A subsample of male red king crab is taken from the sampled catch and weighed to the nearest gram to establish a length-weight relationship. Data are currently entered and stored in the departments Oracle-based database, Alexander.

Estimation of the biomass of crab available for harvest requires data from a number of sources in addition to the red king crab stock assessment survey. These include catches from the commercial fishery fishticket database, personal use catches from the Juneau area personal use permit program, sport fishery creel surveys, and sport fishery surveys conducted by mail. Biological characteristics of red king crab which have not been studied in Southeast Alaska are inferred from results of studies on red king crab in areas outside of Southeast Alaska. The process of determining the commercial quota for Southeast Alaska is shown in Figures 5a and 5b. Commercial and personal use catch data, survey catch data, and estimates for natural mortality and growth are input into a catch-survey analysis to estimate the total number of crab in each of the 8 surveyed areas. The length-weight relationships estimated for each area and shell condition (new and old shells; see below) are used to estimate average weight of mature and legal crab and convert numbers of crab to biomass. An exploitation rate of 20% of the mature biomass but not more than 50% of the legal biomass is applied to the stock abundances in each of the surveyed areas to determine the initial target catch from each area. A 20% mature male harvest rate was proposed for the Kodiak and Bristol Bay red king crab resources to protect the reproductive potential of these stocks and to minimize the risk of overfishing (Pengilly and Schmidt 1995). Zheng et al. (1997c) reevaluated this harvest strategy and recommended a 15% mature male harvest rate if handling mortality is significant and a 50% maximum legal male harvest rate. Next, the abundance of female and juvenile male red king crab, the reproductive condition of female crab, the male reproductive potential (defined in Zheng et al. 1997c as the sum of mature male abundances by CL, each multiplied by the estimated maximum number of females with which these males can mate), and recent history of trends in abundance provide a broad picture of the overall condition of the red king crab populations in the different areas. If a substantial number of concerns are identified, the target catch may be reduced or the area closed to commercial and personal use harvest. The adjusted target catches for each surveyed area are reduced by the anticipated personal use catch and the remaining target catches are summed. To account for unsurveyed areas, the total target catch for all surveyed areas is then expanded by the percent of the total commercial catch that is harvested in the subdistricts represented by the surveyed areas. Since 1993, an average of 30% of the harvest occurred in areas outside of the surveyed subdistricts. If the total target catch from the surveyed areas, unsurveyed areas, and recent average blue king crab harvest equals or exceeds 300,000 pounds, the commercial fishery is opened on the regulatory start date of November 1. (Note: In March 2002 the Alaska Board of Fisheries reduced the commercial fishery threshold to 200,000 pounds which is currently in place.)

Length-Weight Conversions

Paired length and weight measurements have been collected consistently since 1996 from commercial fishery dockside samples, and since 1997 during the stock assessment surveys. A total of 5,676 survey samples and 4,823 commercial fishery samples have been collected. Because only legal male crab are sampled from the commercial fishery, samples from the survey represent a broader range of lengths and are used to determine if there are significant differences between length-weight relationships. The number of measurements are further limited by selecting only measurements from crabs with normal (no missing legs and normal carapace) shell and leg condition. Data were log transformed (see Ricker 1975) and a line was fitted to all measurements. All data points which were greater than 3 standard deviations from the estimated weight were omitted from the set of length-weight pairs used to determine if there are differences in length-weight relationships.

Nonparametric tests (Conover 1980) were used to evaluate the differences between the linear regression results for different shell conditions (old/very old shell compared to new/soft shell crab), between areas, and between years. These differences are used to objectively determine whether crabs of different shell conditions, areas, or years can be grouped to estimate a length-weight conversion formula. A sign test was used to determine if there was a significant difference in intercepts and slopes of old shell crab compared to new shell crab and a Quade test for differences between areas and years. The estimated weights at 130, 145, and 160 mm CL were also evaluated for differences. A significant difference was found between both slope and intercept between old shell and new shell crab ($P = 0.0002$) with the intercept of new shell crab being significantly smaller than the intercept of old shell crab and the slope of new shell crab being significantly larger than the slope of old shell crab. This results in significantly lower weights for small new shell crab at CL of 130 ($P = 0.0007$) and 145 ($P = 0.0064$) but essentially equal weight for larger crab with CL 160 ($P = 0.64$). There was also a significant difference in length-weight conversions between areas for both new ($P = 0.050$) and old ($P = 0.002$) shell but no significant differences between years ($P = 0.09$ and $P = 0.79$ for new and old shell crab respectively).

The estimates of intercept and slope for both the survey and dockside length-weight measurements are given in Table 3 together with the estimated weights for crab of 130 mm, 145 mm, and 160 mm CL. Although there are statistically significant differences in length-weight relationships between crabs with different shell conditions and crab caught in different survey areas, these differences are principally a result of large sample sizes. For practical application, the estimated weights are very similar for crab of the same CL across shell types and areas. Most of the estimated weights are within 100 gm of each other. Estimated weights tend to be lower for smaller new shell crab than for the same size old shell crab, but are about equal when crab reach 160 mm CL. The estimated weights of new shell crab in the survey also tend to be less than the same size crab in the dockside sampling program.

Average weights for crab which were prerecruit-one size or greater (mature crab defined as crab $\geq$ 129) and for legal size crab were estimated for each area and year by estimating the weight of each crab caught in the survey and averaging the weights of mature and legal crab (Tables 4 and 5). These average weights depend mainly upon the size distribution of crab in an area and year. The average weight of mature crabs range from 4.9 pounds to 9.9 pounds and average 6.2 pounds overall. The average weight of legal size crabs range from 6.0 pounds to 10.3 pounds and average 7.1 pounds.

Commercial and Personal Use Catch and Timing

Commercial harvests in pounds are tabulated from fish ticket records and numbers of crab are estimated from the harvest in pounds and estimated average weight of legal crab in each area and year. The harvest by survey area and species, are presented in Tables 6 and 7 respectively. Blue king crab are a small contributor to the total harvest, averaging about 1% of the red king crab harvest. The majority of red king crab harvest comes from surveyed areas, with a larger percent coming from these areas in recent years (average of 70% of the commercial harvest has come from surveyed areas since 1993), compared to 1978/1979 through 1984/1985 season (average of 61% of the harvest). The surveyed area that has contributed most to the commercial harvest in recent years is Seymour Canal, averaging 84,485 pounds annually for the period 1993–1999 seasons. During the 1978/1979–1984/1985 seasons, the Peril Strait area was the largest contributor to the commercial harvests, averaging 73,864 pounds annually. The harvests in northern areas (Districts 111, 112, 114, and 115) have increased in recent years, while harvest in southern areas (principally Districts 110 and 113) have tended to decrease.

Personal use harvests are estimated from the sport fishery mail-out survey program and creel census program (Suchanek 1995; P. Suchanek, Alaska Department of Fish and Game, Sport Fish Division, personal communication, 2001) and from the Juneau personal use permits (Rumble et al. 1999; Clark et al. 2002b). Personal use harvest prior to the 1992/1993 season was estimated based on a best guess of reduction from current catch levels. Estimated personal use harvest in number of crab (Table 8) and pounds of crab (Table 9) increased in the 1980s and peaked at over 13,000 crab (91,000 pounds) in the 1993/1994 season. Recent reported harvests have remained relatively consistent, ranging from 8,800 crab (62,600 pounds) to 12,300 crab (84,300 pounds). Many personal use catches remain unreported and actual personal use catches are believed to be much higher.

Total red king crab commercial and personal use catch in pounds (Table 10) and numbers of crab (Table 11) are used in the catch-survey model. The relationship between survey catch of legal crab, survey catch of postrecruit crab, and total harvest is used to convert survey catch to total abundance in each area. Since the reopening of the commercial fishery in the 1993/1994 season, the largest average catch has come out of the Juneau area (81,300 pounds) followed by Seymour Canal (63,400 pounds) and Pybus Bay (32,100 pounds). The mean date of catch for each survey area was calculated as the sum of the days in the season times the ratio of the catch on that day divided by the total catch for the area and season (see Mundy 1982 for a description of the computation of timing statistics). The fraction of a year between the mean date of catch (Table 12) and the date of the following survey (Table 13) is also used in the catch-survey analysis.

Survey Catch of Male Red King Crab by Recruit Class

Growth of adult red king crab has been modeled for Kodiak Island and Bering Sea populations (Weber and Miyahara 1962; Powell 1965; McCaughran and Powell 1977; and summarized by Jewett and Onuf 1988). Growth has been estimated to range between 15 to 20 mm per molt for adult male crab, although growth rates can vary widely and a single carapace length may represent a number of age groups (Stevens 1990). Mature female crab grow much more slowly than adult male crab (Gray 1963). We use a growth increment of 16 mm per molt for male crab, which is consistent with the data presented in McCaughran and Powell (1977), previous estimates of abundance in Southeast Alaska (Woodby 1994), and much of the length-base modeling for other Alaskan stocks of red king crab (Zheng et al. 1995a, 1995b). Paired

carapace length measurements and assessment of legal size status of male red king crab in the survey indicate that more than one-half of male crab greater than 144 mm CL are of legal size (carapace width of 178 mm) and the majority of crab less than or equal to this carapace length are sublegal size (Figure 6).

Six sex and size classes of red king crab are used for management considerations and are defined as follows: juvenile (or prerecruit-two and smaller) males are male crab less than 129 mm CL; prerecruit males are male crab greater than or equal to 129 mm CL and less than legal size (or less than 145 mm CL if legal size was not measured); recruit males are new shell legal size male crab less than or equal to 160 mm CL; postrecruit males are legal size old shell male crab or male crab larger than 160 mm CL; small female red king crab are those females less than 114 mm CL; and large female red king crab are females greater than or equal to 114 mm CL. These size categories for females were chosen because approximately one-half of the female red king crab caught in the survey belong to the small female group. The small female group averages 34% immature females with undeveloped ovaries, while 99.9% of the large female group is mature females.

Total catch of each of these classes of red king crab are summed for each stratum in each area and in each year, and divided by total number of pot days (total soak time for all pots in these strata) to obtain an average catch per pot day for each sex and size class of red king crab. Only pots with pot condition designated as 'normal' are used in the analysis. Pots with missing bait containers, broken webbing, open doors, or obviously setting on its side while fishing were not classified as 'normal.' In some areas and years all strata were not surveyed. Catch per pot day was estimated for these strata based on the relative catch in these strata compared to other strata in years when these strata were surveyed and on the relative abundance as indicated by catches in the strata that were surveyed. The catch per pot day for each area is the average catch per pot day for each strata weighted by the area of each strata.

Catch-Survey Modeling of Survey Results

A catch-survey analysis (CSA) was used to estimate the abundance of mature and legal red king crab for each of the 8 areas surveyed in 2001. This type of analysis was initially developed by Collie and Sissenwine (1983) and subsequently adapted to crab abundance estimation questions (Kruse and Collie 1991; Collie and Kruse 1998; Zheng et al. 1997b). Woodby (1994) used a two- stage CSA to estimate the abundance of red king crab in Southeast Alaska. We used a three-stage CSA (Collie and DeLong 1998) which uses survey catches of prerecruit-ones, recruits, and postrecruits.

A CSA model estimates the abundance of a population by comparing the changes in survey catches to the number of crab removed by commercial and personal use effort. The postrecruit survey catch is related to the recruit and postrecruit catch in the previous year and the fishery removal of crab between the surveys. Errors are associated with all catches and modeled as being log-normally distributed. Although natural mortality can theoretically be estimated in the CSA, estimates are extremely variable and easily confounded with catchability coefficients. We use a constant instantaneous natural mortality value of 0.32, which translates into an annual natural mortality rate of 27% (survival of 73%). Estimated annual natural mortality rates for red king crab 125 mm CL or larger range from 6 to 72% (survival of 28 to 94%) and average 30% (median of 26%) annual natural mortality across a number of studies (Balsiger 1974; Greenberg et al. 1991; and Zheng et al. 1995a). The instantaneous natural mortality value of 0.32 is the same value used by Woodby (1994).

There are two processes described in a three-stage CSA. The first is the growth and survival of prerecruit-one crab to recruit crab:

$$R_{yr+1} = uA_{yr} \tag{2}$$

where R_{yr+1} is the relative abundance of recruit crab in year + 1, A_{yr} is the relative abundance of prerecruit-one crab in year yr, and u is a proportionality constant, which is a function of the relative catchability of prerecruit-one and recruit crab, survival and probability of molting from prerecruit-one to recruit crab. The second process is the accumulation of postrecruit crab from recruit and postrecruit crab in the previous year after natural mortality and removal by the fisheries:

$$P_{yr+1} = (R_{yr} + P_{yr})e^{Mt_{yr}} - qC_{yr}e^{Ml_{yr}} \tag{3}$$

where P_{yr+1} is the relative abundance of postrecruit crab in the area, C_{yr} is the total harvest (in number of crab) in year yr, t_{yr} is the time interval between surveys (in years), l_{yr} is the time lag between the midpoint of the fishery in year yr and the survey in year $yr+1$, q is a catchability coefficient relating the relative abundance measured as catch per pot day in the survey to the absolute abundance of crab in the area, and M is the instantaneous natural mortality coefficient. The observed catches in the survey are the relative abundances with a lognormally distributed measurement error, or

$$\begin{aligned} \tilde{A}_{yr} &= A_{yr}e^{t_{yr}} \\ \tilde{R}_{yr} &= R_{yr}e^{u_{yr}} \\ \tilde{P}_{yr} &= P_{yr}e^{w_{yr}} \end{aligned} \tag{4}$$

where t_{yr}, u_{yr}, and w_{yr} are normal deviates. The values A_{yr}, R_{yr}, and P_{yr} are estimated by minimizing the squared deviation of the log of the estimated values and observed values. The squared deviations were weighted to account for improvements in survey methods in recent years. Squared deviations were multiplied by 1 for years 1978 through 1985 (fixed station surveys), by 2 from 1986 through 1991 (random station but sometimes mixed fall/summer survey), and by 4 from 1993 to present. If a significant expansion in the survey area occurred after 1993, the weighting factor was increased to 6. This happened in the Juneau area (addition of West Douglas Island stratum) and Peril Strait area (addition of Rodman Bay). Minimization of the sum of squared deviations times weighting factors was performed using Microsoft Excel's[2] 'Solver' tool.

A number of other factors are considered when calculating the total target catch for all of Southeast Alaska. The catch of female and juvenile red king crab are compared to historical catches to assess if relative abundances are significantly below historical abundance levels. The clutch size of mature females and the ratio of ovigerous females to male reproductive potential (Zheng et al. 1995a, 1997c) are examined to see if potential reproductive problems exist in surveyed areas. If a number of concerns are identified for a certain area, target catches for this area may be reduced or the entire area closed to fishing. The target catches are then reduced by the expected personal use catch in these areas and the remaining target catches are summed to obtain the total target catch from all surveyed areas. This catch is then expanded by the average 1993 to 1999 ratio of total commercial catch in Southeast Alaska to total

[2] Product names used in this publication are included for scientific completeness but do not constitute product endorsement.

commercial catch from subdistricts represented by surveyed areas to account for red king crab stocks outside of surveyed areas. The expanded target catch is the total target catch for Southeast Alaska.

RESULTS

The average survey catches by year and bay of all categories of red king crab are highly variable (Figures 7 – 14 and Appendix Tables 2–8). In general, catches of all categories were relatively high in the early years of the survey, averaging 20 to 30 crab per pot day from 1979 to 1981. Catches of both male and female crab of all sizes and in all areas rapidly declined from 1983 through 1988, averaging less than 6 total crab per pot day in 1988. Since 1993, catches have been variable, with some sex and size groups in some areas showing high abundance and others being much less abundant. Since 1993, the average catch of all red king crab has ranged between 15 to 30 crab per pot day.

The average catch of juvenile male red king crab and female red king crab is larger than catches of mature male red king crab. Average catch per pot day by area and year range up to 25 crab per pot day for juvenile male crab, 20 crab per pot day for prerecruit one, and 6 crab per pot day for recruit and postrecruit crab. Excursion Inlet had the highest catch of juvenile male crab, averaging over 6 crab per pot day for all years, and Gambier Bay had the highest catch of mature male crab, averaging almost 8 crab per pot day. The average catches of female red king crab by area and year are highly variable, ranging up to 28 and 48 crab per pot day for small and large female crab, respectively. Catches of female crab are highest in the Peril Strait area, with smaller females also being relatively more abundant in Excursion Inlet and larger females being more abundant in Seymour Canal.

Results of the CSA are summarized in Table 14. The three-stage CSA for Seymour Canal was problematic because of the large catches in the 1995 – 1997 commercial fisheries (ranging from 15,000 to 20,000 crab) and corresponding high catch of postrecruit crab in the following surveys. This resulted in a very low catchability coefficient and unrealistically high estimates of biomass. A more conservative two-stage CSA was used for Seymour Canal which still resulted in a low catchability parameter compared to other areas. Catchability coefficients ranged from 0.000077 to 0.000563. Catchability coefficients relate the survey catch to the underlying abundance in the survey area and translate into each crab per pot day representing from 1,777 crab (Lynn Canal) to 12,973 crab (Seymour Canal) in the area. The relationship (parameter *u)* between prerecruit-one catches in one year and recruit catches in the following year ranged from 0.33 (Peril Strait) to 0.75 (Juneau Area and Pybus Bay) and averages 0.58. This factor is a composite of a number of factors, including survival from prerecruit-one to recruit, molting probability (about 86% of prerecruit-one crab are new shell crab), and relative catchability of recruit crab compared to prerecruit-one crab.

Biomass of both legal and prerecruit-one male red king crab decreased from the high levels of abundance measured in the late 1970s and early 1980s to a low abundance of prerecruit-one crab from 1987 through 1989 and of legal crab through 1990 (Tables 15 and 16) (Figures 15 and 16). Although no survey was conducted in 1990 or 1992, the large number of juvenile crab seen in the 1989 survey, recruit crab seen in the 1991 survey, and postrecruit crab seen in the 1993 survey suggest that a large number of prerecruit-one crab were present in 1990 and moderate to good recruitment continued through 2001. The abundance in the northern areas has increased more than in the southern areas, although all areas have abundances comparable to the relatively high abundances seen in the early 1980s. Estimated exploitation rates in the early 1980s were significantly higher than rates in recent fisheries (Table 17). The average exploitation

rate on legal males in surveyed areas ranged from 28 to 41% and averaged 35% overall. Since 1993, average exploitation rates in surveyed areas ranged from 19 to 32% (not counting years when the commercial fishery was closed) and averaged 22%.

The mating potential indices (defined as the male reproductive potential divided by the abundance of mature females with clutch sizes greater than 75% clutch fullness) generally indicate that in recent years, sufficient male abundance is present to fertilize all mature females (Table 18). However some areas have higher concentrations of female red king crab than mature male red king crab (Peril Strait, Barlow Cove, and Eagle River) and the late 1980s generally tended to have lower abundances of male crab, resulting in potential under fertilization of females. This coincides with generally lower percent clutch fullness of mature females in 1988 in a number of areas (Table 19). Port Frederick is generally characterized with females in poor reproductive condition, as evidenced by a substantially lower percent of clutch fullness when compared to other areas. The number of males in Port Frederick are sufficient to fertilize all the females present.

The criteria used to evaluate each area's ability to support a harvest of surplus production are summarized in Table 20. The criteria are the relative abundance and condition of the sex and recruit classes in the 8 areas surveyed and recent trends in abundance and condition of stocks. Areas with multiple categories of concern are carefully evaluated to determine if the harvests from the areas should be reduced or suspended until better stock conditions are observed. In the 2001 survey, Seymour Canal and Peril Strait were identified as areas of concern. Both these areas were closed to fishing following the 2000 survey and legal male abundance remains below the historic average. In addition, Seymour Canal exhibited conspicuous weakness in prerecruit-one and juvenile male abundances and both areas demonstrated weakness in female abundance and condition.

An estimate of the total guideline harvest for Southeast Alaska is detailed in Table 21. The target catches from Seymour Canal and Peril Strait areas are reduced by half due to concerns of low abundance of prerecruit-one and juvenile male red king crabs. The large abundance of prerecruit-one crab in the Excursion Inlet area resulted in 20% of the mature biomass exceeding the 50% exploitation rate cap on the legal biomass, so the target catch was set at 50% of the legal biomass. The estimated allowable target catch in Port Frederick exceeded 30,000 pounds, which is almost three times the largest harvest recorded since 1993. The target catch was reduced to the largest harvest since 1993 of 10,200 pounds. An estimated 88,786 pounds were projected to come from areas outside of the surveyed areas and an estimated additional 2,937 pounds of blue king crab were projected to be caught. The total allowable target catch sums to 302,000 pounds, just exceeding the 300,000 pounds threshold.

DISCUSSION

The red king crab stock assessment program has become the most important component in the assortment of management tools used to oversee red king crab harvest activities. The survey provides information on the abundance and condition of all segments of red king crab stocks which support the majority of harvests in Southeast Alaska. The 19 to 21 years of survey catches for 8 areas provide data useful in the evaluation of trends in recruitment, survival, effect of harvests on survival, abundance and stock condition, spawner-recruit relationships, and other biological information useful towards achieving the goals of the management policy. Application of CSA to the data also provides an objective means of determining appropriate catch levels.

A length-based modeling approach has been suggested as a better alternative to CSA for crab survey data (Zheng et al. 1995a, 1995b, 1996a, 1996b). A length-based analysis can incorporate a number of other factors into the modeling exercise, including stochastic growth, molt probability, variable natural mortality, handling mortality, and spawner-recruit relationships. These models can also be used to evaluate management strategies, such as thresholds and harvest rates and predict future population levels (Zheng et al. 1995a, 1997a). Many of the management guidelines established for Southeast Alaska stocks were obtained from length-based analysis of Bristol Bay stocks. Application of this approach to catch and survey data from Southeast Alaska might result in better definition of the best harvest strategies for red king crab stocks in this region.

Studying the spatial patterns of crab catches would contribute to a better understanding of the distribution and interactions of different population segments in an area and improve the accuracy of abundance estimates. Application of a restratification process to red king crab in Deadman Reach resulted in the variance of estimated catch rates in the survey decreasing by 42 to 55% (Clark et al. 2002a). Restratification of other survey areas could significantly improve the accuracy of the survey overall and provide additional opportunities to expand the survey to other areas. Application of spatial statistical methods, such as kriging, could also result in more accurate estimates of relative catch rates (Vining et al. 1996).

The catch of each pot is divided by the fraction of a day that the pot was fishing. However, a proper model expressing the relationship between the catch per pot hauled, soak time, and species abundance and composition in the pot is essential to correctly standardize catch rates, especially catches from pots with soak times that differ substantially from the 18 to 24 hours that most pots are in the water. A number of equations have been proposed to describe the relationship between soak time and catch (see Zhou and Shirley 1997 for one of the most flexible models). However, other factors may play equally important roles in type and number of animals caught, and design of experiments to measure the effects of soak time, species abundance and composition, environmental conditions and other factors that need to be carefully considered (Miller 1990).

A number of biological attributes of red king crab stocks in Southeast Alaska are unknown and are assumed to be similar to the stocks in Bristol Bay and near Kodiak Island. Growth per molt, molting probability, natural mortality, mating potential of males, and a number of other characteristics have been shown to be highly variable and have not been examined for red king crab in Southeast Alaska. Tagging data exist but have not been fully evaluated. Future tagging studies could provide information that could substantially refine and improve management of this resource. Understanding the effect of environmental factors on abundance, condition, and distribution of red king crab stocks could also prove to be fundamental in interpreting past trends in abundance and predicting future levels of abundance (Zheng and Kruse 1999).

Having reliable estimates of unobserved and unrecorded fishery mortality is essential for accurate analysis of survey data and has also been shown to be important in setting appropriate exploitation rates and thresholds (Zheng 1995a). Zhou and Shirley (1995, 1996) reported that although handling significantly increases damage to crab, mortality over the 4 months of laboratory observations was not higher in handled crab compared to the control group. Personal use catches continue to be poorly monitored in areas outside of the Juneau Area. Significant personal use fishing effort has been observed in surveyed areas such as Port Frederick, Pybus Bay, and Gambier Bay with no documented personal use catches coming from these areas. A better understanding of the biology and effects of fisheries on red king crab population dynamics would result in improvements in management, survey design, and the ability to achieve goals set out in the red king crab management policy.

LITERATURE CITED

ADF&G (Alaska Department of Fish and Game). 2000. Commercial shellfish fishing regulations, 2000-2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Balsiger, J. W. 1974. A computer simulation model of the eastern Bering Sea king crab. Doctoral dissertation, University of Washington, Seattle.

BOF (Alaska Board of Fisheries). 1990. Policy on king and Tanner crab resource management. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2H90-07.

Clark, J. E., S. Hinkley, and T. Koeneman. 2002a. Restratification of red king crab stock assessment areas in Southeast Alaska. *in* Crabs in cold water regions: biology, management, and economics. Alaska Sea Grant College Program. AK-SG-02-01. pp 457–473.

Clark, J. E., S. Merkouris, P. van Tamelen, and G. Timothy. 2002b. Section 11-A personal use king crab fisheries. Report to the Board of Fisheries 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 1J02-14.

Cochran, W. G. 1977. Sampling techniques. 3rd edition. John Wiley & Sons. New York.

Collie, J. S. and M. P. Sissenwine. 1983. Estimating population size from relative abundance data measured with error. Canadian Journal of Fisheries and Aquatic Science 40:1871–1879.

Collie, J. S. and A. K. DeLong. 1998. Development of a three-stage catch-survey analysis. Report to the Alaska Department of Fish and Game. Graduate School of Oceanography. University of Rhode Island. Narragansett, RI.

Collie, J. S. and G. H. Kruse. 1998. Estimating king crab (*Paralithodes camtschatica*) abundance from commercial catch and research survey data. Pages 73–83 *in* G. S. Jamieson and A. Campbell, eds. Proceedings of the North Pacific Symposium on Invertebrate Stock Assessment and Management. Canadian Special Publication of Fisheries and Aquatic Science 125. pp. 73–83.

Conover, W. J. 1980. Practical nonparametric statistics, 2nd edition. John Wiley & Sons, New York.

Greenberg, J. A., S. C. Matulich, and R. C. Mittelhammer. 1991. A system-of-equations approach to modeling age-structured fish populations: the case of Alaskan red king crab, *Paralithodes camtschatica.* Canadian Journal of Fisheries and Aquatic Science 48:1613–1622.

Gray Jr., G. W. 1963. Growth of mature female king crab *Paralithodes camtschatica* (Tilesius). Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau. Informational Leaflet # 26.

Kruse, G. H. and J. S. Collie. 1991. Preliminary application of a population size estimation model to the Bristol Bay stock of red king crabs. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 5J91-09. Juneau.

Jewett, S. C. and C. P. Onuf. 1988. Habitat suitability index models: red king crab. U.S. Fish Wildlife Service Biological Report 82 (10.153).

Koeneman, T. and C. A. Botelho. 1999. Red and blue king crab fisheries. *in* Report to the Board of Fisheries, 1997/98 Shellfish fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries. Regional Information Report 1J99-07.

McCaughran, D. A. and G. C. Powell. 1977. Growth model for Alaska king crab (*Paralithodes camtschatica*). Journal of the Fisheries Research Board of Canada. 34:989–995.

Miller, R. J. 1990. Effectiveness of crab and lobster traps. Canadian Journal of Fisheries and Aquatic Science 47:1228–1251.

Mundy, P. R. 1982. Computation of migratory timing statistics for adult chinook salmon in the Yukon River, Alaska, and their relevance to fisheries management. North American Journal of Fisheries Management 4:359–370.

Pengilly, D. , and D. Schmidt. 1995. Harvest strategy for Kodiak and Bristol Bay red king crab and St. Matthew Island and Pribilof blue king crab. Alaska Department of Fish and Game, Commercial Fisheries Division. Special Publication No. 7. Juneau.

LITERATURE CITED (continued)

Powell, G. C. 1965. Growth of king crabs in the vicinity of Kodiak Island, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries. Informational Leaflet 92. Juneau.

Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada 191.

Rumble, J., T. Koeneman, and J. E. Clark. 1999. Section 11-A personal use king crab fisheries. Report to the Board of Fisheries 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries. Regional Information Report No. 1J99-07. Juneau.

Stevens, B. G. 1990. Temperature-dependent growth of juvenile red king crab (*Paralithodes camtschatica*) and its effects on size-at-age and subsequent recruitment in the Eastern Bering Sea. Canadian Journal of Fisheries and Aquatic Science 47:1307–1317.

Suchanek, P. M. 1995. The personal use king crab fishery in Southeast Alaska. Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Sport Fish Division. Juneau, AK.

Vining, I., and L. J. Watson. 1996. Application of kriging trawl survey data to estimate red king crab distribution and abundance in Bristol Bay, Alaska. *in* High latitude crabs: Biology, management, and economics. University of Alaska Sea Grant, AK-SG-96-02, Fairbanks. pp. 255–282.

Weber, D. D. and T. Miyahara. 1962. Growth of the adult male king crab *Paralithodes camtschatica* (Tilesius). Fishery Bulletin 200 from Fishery Bulletin of the Fish and Wildlife Service 62: 53–75.

Woodby, D. 1994. Population sizes and harvest rates of red king crabs in southeast Alaska, 1993. Alaska Department of Fish and Game., Commercial Fisheries Management and Development Division. Regional Information Report 1J94-20.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1995a. A length-based population model and stock-recruitment relationships for red king crab, *Paralithodes camtschaticus,* in Bristol Bay, Alaska. Canadian Journal of Fisheries and Aquatic Sciences 52:1229–1246.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1995b. Updated length-based population model and stock-recruitment relationships for red king crab in Bristol Bay, Alaska. Alaska Fishery Research Bulletin 2(2):114–124.

Zheng, J., G. H. Kruse, and M. C. Murphy. 1996a. Comparisons of abundance estimation methods for red king crab in Bristol Bay and Kodiak. Pages 283–294 *in* High latitude crabs: biology, management, and economics. University of Alaska Fairbanks, Alaska Sea Grant College Program Report 96-02.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1996b. A catch-length analysis for crab populations. Fishery Bulletin 94:576–588.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1997a. Alternative rebuilding strategies for the red king crab *Paralithodes camtschaticus,* in Bristol Bay, Alaska. Journal of Shellfish Research 16:205–217.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1997b. Application of a catch-survey analysis to blue king crab stocks near Pribilof and St. Mathew Islands. Alaska Fishery Research Bulletin 4(1): 62–74.

Zheng, J., M. C. Murphy, and G. H. Kruse. 1997c. Analysis of the harvest strategies for red king crab *Paralithodes camtschaticus,* in Bristol Bay, Alaska. Canadian Journal of Fisheries and Aquatic Sciences 54: 1121–1134.

Zheng, J. and G. H. Kruse. 1999. Recruitment patterns of Alaskan crabs and relationships to decadal shifts in climate and physical oceanography. ICES Journal of Marine Science 56:438–451.

Zhou, S. and T. C. Shirley. 1995. Effects of handling on feeding, activity and survival of red king crabs, *Paralithodes camtschaticus* (Tilesius, 1815). Journal of Shellfish Research 14:173–177.

Zhou, S. and T. C. Shirley. 1996. Is handling responsible for the decline of the red king crab fishery? Pages 591–611 *in* High latitude crabs: biology, management, and economics. University of Alaska Fairbanks, Alaska Sea Grant College Program Report 96-02.

Zhou, S. and T. C. Shirley. 1997. A model expressing the relationship between catch and soak time for trap fisheries. North American Journal of Fisheries Management 17:482–487.

Table 1. Number of standard pots set and retrieved by area in the red king crab stock assessment survey.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait[a]	Juneau Area[b]	Lynn Canal[c]	Port Frederick	Excursion Inlet	Other Areas[d]	Total
1978	43	24	0	0	0	0	0	0	16	83
1979	46	24	19	24	40	23	32	32	79	319
1980	43	20	35	12	37	24	31	32	44	278
1981	47	24	35	52	51	20	32	36	54	351
1982	47	23	35	49	59	23	31	35	87	389
1983	44	24	34	51	56	20	32	36	71	368
1984	43	24	27	52	56	20	32	36	70	360
1985	46	24	35	52	56	20	32	36	63	364
1986	38	38	79	76	50	30	39	60	58	468
1987	100	0	0	120	54	0	0	40	0	314
1988	40	120	80	114	69	30	114	76	0	643
1989	0	60	40	60	20	0	0	0	0	180
1990	No Survey was conducted									
1991	40	59	57	60	44	27	60	38	0	385
1992	No Survey was conducted									
1993	60	60	78	100	93	80	60	60	0	591
1994	25	72	73	74	82	97	25	75	0	523
1995	76	75	75	100	188	75	24	43	0	656
1996	46	67	64	61	167	66	23	42	0	536
1997	24	24	39	71	96	33	24	20	0	331
1998	22	21	38	66	94	34	24	20	0	319
1999	39	40	40	69	97	24	40	40	0	389
2000	40	40	81	73	98	29	40	40	0	441
2001	44	40	62	79	101	31	42	42	0	441
Total	953	903	1,026	1,415	1,608	706	737	839	542	8,729

[a] Peril Strait includes Deadman Reach and Rodman Bay.
[b] Juneau Area includes Juneau, Eagle River, and Barlow Cove.
[c] Lynn Canal includes Lynn Sisters and St. James Bay.
[d] Other areas includes Farragut Bay, Freshwater Bay, Funter Bay, Hawk Inlet, Iyoukeen Cove, Mole Harbor, Sitkoh Bay, and Sullivan Island.

Table 2. Description of areas currently surveyed in the red king crab stock assessment program.

Area Name	Statistical Commercial Fishing Areas	Number of Strata	Total Area (km^2)	Average Pot Depth (fm)	Maximum Depth (fm)	Comments
Pybus Bay	110-22	8	35.8	34.5	70	
Gambier Bay	110-23	6	39.8	46.2	118	
Seymour Canal	111-11 north to 111-17	4	53.2	30.0	89	Began Surveying East Tiedeman in 2000
Peril Strait	113-51 west to 113-58	6	63.5	34.2	115	Deadman Reach and Rodman Bay
Juneau Area	111-40, 111-41, and 111-50	13	326.4	50.6	130	Juneau area waters, Eagle River and Barlow Cove
Lynn Canal	112-15 and 115-10	5	31.0	42.2	160	St. James Bay and Lynn Sisters
Port Frederick	All areas in 114-30	5	66.7	49.4	92	
Excursion Inlet	114-25 and 114-80	4	79.2	52.5	102	Excursion Inlet and East of Pleasant Island
Total		51		695.6		

Table 3. Coefficients estimated for length-weight conversion formulas. Formula for all conversions is Weight = exp[Intercept + Slope*ln(carapace length)]. Significant differences were found between new shell and old shell crab (p = .0002) and between areas (p = .05 for new shell and p = .002 for old shell crab), but not between years.

					Estimated Weight in Grams		
Area Name	Source	Shell Type	Intercept	Slope	130 mm CL	145 mm CL	160 mm CL
Pybus Bay	Survey	New Shell	-5.9332	2.7660	1,864	2,521	3,311
Pybus Bay	Fishery	New Shell	-5.6819	2.7198		2,576	3,367
Gambier Bay	Survey	New Shell	-5.4725	2.6728	1,877	2,513	3,269
Gambier Bay	Fishery	New Shell	-5.9128	2.7629		2,534	3,326
Seymour Canal	Survey	New Shell	-6.4098	2.8656	1,879	2,569	3,406
Seymour Canal	Fishery	New Shell	-5.9856	2.7814		2,583	3,397
Barlow Cove	Survey	New Shell	-6.6747	2.9085	1,777	2,441	3,250
Juneau Area	Survey	New Shell	-7.0716	2.9996	1,862	2,583	3,470
Juneau Area	Fishery	New Shell	-5.8149	2.7572		2,716	3,563
Eagle River	Survey	New Shell	-6.9871	2.9817	1,856	2,571	3,447
Lynn Canal	Survey	New Shell	-5.8222	2.7484	1,912	2,581	3,383
Lynn Canal	Fishery	New Shell	-5.5766	2.7042		2,648	3,455
Excursion Inlet	Survey	New Shell	-5.5536	2.6756	1,754	2,350	3,058
Port Frederick	Survey	New Shell	-6.5624	2.8946	1,857	2,548	3,388
Port Frederick	Fishery	New Shell	-7.1138	3.0051		2,545	3,421
Peril Strait	Survey	New Shell	-6.0944	2.7951	1,828	2,481	3,267
Other 110	Fishery	New Shell	-5.6664	2.7150		2,554	3,336
Other 111	Fishery	New Shell	-5.2975	2.6415		2,561	3,322
Other 112	Fishery	New Shell	-6.6958	2.9318		2,683	3,581
Other 113	Fishery	New Shell	-6.4539	2.8723		2,542	3,373
Other 114	Fishery	New Shell	-7.3002	3.0435		2,556	3,449
Unknown	Fishery	New Shell	-5.5139	2.6897		2,623	3,418
Pybus Bay	Survey	Old Shell	-6.1282	2.8100	1,900	2,583	3,406
Pybus Bay	Fishery	Old Shell	-5.6283	2.7159		2,665	3,482
Gambier Bay	Survey	Old Shell	-5.7322	2.7311	1,923	2,591	3,390
Gambier Bay	Fishery	Old Shell	-6.6095	2.9050		2,560	3,407
Seymour Canal	Survey	Old Shell	-4.7351	2.5437	2,093	2,763	3,549
Seymour Canal	Fishery	Old Shell	-6.0144	2.7902		2,622	3,451
Barlow Cove	Survey	Old Shell	-5.9337	2.7628	1,834	2,480	3,255
Juneau Area	Survey	Old Shell	-7.0432	2.9985	1,905	2,643	3,551
Juneau Area	Fishery	Old Shell	-5.1098	2.6195		2,771	3,586
Eagle River	Survey	Old Shell	-4.1465	2.4226	2,091	2,724	3,458
Lynn Canal	Survey	Old Shell	-4.5076	2.4940	2,064	2,709	3,463
Lynn Canal	Fishery	Old Shell	-6.3037	2.8491		2,632	3,484
Excursion Inlet	Survey	Old Shell	-3.6669	2.3242	2,092	2,697	3,390
Port Frederick	Survey	Old Shell	-5.7997	2.7487	1,958	2,643	3,464
Port Frederick	Fishery	Old Shell	-6.1613	2.8167		2,583	3,408
Peril Strait	Survey	Old Shell	-5.6047	2.7003	1,880	2,525	3,294
Other 110	Fishery	Old Shell	-5.9691	2.7772		2,572	3,381
Other 111	Fishery	Old Shell	-5.5272	2.6896		2,587	3,372
Other 112	Fishery	Old Shell	-7.2254	3.0374		2,672	3,603
Other 113	Fishery	Old Shell	-7.0258	2.9858		2,524	3,386
Other 114	Fishery	Old Shell	-6.8712	2.9571		2,554	3,417
Unknown	Fishery	Old Shell	-5.8465	2.7587		2,651	3,478
Maximum					1,754	2,350	3,058
Minimum					2,093	2,771	3,603

Table 4. Estimated average weight (pounds) of mature crab by area and survey year. In years of no survey, weights were estimated as the weight of the previous year, weight of the following year, or average weight of the previous and following year, depending on if a survey had been conducted in the previous, following, or both previous and following years. The estimated weight in other areas is the average weight across the surveyed areas.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Straits	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Other Areas
1978	6.00	5.79	6.14 b	5.59 [b]	5.65 [b]	5.87 [b]	6.19 [b]	5.22 [b]	5.81
1979	6.65	6.02	6.14	5.59	5.65	5.87	6.19	5.22	5.92
1980	6.45	5.75	6.03	6.16	5.81	5.88	6.53	5.09	5.96
1981	5.82	5.92	5.82	5.21	5.68	6.72	6.20	4.93	5.79
1982	6.38	5.96	6.27	5.80	6.00	6.78	6.81	5.63	6.20
1983	7.24	5.83	5.72	5.97	5.56	5.90	6.46	5.35	6.00
1984	8.40	6.49	5.91	6.44	5.80	6.53	6.60	5.98	6.52
1985	8.16	6.63	6.82	5.79	5.26	5.92	6.68	6.37	6.45
1986	9.91	6.75	7.46	5.83	5.69	6.36	7.31	6.58	6.99
1987	8.51	6.99 c	7.37 c	5.95	5.22	6.43 [c]	6.57 [c]	5.95	6.62
1988	6.14	7.23	7.28	5.27	4.86	6.50	5.84	7.00	6.26
1989	6.14 [a]	6.17	8.08	5.39	5.09	6.50 [a]	5.84 [a]	7.00 [a]	6.28
1990	6.49 [b]	6.18 c	7.34 c	5.38 [c]	5.20 [c]	5.98 [c]	6.90 [b]	5.50 [b]	6.12
1991	6.49	6.20	6.60	5.36	5.31	5.98	6.90	5.50	6.04
1992	6.68 [c]	6.71 c	6.69 c	5.62 [c]	5.65 [c]	6.60 [c]	6.69 [c]	6.03 [c]	6.33
1993	6.86	7.22	6.78	5.87	5.98	7.21	6.47	6.57	6.62
1994	5.96	6.33	6.04	5.37	6.02	6.08	5.91	4.99	5.84
1995	6.51	6.09	6.54	5.48	6.15	5.88	6.28	5.38	6.04
1996	7.45	6.38	7.38	5.59	6.23	6.44	6.10	5.83	6.43
1997	8.30	6.07	8.11	5.79	6.40	6.26	5.75	5.07	6.47
1998	7.18	5.90	8.56	5.27	5.97	6.01	5.90	5.16	6.25
1999	6.21	5.68	8.48	5.57	6.23	6.38	6.03	6.20	6.35
2000	6.88	5.95	6.45	5.57	6.09	5.91	6.38	5.45	6.08
2001	6.57	6.11	7.21	5.28	6.41	5.91	6.04	5.11	6.08
Average	6.97	6.26	6.88	5.63	5.75	6.25	6.36	5.71	6.23

[a] Weight estimated as the weight of the previous year for the area.
[b] Weight estimated as the weight of the following year for the area.
[c] Weight estimated as the average of the weights of the previous and following year for the area.

Table 5. Estimated average weight (pounds) of legal crab by area and survey year. In years of no survey, weights were estimated as the weight of the previous year, weight of the following year, or average weight of the previous and following year, depending on if a survey had been conducted in the previous, following, or both previous and following years. The estimated weight in other areas is the average weight across the surveyed areas.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Straits	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Other Areas
1978	6.72	6.76	6.77 [b]	6.42 [b]	6.77 [b]	6.75 [b]	6.96 [b]	6.04 [b]	6.65
1979	7.24	6.80	6.77	6.42	6.77	6.75	6.96	6.04	6.72
1980	7.76	6.58	6.73	6.69	6.91	6.59	7.21	6.00	6.81
1981	6.97	6.63	6.79	6.38	6.93	7.10	7.16	6.20	6.77
1982	6.96	6.71	7.71	6.62	6.68	7.41	7.56	6.52	7.02
1983	7.64	6.83	6.86	6.65	6.54	6.94	7.33	6.19	6.87
1984	8.47	7.35	6.61	7.00	6.78	6.97	6.89	6.57	7.08
1985	8.48	7.19	7.28	6.83	6.71	7.73	7.27	7.04	7.32
1986	9.91	7.30	7.74	6.68	6.40	7.42	8.45	7.11	7.62
1987	10.33	7.61 [c]	7.97 [c]	6.75	6.48	7.13 [c]	7.57 [c]	6.79	7.58
1988	6.14	7.93	8.20	6.46	6.40	6.84	6.69	7.67	7.04
1989	6.14 [a]	8.40	8.35	6.57	5.98	6.84 [a]	6.69 [a]	7.67 [a]	7.08
1990	7.77 [b]	7.56 [c]	7.85 [c]	6.49 [c]	6.18 [c]	6.75 [b]	7.81 [b]	6.18 [b]	7.07
1991	7.77	6.72	7.36	6.41	6.37	6.75	7.81	6.18	6.92
1992	8.24 [c]	7.35 [c]	7.57 [c]	6.60 [c]	6.52 [c]	7.18 [c]	7.87 [c]	6.54 [c]	7.23
1993	8.71	7.98	7.79	6.80	6.66	7.61	7.93	6.90	7.55
1994	7.37	7.79	7.28	6.63	7.04	7.52	7.13	6.70	7.18
1995	6.91	6.81	7.09	6.38	7.45	7.00	7.34	6.38	6.92
1996	7.71	6.90	7.63	6.21	7.39	7.19	6.78	6.73	7.07
1997	8.38	6.81	8.46	6.63	7.38	7.34	6.86	6.62	7.31
1998	8.45	7.14	9.18	6.40	7.17	7.18	6.80	6.31	7.33
1999	6.88	6.70	9.20	6.47	7.36	7.23	6.87	6.95	7.21
2000	7.31	6.66	7.76	6.41	7.29	7.25	7.34	7.03	7.13
2001	7.86	6.79	7.54	6.33	7.32	6.87	7.15	6.59	7.06
Average	7.75	7.14	7.60	6.55	6.81	7.10	7.27	6.62	7.11

[a] Weight estimated as the weight of the previous year for the area.
[b] Weight estimated as the weight of the following year for the area.
[c] Weight estimated as the average of the weights of the previous and following year for the area.

Table 6. Commercial Catch of red and blue king crab in Southeast Alaska in pounds as reported on fishtickets.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Southern Areas	Other Northern Areas	Blue King Crab in Red King Crab Season	Blue King Crab not in Red King Crab Season
1978/79	8,240	4,610	55,302	78,112	46,951	17,156	574	23,938	146,592	62,164	3,641	0
1979/80	24,429	23,220	136,381	79,434	50,131	16,271	2,908	69,836	170,339	85,138	442	0
1980/81	5,499	78,969	89,103	73,410	78,536	39,077	0	0	126,730	41,350	2,017	0
1981/82	1,048	63,935	43,825	116,707	62,135	34,485	4,107	12,386	88,805	96,676	4,159	0
1982/83	24,522	14,499	10,646	70,823	16,337	56,569	36,727	0	51,051	131,431	10,729	35,910
1983/84	32,425	8,673	8,379	46,747	14,975	8,547	32,630	1,610	74,805	51,890	12,835	25,495
1984/85	16,951	12,877	43,151	51,817	28,837	4,894	20,258	15,699	30,764	45,247	4,222	1,214
1985/86	0	0	0	0	0	0	0	0	0	0	0	1,886
1986/87	0	0	0	0	0	0	0	0	0	0	0	1,179
1987/88	0	0	0	0	0	0	0	0	13	0	0	1,506
1988/89	23	548	2,106	0	0	0	0	0	2,267	0	0	3,186
1989/90	645	646	104	0	6,810	6,465	0	0	9,658	52	0	501
1990/91	0	0	0	0	0	0	0	0	0	0	0	597
1991/92	0	0	0	0	0	0	0	0	0	0	0	1,037
1992/93	0	0	0	0	0	0	0	0	0	0	0	929
1993/94	0	17,278	24,994	22,642	27,660	21,809	0	7,060	15,479	65,462	1,200	924
1994/95	33,357	24,383	34,845	21,366	42,278	7,427	3,720	9,037	18,778	61,076	3,459	1,869
1995/96	96,933	36,437	110,544	13,082	5,012	6,445	1,316	12,017	41,813	34,216	2,416	1,067
1996/97	95,628	27,307	153,160	18,305	22,131	5,306	6,190	8,105	55,783	36,634	404	844
1997/98	21,405	7,808	130,960	6,527	22,241	4,926	10,151	12,845	54,911	36,548	1,859	457
1998/99	0	0	0	0	0	0	0	0	0	0	0	421
1999/00	9,596	9,007	52,407	144	83,514	8,115	6,547	20,027	26,760	73,431	7,764	1,306
2000/01	0	0	0	0	0	0	0	0	0	0	0	1,767

Table 7. Estimated commercial Catch of red king crab in Southeast Alaska in number of crab.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Southern Areas	Other Northern Areas	Total
1978/79	1,226	682	8,172	12,170	6,934	2,542	82	3,962	22,047	9,349	67,166
1979/80	3,374	3,415	20,152	12,376	7,404	2,411	418	11,557	25,353	12,672	99,133
1980/81	709	12,005	13,236	10,975	11,370	5,930	0	0	18,616	6,074	78,916
1981/82	150	9,637	6,454	18,290	8,972	4,859	574	1,999	13,120	14,283	78,337
1982/83	3,523	2,160	1,380	10,697	2,444	7,634	4,861	0	7,270	18,717	58,686
1983/84	4,245	1,269	1,221	7,027	2,290	1,231	4,449	260	10,881	7,548	40,421
1984/85	2,002	1,752	6,529	7,402	4,255	702	2,941	2,390	4,346	6,391	38,710
1985/86	0	0	0	0	0	0	0	0	0	0	0
1986/87	0	0	0	0	0	0	0	0	0	0	0
1987/88	0	0	0	0	0	0	0	0	2	0	2
1988/89	4	69	257	0	0	0	0	0	322	0	652
1989/90	105	77	12	0	1,138	945	0	0	1,364	7	3,649
1990/91	0	0	0	0	0	0	0	0	0	0	0
1991/92	0	0	0	0	0	0	0	0	0	0	0
1992/93	0	0	0	0	0	0	0	0	0	0	0
1993/94	0	2,166	3,210	3,330	4,152	2,864	0	1,023	2,051	8,673	27,467
1994/95	4,529	3,132	4,783	3,224	6,003	988	522	1,349	2,615	8,504	35,647
1995/96	14,027	5,348	15,593	2,051	673	921	179	1,882	6,042	4,944	51,661
1996/97	12,406	3,955	20,063	2,946	2,996	738	914	1,204	7,892	5,183	58,297
1997/98	2,554	1,146	15,476	984	3,015	672	1,479	1,942	7,512	5,000	39,780
1998/99	0	0	0	0	0	0	0	0	0	0	0
1999/00	1,394	1,345	5,694	22	11,352	1,123	953	2,880	3,713	10,188	38,665
2000/01	0	0	0	0	0	0	0	0	0	0	0

Table 8. Personal use catch in number of crab from surveyed bays and other areas in Southeast Alaska.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Areas	Total
1978/79	0	200	0	500	500	0	0	80	350	1,630
1979/80	0	200	0	500	500	0	0	80	350	1,630
1980/81	0	200	0	500	500	0	0	80	350	1,630
1981/82	0	200	0	500	500	0	0	80	350	1,630
1982/83	0	200	0	500	500	0	0	80	350	1,630
1983/84	0	200	0	500	500	0	0	80	350	1,630
1984/85	0	200	0	500	500	0	0	80	350	1,630
1985/86	0	200	0	500	500	0	0	80	350	1,630
1986/87	0	200	0	500	500	0	0	80	350	1,630
1987/88	0	200	0	500	500	0	0	80	350	1,630
1988/89	0	200	0	500	665	0	0	80	350	1,795
1989/90	0	200	0	500	2,228	0	0	80	350	3,358
1990/91	0	200	0	500	2,361	0	0	80	350	3,491
1991/92	0	200	0	500	2,972	0	0	80	350	4,102
1992/93	0	212	0	495	6,835	0	0	106	812	8,460
1993/94	0	0	0	2,309	10,799	0	0	0	497	13,605
1994/95	0	22	0	1,915	7,139	0	0	366	415	9,857
1995/96	0	338	0	2,035	5,540	0	0	105	775	8,793
1996/97	0	44	0	2,077	7,086	0	0	33	22	9,262
1997/98	0	270	0	2,803	6,612	0	0	0	135	9,820
1998/99	0	133	0	5,118	7,016	0	0	9	35	12,311
1999/00	0	389	0	65	9,036	0	0	43	365	9,898
2000/01	0	176	0	0	9,088	0	0	83	382	9,729

Data are from the following sources: Suchanek 1995; sport fish mail out survey program, creel survey, Juneau personal use permits, and best guess for years prior to 1992/1993 (Gambier Bay, Peril Straits, Excursion Inlet, and other areas) or prior to 1988/1989 for Juneau. Sport fish estimates are by town. Catches landed in Sitka were assigned to Peril Straits, those landed in Petersburg and Wrangell were assigned to Gambier Bay, and those landed in Glacier Bay were assigned to Excursion Inlet. All other catches (Ketchikan, Prince of Wales, Haines and Skagway were assigned to catch from other areas.

Table 9. Estimated personal use catch in pounds of crab from surveyed bays and other areas in Southeast Alaska. Estimated catch is the estimated number of crab caught times the estimated average weight of legal size crab in the bay.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Areas	Total
1978/79	0	1,352	0	3,209	3,386	0	0	483	2,327	10,757
1979/80	0	1,360	0	3,209	3,386	0	0	483	2,352	10,789
1980/81	0	1,316	0	3,344	3,454	0	0	480	2,383	10,976
1981/82	0	1,327	0	3,190	3,463	0	0	496	2,369	10,845
1982/83	0	1,343	0	3,311	3,342	0	0	522	2,458	10,974
1983/84	0	1,366	0	3,326	3,269	0	0	496	2,406	10,864
1984/85	0	1,470	0	3,500	3,388	0	0	526	2,478	11,361
1985/86	0	1,438	0	3,417	3,357	0	0	564	2,561	11,337
1986/87	0	1,460	0	3,339	3,200	0	0	569	2,669	11,236
1987/88	0	1,522	0	3,375	3,239	0	0	543	2,652	11,332
1988/89	0	1,585	0	3,230	4,255	0	0	613	2,464	12,147
1989/90	0	1,680	0	3,285	13,328	0	0	613	2,478	21,385
1990/91	0	1,512	0	3,244	14,585	0	0	495	2,475	22,310
1991/92	0	1,344	0	3,203	18,932	0	0	495	2,422	26,395
1992/93	0	1,558	0	3,268	44,532	0	0	694	5,874	55,926
1993/94	0	0	0	15,700	71,934	0	0	0	3,751	91,386
1994/95	0	171	0	12,690	50,277	0	0	2,452	2,981	68,571
1995/96	0	2,303	0	12,981	41,264	0	0	670	5,363	62,582
1996/97	0	304	0	12,904	52,350	0	0	222	155	65,935
1997/98	0	1,839	0	18,594	48,766	0	0	0	987	70,185
1998/99	0	950	0	32,754	50,283	0	0	57	256	84,300
1999/00	0	2,605	0	421	66,474	0	0	299	2,631	72,429
2000/01	0	1,172	0	0	66,268	0	0	584	2,725	70,749

Table 10. Total estimated catch (in pounds) of commercial and personal use catch of red king crab in Southeast Alaska.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Areas	Total
1978/79	8,240	5,962	55,302	81,321	50,337	17,156	574	24,421	211,083	454,396
1979/80	24,429	24,580	136,381	82,643	53,517	16,271	2,908	70,319	257,829	668,876
1980/81	5,499	80,285	89,103	76,754	81,990	39,077	0	480	170,463	543,650
1981/82	1,048	65,262	43,825	119,897	65,598	34,485	4,107	12,882	187,850	534,954
1982/83	24,522	15,842	10,646	74,134	19,679	56,569	36,727	522	184,940	423,579
1983/84	32,425	10,039	8,379	50,073	18,244	8,547	32,630	2,106	129,101	291,545
1984/85	16,951	14,347	43,151	55,317	32,225	4,894	20,258	16,225	78,489	281,856
1985/86	0	1,438	0	3,417	3,357	0	0	564	2,561	11,337
1986/87	0	1,460	0	3,339	3,200	0	0	569	2,669	11,236
1987/88	0	1,522	0	3,375	3,239	0	0	543	2,665	11,345
1988/89	23	2,133	2,106	3,230	4,255	0	0	613	4,731	17,091
1989/90	645	2,326	104	3,285	20,138	6,465	0	613	12,188	45,765
1990/91	0	1,512	0	3,244	14,585	0	0	495	2,475	22,310
1991/92	0	1,344	0	3,203	18,932	0	0	495	2,422	26,395
1992/93	0	1,558	0	3,268	44,532	0	0	694	5,874	55,926
1993/94	0	17,278	24,994	38,342	99,594	21,809	0	7,060	84,692	293,770
1994/95	33,357	24,554	34,845	34,056	92,555	7,427	3,720	11,489	82,835	324,838
1995/96	96,933	38,740	110,544	26,063	46,276	6,445	1,316	12,687	81,392	420,397
1996/97	95,628	27,611	153,160	31,209	74,481	5,306	6,190	8,327	92,572	494,484
1997/98	21,405	9,647	130,960	25,121	71,007	4,926	10,151	12,845	92,446	378,507
1998/99	0	950	0	32,754	50,283	0	0	57	256	84,300
1999/00	9,596	11,612	52,407	565	149,988	8,115	6,547	20,326	102,822	361,977
2000/01	0	1,172	0	0	66,268	0	0	584	2,725	70,749

Table 11. Total commercial and personal use catches in number of crab.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)	Other Areas	Total
1978/79	1,226	882	8,172	12,670	7,434	2,542	82	4,042	31,746	68,796
1979/80	3,374	3,615	20,152	12,876	7,904	2,411	418	11,637	38,375	100,763
1980/81	709	12,205	13,236	11,475	11,870	5,930	0	80	25,040	80,546
1981/82	150	9,837	6,454	18,790	9,472	4,859	574	2,079	27,752	79,967
1982/83	3,523	2,360	1,380	11,197	2,944	7,634	4,861	80	26,337	60,316
1983/84	4,245	1,469	1,221	7,527	2,790	1,231	4,449	340	18,779	42,051
1984/85	2,002	1,952	6,529	7,902	4,755	702	2,941	2,470	11,087	40,340
1985/86	0	200	0	500	500	0	0	80	350	1,630
1986/87	0	200	0	500	500	0	0	80	350	1,630
1987/88	0	200	0	500	500	0	0	80	352	1,632
1988/89	4	269	257	500	665	0	0	80	672	2,447
1989/90	105	277	12	500	3,366	945	0	80	1,721	7,007
1990/91	0	200	0	500	2,361	0	0	80	350	3,491
1991/92	0	200	0	500	2,972	0	0	80	350	4,102
1992/93	0	212	0	495	6,835	0	0	106	812	8,460
1993/94	0	2,166	3,210	5,639	14,951	2,864	0	1,023	11,220	41,072
1994/95	4,529	3,154	4,783	5,139	13,141	988	522	1,715	11,533	45,504
1995/96	14,027	5,686	15,593	4,086	6,213	921	179	1,987	11,761	60,454
1996/97	12,406	3,999	20,063	5,023	10,082	738	914	1,237	13,097	67,559
1997/98	2,554	1,416	15,476	3,787	9,627	672	1,479	1,942	12,647	49,600
1998/99	0	133	0	5,118	7,016	0	0	9	35	12,311
1999/00	1,394	1,734	5,694	87	20,387	1,123	953	2,923	14,266	48,562
2000/01	0	176	0	0	9,088	0	0	83	382	9,729

Table 12. Average date of commercial and personal use catch of red king crab in Southeast Alaska.

Season	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)
1978/79	1-Oct-78	16-Sep-78	9-Nov-78	2-Nov-78	6-Nov-78	9-Dec-78	2-Jan-79	13-Dec-78
1979/80	3-Nov-79	29-Oct-79	8-Oct-79	5-Oct-79	20-Oct-79	31-Oct-79	18-Dec-79	10-Nov-79
1980/81	16-Nov-80	1-Oct-80	12-Oct-80	8-Oct-80	25-Oct-80	20-Oct-80		15-Aug-80
1981/82	1-Dec-81	25-Oct-81	27-Oct-81	23-Oct-81	31-Oct-81	21-Oct-81	7-Nov-81	28-Oct-81
1982/83	19-Oct-82	6-Oct-82	20-Oct-82	9-Oct-82	4-Oct-82	17-Oct-82	18-Oct-82	15-Aug-82
1983/84	24-Nov-83	9-Nov-83	24-Nov-83	18-Nov-83	5-Nov-83	24-Nov-83	26-Nov-83	1-Nov-83
1984/85	20-Oct-84	11-Oct-84	17-Oct-84	13-Oct-84	9-Oct-84	15-Oct-84	17-Oct-84	16-Oct-84
1985/86		15-Aug-85		15-Aug-85	15-Aug-85			15-Aug-85
1986/87		15-Aug-86		15-Aug-86	15-Aug-86			15-Aug-86
1987/88		15-Aug-87		15-Aug-87	15-Aug-87			15-Aug-87
1988/89	14-Oct-88	30-Aug-88	17-Oct-88	15-Aug-88	15-Aug-88			15-Aug-88
1989/90	20-Oct-89	2-Sep-89	23-Oct-89	15-Aug-89	14-Sep-89	13-Nov-89		15-Aug-89
1990/91		15-Aug-90		15-Aug-90	15-Aug-90			15-Aug-90
1991/92		15-Aug-91		15-Aug-91	15-Aug-91			15-Aug-91
1992/93		15-Aug-92		15-Aug-92	15-Aug-92			15-Aug-92
1993/94		15-Nov-93	15-Nov-93	5-Oct-93	7-Sep-93	10-Nov-93		23-Nov-93
1994/95	11-Nov-94	9-Nov-94	9-Nov-94	10-Oct-94	24-Sep-94	12-Nov-94	12-Nov-94	24-Oct-94
1995/96	10-Nov-95	5-Nov-95	10-Nov-95	28-Sep-95	24-Aug-95	10-Nov-95	10-Nov-95	7-Nov-95
1996/97	13-Nov-96	10-Nov-96	12-Nov-96	8-Oct-96	13-Sep-96	8-Nov-96	14-Nov-96	17-Nov-96
1997/98	7-Nov-97	22-Oct-97	11-Nov-97	6-Sep-97	6-Sep-97	8-Nov-97	15-Nov-97	15-Nov-97
1998/99		15-Aug-98		15-Aug-98	9-Sep-98			15-Aug-98
1999/00	8-Nov-99	17-Oct-99	8-Nov-99	6-Sep-99	10-Oct-99	7-Nov-99	12-Nov-99	9-Nov-99
2000/01		15-Aug-00			24-Sep-00			15-Aug-00

Table 13. Average date of survey effort (set time) for the Southeast Alaska red king crab stock assessment survey.

Survey Year	Pybus Bay (110-22)	Gambier Bay (110-23)	Seymour Canal (111-11 to 111-19)	Peril Straits (113-51 to 113-59)	Juneau Pers. Use (111-40 & 111-50)	Lynn Canal (115-10/112-15)	Port Frederick (114-31 to 114-39)	Excursion Inlet (114-25 & 114-80)
1978	27-Aug-1978	28-Aug-1978	No Survey	No Survey	No Survey	No Survey	No Survey	No Survey
1979	23-Jun-1979	26-Jun-1979	27-Jun-1979	16-Jul-1979	2-Jul-1979	7-Jul-1979	11-Jul-1979	13-Jul-1979
1980	8-Jun-1980	14-Jun-1980	20-Jun-1980	2-Jul-1980	18-Jun-1980	24-Jun-1980	30-Jun-1980	28-Jun-1980
1981	17-Jun-1981	19-Jun-1981	22-Jun-1981	11-Jul-1981	26-Jun-1981	28-Jun-1981	9-Jul-1981	30-Jun-1981
1982	9-Jun-1982	12-Jun-1982	15-Jun-1982	9-Jul-1982	23-Jun-1982	26-Jun-1982	30-Jun-1982	28-Jun-1982
1983	9-Jun-1983	13-Jun-1983	15-Jun-1983	9-Jul-1983	22-Jun-1983	24-Jun-1983	27-Jun-1983	26-Jun-1983
1984	8-Jun-1984	10-Jun-1984	19-Jun-1984	11-Jul-1984	21-Jun-1984	23-Jun-1984	27-Jun-1984	25-Jun-1984
1985	12-Jun-1985	13-Jun-1985	17-Jun-1985	31-Jul-1985	13-Jul-1985	18-Jul-1985	26-Jul-1985	20-Jul-1985
1986	15-Jun-1986	17-Jun-1986	26-Jun-1986	12-Jun-1986	2-Jul-1986	5-Jul-1986	13-Jul-1986	10-Jul-1986
1987	18-Aug-1987	No Survey	No Survey	29-Aug-1987	18-Aug-1987	No Survey	No Survey	21-Jul-1987
1988	21-Sep-1988	29-Jul-1988	31-Jul-1988	14-Aug-1988	28-Aug-1988	5-Oct-1988	10-Aug-1988	8-Aug-1988
1989	No Survey	27-Sep-1989	30-Sep-1989	6-Oct-1989	3-Oct-1989	No Survey	No Survey	No Survey
1990	No Survey Conducted in 1990							
1991	7-Jun-1991	9-Jun-1991	12-Jun-1991	11-Jul-1991	21-Jun-1991	24-Jun-1991	8-Jul-1991	26-Jun-1991
1992	No Survey Conducted in 1992							
1993	21-Jul-1993	13-Jul-1993	9-Jul-1993	26-Jul-1993	30-Jun-1993	22-Jun-1993	16-Jun-1993	19-Jun-1993
1994	11-Jul-1994	13-Jul-1994	16-Jul-1994	10-Aug-1994	21-Jul-1994	2-Aug-1994	7-Aug-1994	5-Aug-1994
1995	25-Jul-1995	22-Jul-1995	19-Jul-1995	3-Aug-1995	1-Jul-1995	9-Jul-1995	13-Jul-1995	12-Jul-1995
1996	10-Jul-1996	12-Jul-1996	15-Jul-1996	16-Jun-1996	28-Jun-1996	7-Jun-1996	12-Jun-1996	10-Jun-1996
1997	12-Jul-1997	10-Jul-1997	9-Jul-1997	15-Jul-1997	26-Jun-1997	1-Jul-1997	23-Jul-1997	29-Jun-1997
1998	14-Jul-1998	12-Jul-1998	11-Jul-1998	23-Jul-1998	25-Jun-1998	29-Jun-1998	27-Jul-1998	28-Jul-1998
1999	8-Jun-1999	10-Jun-1999	12-Jun-1999	9-Jul-1999	24-Jun-1999	28-Jun-1999	17-Jun-1999	15-Jun-1999
2000	7-Jul-2000	9-Jul-2000	12-Jul-2000	27-Jul-2000	22-Jun-2000	26-Jun-2000	23-Jul-2000	20-Jul-2000
2001	7-Jul-2001	8-Jul-2001	11-Jul-2001	25-Jul-2001	21-Jun-2001	26-Jun-2001	21-Jul-2001	19-Jul-2001

Table 14. Results of the catch-survey analysis for the 2001 red king crab stock assessment survey. The estimated abundances of prerecruit-one, recruit, and postrecruit crab are the catch-survey model estimates of crab per pot day catches.

Survey Bay	Catchability Coefficient (q)	Prerecruit-One to Recruit Constant(u)	Estimated Abundance of Prerecruit-One in 2001	Estimated Abundance of Recruits in 2001	Estimated Abundance of Postrecruits in 2001	Estimated Total Catch of Mature Crab
Pybus Bay	0.000152	0.7465	2.615	0.544	2.336	5.495
Gambier Bay	0.000401	0.5455	4.283	2.939	5.803	13.025
Seymour Canal[a]	0.000077	0.6587	0.263	0.977	1.377	2.616
Peril Straits	0.000108	0.3341	1.144	0.369	0.660	2.173
Juneau Area	0.000123	0.7521	3.980	4.268	4.375	12.623
Lynn Canal	0.000563	0.5046	1.841	0.910	1.526	4.277
Excursion Inlet	0.000337	0.4212	4.153	0.714	1.022	5.889
Port Frederick	0.000319	0.6546	2.451	1.463	5.422	9.335

[a] Seymour Canal parameters were estimated using a two-stage CSA.

Table 15. Estimated abundance (in pounds) of mature male red king crab in surveyed areas in Southeast Alaska.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	101,294	209,102			Surveys began in 1979.				
1979	96,484	236,756	418,124	373,236	270,588	187,207	69,064	96,926	1,748,384
1980	105,344	150,048	353,147	512,394	252,613	192,708	77,461	38,912	1,682,628
1981	99,299	96,078	569,452	469,341	159,565	120,258	105,356	37,738	1,657,088
1982	78,894	76,947	307,905	357,435	93,455	86,306	116,828	26,327	1,144,096
1983	48,670	62,116	388,119	248,134	84,798	23,534	90,136	42,125	987,632
1984	30,891	54,133	639,224	190,381	71,015	15,657	51,760	26,729	1,079,790
1985	22,645	47,620	449,728	138,497	47,129	15,436	27,765	9,243	758,062
1986	18,926	37,035	437,672	111,947	52,273	16,636	29,730	9,838	714,056
1987	13,909	29,071	366,067	91,351	56,613	13,471	26,901	9,328	606,710
1988	6,366	21,259	381,577	74,291	94,988	11,031	22,162	6,488	618,163
1989	8,350	25,704	207,031	63,011	136,237	24,439	17,990	4,457	487,218
1990	179,323	252,244	304,832	177,623	342,822	52,178	16,138	41,081	1,366,241
1991	160,120	170,213	371,389	170,466	309,057	50,653	17,835	24,431	1,274,163
1992	137,971	139,503	317,942	215,658	467,635	65,506	21,677	57,838	1,423,730
1993	231,917	134,882	365,554	231,221	416,891	57,527	31,650	38,145	1,507,786
1994	303,886	141,735	574,456	209,370	325,157	38,187	42,601	54,905	1,690,298
1995	221,381	99,370	648,964	185,153	323,080	40,465	66,136	40,784	1,625,334
1996	130,685	83,345	785,577	166,279	362,688	39,358	83,744	39,607	1,691,283
1997	94,009	79,035	466,074	109,360	464,863	40,222	108,910	91,261	1,453,734
1998	110,661	117,912	350,122	86,771	541,284	44,526	138,987	60,795	1,451,059
1999	129,946	131,582	438,740	72,672	635,265	46,142	156,296	67,122	1,677,766
2000	139,133	166,097	221,896	91,182	639,100	40,997	153,295	50,685	1,502,385
2001	238,268	198,373	244,678	106,628	658,090	44,868	177,119	89,218	1,757,243
Average	112,849	115,007	417,751	193,583	295,879	55,101	71,719	41,912	1,300,211

Table 16. Estimated abundance (in pounds) of legal male red king crab in surveyed areas in Southeast Alaska.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	70,231	106,656			Surveys began in 1979.				
1979	70,258	133,962	254,960	150,844	220,466	78,276	49,095	83,462	1,041,323
1980	77,438	100,240	211,207	144,280	200,891	110,647	54,045	15,893	914,641
1981	83,009	59,788	202,587	173,094	153,756	109,713	59,160	24,553	865,659
1982	67,038	57,614	165,015	170,903	86,008	63,511	85,371	17,997	713,458
1983	41,712	50,412	186,293	145,684	59,129	15,288	59,859	17,071	575,447
1984	27,623	40,850	338,590	114,181	60,665	10,318	41,504	25,486	659,217
1985	22,645	38,781	357,115	67,971	34,355	7,441	22,946	7,527	558,782
1986	18,668	34,552	370,820	78,979	40,085	11,398	25,142	6,286	585,929
1987	13,909	27,203	320,977	68,351	40,148	11,835	21,766	5,660	509,850
1988	6,325	20,528	278,789	57,024	48,556	9,106	18,948	6,488	445,765
1989	4,124	15,604	210,704	49,473	82,947	7,876	17,990	4,457	393,174
1990	8,150	19,585	145,837	41,965	105,739	9,586	15,462	2,226	348,550
1991	160,120	151,621	219,994	86,903	309,057	32,500	13,381	19,819	993,394
1992	137,971	135,256	258,437	102,669	257,736	38,362	14,271	18,236	962,938
1993	120,341	103,020	259,959	125,124	372,039	47,172	18,046	33,259	1,078,961
1994	156,177	77,345	319,882	105,253	273,951	22,324	20,000	19,809	994,740
1995	182,922	64,735	551,904	98,093	222,077	21,480	16,000	26,937	1,184,149
1996	113,825	51,099	701,238	90,386	251,281	24,798	24,000	19,633	1,276,259
1997	89,964	49,894	450,402	75,889	258,767	23,440	29,000	17,866	995,222
1998	71,658	60,576	297,589	50,399	331,835	24,467	40,000	42,941	919,465
1999	69,080	72,929	304,017	31,203	452,900	32,471	57,000	50,235	1,069,835
2000	75,000	96,379	194,226	39,279	429,178	27,059	62,000	29,966	953,087
2001	149,321	147,949	230,243	60,471	514,800	29,718	77,000	33,964	1,243,465
Average	76,563	71,524	296,991	92,540	208,972	33,425	36,608	23,034	838,405

Table 17. Estimated percent exploitation rates on legal male red king crab in surveyed areas in Southeast Alaska.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Average
1978	11.7	5.6			Surveys began in 1979.				
1979	34.8	18.3	53.5	54.8	24.3	20.8	5.9	84.3	39.5
1980	7.1	80.1	42.2	53.2	40.8	35.3	0.0	3.0	40.8
1981	1.3	109.2	21.6	69.3	42.7	31.4	6.9	52.5	40.1
1982	36.6	27.5	6.5	43.4	22.9	89.1	43.0	2.9	33.4
1983	77.7	19.9	4.5	34.4	30.9	55.9	54.5	12.3	28.2
1984	61.4	35.1	12.7	48.4	53.1	47.4	48.8	63.7	30.8
1985	0.0	3.7	0.0	5.0	9.8	0.0	0.0	7.5	1.6
1986	0.0	4.2	0.0	4.2	8.0	0.0	0.0	9.1	1.5
1987	0.0	5.6	0.0	4.9	8.1	0.0	0.0	9.6	1.7
1988	0.4	10.4	0.8	5.7	8.8	0.0	0.0	9.5	2.8
1989	15.6	14.9	0.0	6.6	24.3	82.1	0.0	13.8	8.5
1990	0.0	7.7	0.0	7.7	13.8	0.0	0.0	22.2	5.7
1991	0.0	0.9	0.0	3.7	6.1	0.0	0.0	2.5	2.4
1992	0.0	1.2	0.0	3.2	17.3	0.0	0.0	3.8	5.2
1993	0.0	16.8	9.6	30.6	26.8	46.2	0.0	21.2	19.4
1994	21.4	31.7	10.9	32.4	33.8	33.3	18.6	58.0	24.3
1995	53.0	59.8	20.0	26.6	20.8	30.0	8.2	47.1	28.6
1996	84.0	54.0	21.8	34.5	29.6	21.4	25.8	42.4	31.5
1997	23.8	19.3	29.1	33.1	27.4	21.0	35.0	71.9	28.7
1998	0.0	1.6	0.0	65.0	15.2	0.0	0.0	0.1	9.1
1999	13.9	15.9	17.2	1.8	33.1	25.0	11.5	40.5	24.2
2000	0.0	1.2	0.0	0.0	15.4	0.0	0.0	1.9	7.1
Average									
1979-84	36.5	48.4	23.5	50.6	35.8	46.7	26.5	36.4	35.5
1985-92	2.0	6.1	0.1	5.1	12.0	10.3	0.0	9.7	3.7
1993-00	24.5	25.1	13.6	28.0	25.3	22.1	12.4	35.4	21.6

Table 18. Ratio of male red king crab reproductive potential to ovigerous female red king crab with clutch fullness > 75% caught in the Southeast Alaska red king crab stock assessment survey. Black-shaded areas designate ratios less than 0.50 and gray-shaded areas designate a ratio between 0.50 and 0.75. Juneau Area is separated into Barlow Cove, Stephens Passage, and Eagle River.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Barlow Cove	Stephens Passage	Eagle River	Lynn Canal	Excursion Inlet	Port Frederick
1978	2.89	13.98								
1979	2.85	3.20	3.87	**0.47**	**0.31**	0.71	**0.22**	2.30	**0.72**	1.19
1980	2.67	3.02	1.03	1.18	1.22	2.26	**0.60**	1.42	2.84	5.36
1981	1.19	**0.70**	0.79	1.17	**0.40**	0.84	5.58	1.40	1.08	1.29
1982	6.93	5.74	1.20		**0.49**		1.52	3.88	65.25	9.62
1983	26.26	2.61	0.96	0.79	1.36	1.57	**0.68**	**0.43**	4.82	4.54
1984	12.88	58.12	0.97	1.33	2.05	1.85	2.82	1.23	8.60	1.41
1985	7.93	39.17	2.18	**0.47**	1.24	**0.45**	**0.38**	1.36	1.45	0.99
1986		11.96	4.69	2.47	**0.13**		**0.31**	1.06	17.79	1.47
1987	0.78			**0.55**			**0.25**		2.60	
1988	**0.11**	3.66	4.28	**0.50**	1.47		**0.10**	4.18	2.38	4.70
1989		**0.41**	**0.54**	**0.24**	1.13					
1990										
1991	1.31	3.70	3.44	**0.60**	**0.09**		**0.53**	4.19	1.89	2.37
1992										
1993	6.27	1.34	2.06	**0.58**	**0.47**		0.76	3.08	6.26	**0.43**
1994	33.12	2.10	3.13	1.08	0.91		1.00	1.53	1.40	2.23
1995	11.30	2.78	2.61	1.24	**0.69**	2.30	1.74	2.07	1.36	7.90
1996	3.44	4.52	2.05	3.05	1.03	3.87	5.21	1.56	1.19	2.65
1997	1.92	1.77	1.24	**0.74**	**0.71**	2.90	1.55	2.66	8.43	2.65
1998	0.55	4.88	2.87	1.32	3.65	8.79	5.60	4.60	1.47	19.61
1999	15.19	4.62	3.76	1.78	4.10	11.47	7.69	7.62	4.56	8.28
2000	3.89	9.39	1.89	0.85	2.59	10.84	2.85	3.00	1.43	7.91
2001	3.67	5.97	9.77	0.92	1.74	4.47	7.06	2.22	4.86	7.22
Median	3.55	3.70	2.12	0.88	1.08	2.30	1.26	2.22	2.49	2.65
				Lower 25% Quartile						
	1.77	2.61	1.16	0.57	0.49	1.57	0.49	1.41	1.43	1.44

Table 19. Average percent clutch fullness of mature female red king crab caught in the Southeast Alaska red king crab stock assessment survey. Gray-shaded areas designate averages less than 80% clutch fullness. Juneau Area is separated into Barlow Cove, Stephens Passage, and Eagle River.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Barlow Cove	Stephens Passage	Eagle River	Lynn Canal	Excursion Inlet	Port Frederick
1978	85.3	92.6								
1979	92.7	88.0	95.0	91.5	92.9	93.9	92.8	93.7	92.6	92.2
1980	93.2	94.8	95.0	90.4	90.7	86.4	91.4	92.9	88.2	80.8
1981	92.9	92.5	94.4	93.8	91.6	93.7	94.4	94.7	89.9	**79.9**
1982	100.0	96.1	100.0		98.7		91.7	99.2	93.3	97.8
1983	92.1	89.6	91.9	90.1	92.2	92.5	90.6	92.1	86.1	**53.8**
1984	95.0	95.0	90.8	88.8	89.7	95.0	93.1	94.2	**50.0**	**73.7**
1985	95.0	95.0	92.9	88.3	93.7	87.1	94.1	95.0	**68.6**	**73.7**
1986		93.7	94.6	87.8	97.6		96.3	97.7	85.6	**46.3**
1987	94.9			92.3	97.5		94.1		95.5	
1988	**77.5**	95.1	92.1	**78.1**	92.4		83.7	**77.0**	**67.2**	**39.0**
1989		96.7	84.7	82.7	93.1					
1990										
1991	96.3	96.9	94.6	97.4	96.2		95.5	99.2	96.8	**75.9**
1992										
1993	100.0	99.4	98.9	98.9	97.7		96.9	98.7	98.9	98.0
1994	92.0	98.1	96.2	97.7	97.8		98.9	98.5	98.6	82.0
1995	96.6	95.8	99.2	91.5	98.9	96.7	97.6	97.5	98.6	**65.5**
1996	98.7	94.8	95.7	94.6	95.7	96.8	94.8	98.4	98.9	97.4
1997	99.1	99.0	97.0	98.9	92.9	96.3	96.0	97.5	94.6	**75.2**
1998	97.5	93.7	98.9	86.0	98.0	99.1	98.4	98.4	97.0	**27.5**
1999	91.3	94.6	98.9	93.5	96.2	96.3	99.1	99.5	98.7	96.9
2000	96.2	98.1	96.2	97.9	99.2	97.0	97.0	100.0	97.3	93.2
2001	99.7	97.8	91.2	84.4	**76.2**	95.4	**70.1**	84.2	87.3	36.8
Average	94.3	95.1	94.9	91.2	94.2	94.3	93.3	95.2	89.2	**72.9**

Table 20. General criteria for determining if areas will be managed as area of concern for commercial fishery or be closed to commercial fishing and personal use fishing.

Criteria	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Port Frederick	Excursion Inl.	Lynn Canal	Juneau Area
Considerations for Female Survey Catch								
Percent Clutch Fullness	99.7%	97.8%	91.2%	**84.4%**	**36.8%**	87.3%	84.2%	80.7%
Large Female Crab Abundance (as percent of Historical Average)	484%	180%	**14%**	**50%**	94%	166%	91%	226%
Small Female Crab Abundance (as percent of Historical Average)	826%	126%	**0%**	109%	122%	121%	157%	98%
Considerations for Juvenile Male Survey Catch								
Juvenile Male Crab Abundance (as percent of Historical Average)	217%	110%	**1%**	80%	102%	131%	77%	109%
Considerations for Prerecruit Male Survey Catch								
Prerecruit-one Male Crab Abundance (as percent of Historical Average)	230%	130%	**14%**	61%	133%	208%	82%	171%
Trend in Abundance[a]	V	V	**D**	V	V	V	V	V
Last three years average as percent of Historical Average	155%	140%	**40%**	**59%**	233%	150%	105%	261%
Red Flags for Legal Male Survey Catch								
Recruit Male Crab Abundance (as percent of Historical Average)	82%	180%	**59%**	**43%**	95%	137%	62%	205%
Postrecruit Male Crab Abundance (as percent of Historical Average)	294%	191%	**56%**	**31%**	105%	128%	**39%**	164%
Mature male abundance(as percent of Historical Average)	222%	178%	**57%**	**54%**	265%	224%	81%	236%
Legal male abundance(as percent of Historical Average)	199%	217%	77%	64%	340%	151%	88%	264%
Trend in Legal Abundance[a]	I	I	V	I	V	V	V	I
Trend in Mature Abundance[a]	I	I	V	I	I	V	V	V
Ratio of potential males to ovigerous females	3.67	5.97	9.77	0.92	7.22	4.86	2.22	4.59
Legal Male Exploitation Rate[b]	31.9%	26.8%	21.3%	35.3%	22.9%	**50.0%**	30.2%	25.6%
General Concerns								
Bay/Area closed previous year to commercial or personal use catch	**Yes**	-	**Yes**	**Yes**	-	-	-	-
On grounds concerns expressed by survey biologists	-	-	**Note[c]**	**Note[d]**	-	-	-	-
Unusually high parasitism, leg loss, etc.	-	-	-	-	-	-	-	-

[a] Trend is defined as three consecutive abundances which are either increasing (I), decreasing (D), or either increasing one year and decreasing the adjacent year (V).

[b] Exploitation rate is the estimated percent of legal size male crab that will be removed if the target exploitation rate on mature crab is achieved.

[c] The catch of all recruit classes of crab were highly variable. Only a few pots caught a large number of crab and most pots caught no crab.

[d] Although the catch of crab in Deadman Reach area of Peril Strait was good, the catch of all sex and recruit classes of red king crab in Rodman Bay was very poor.

Table 21. Estimated allowable commercial catch (pounds) of red king crab in Southeast Alaska for the November 2001/2002 season.

Survey Bay	20% of Mature Biomass/50% of Legal Biomass	Personal Use Catch	Proposed Allowable Commercial Harvest		Estimated Legal Exploitation Rate	Average 1993/1994 - 1999/2000 Catch	Maximum 1993/1994 - 1999/2000 Catch	Management Considerations
Pybus Bay	47,654	0	48,200		32.3%	42,820	96,933	Maximum harvest of 75,000 lbs
Gambier Bay	39,675	1,216	38,500		26.8%	20,370	36,437	Maximum harvest of 75,000 lbs
Seymour Canal	48,936	0	24,500	[a]	8.1%	84,485	153,160	Reduced Season of 7 Days
Peril Straits	21,326	0	10,700	[b]	17.7%	13,678	22,642	Reduced Season of 7 Days
Juneau Area	131,618	78,971	52,600	[c]	25.6%	33,806	83,514	Very Focused Oversight to Achieve Quota
Lynn Canal	8,974	0	9,000		30.3%	9,005	21,809	
Excursion Inlet	16,982	549	16,400	[d]	49.9%	11,515	20,027	
Port Frederick	30,659	0	10,200	[e]	8.2%	4,654	10,151	
Other Areas		2,356	88,786	[f]	24.8%	86,815	0	
Blue King Crab			2,937	[g]		2,850	7,764	
Total		83,093	301,823			309,998		

[a] 20% of mature male abundance reduced by one-half due to poor abundance of sublegal males and females and uncertainty over estimate of catchability.
[b] 20% of mature male abundance reduced by one-half due to continued low abundance of non-legal segments of population.
[c] Set allocation of 40% of available harvest allocated to commercial fishery and 60% to personal use fishery.
[d] Harvestable surplus set as 50% of the legal abundance instead of 20% of mature abundance.
[e] Harvestable surplus set at maximum harvest recorded since 1993/1994.
[f] An average of 30% of the harvest has come from waters outside of the surveyed areas. This is the estimated catch from these other areas.
[g] An average of 1% of the harvest is blue king crab, which isn't accounted for in the previous catch figures.

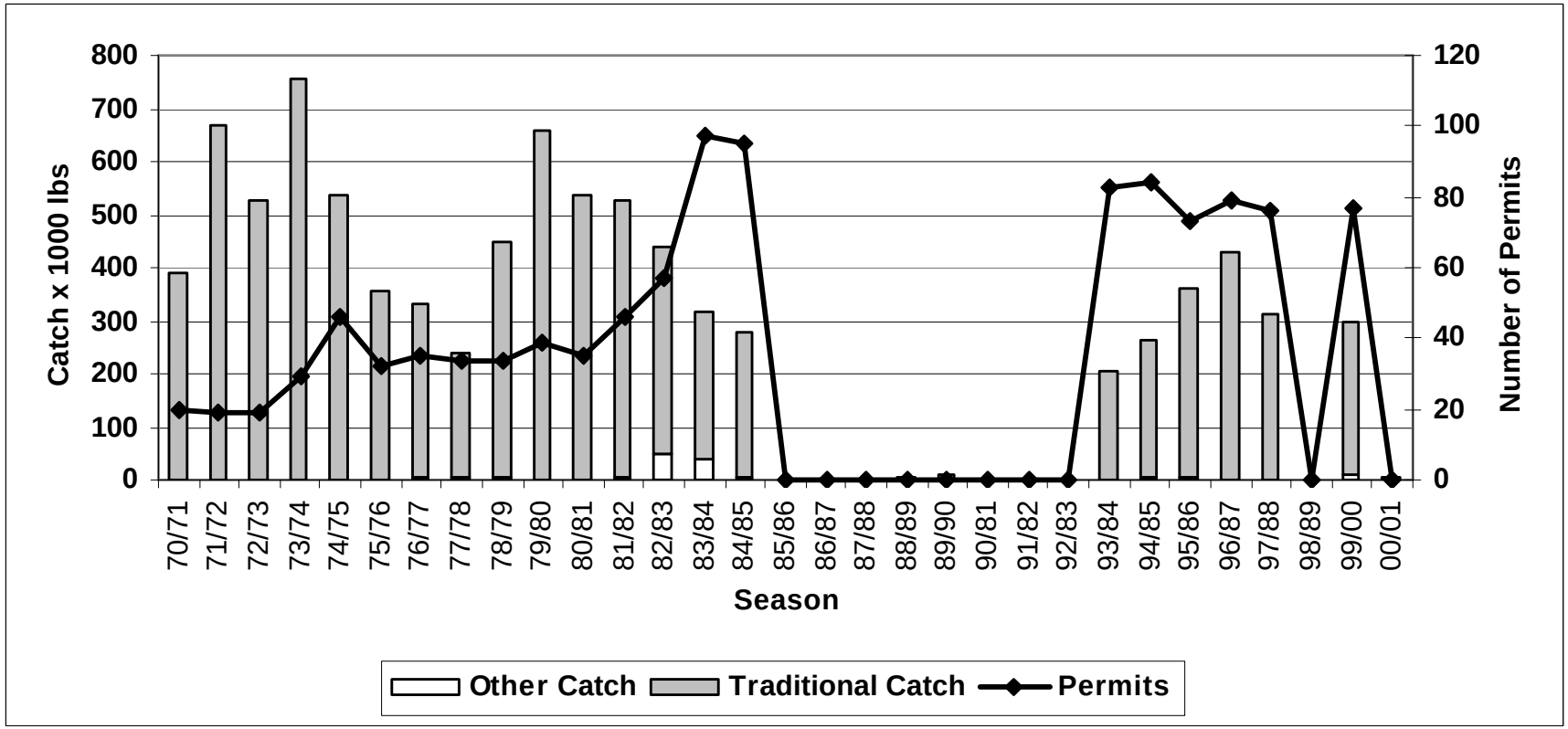


Figure 1. Red and blue king crab catch and effort in the Southeast Alaska commercial fishery. Data are from the traditional fishery and 'other' commercial fisheries, which includes experimental fisheries and blue king crab caught in tanner crab fisheries.

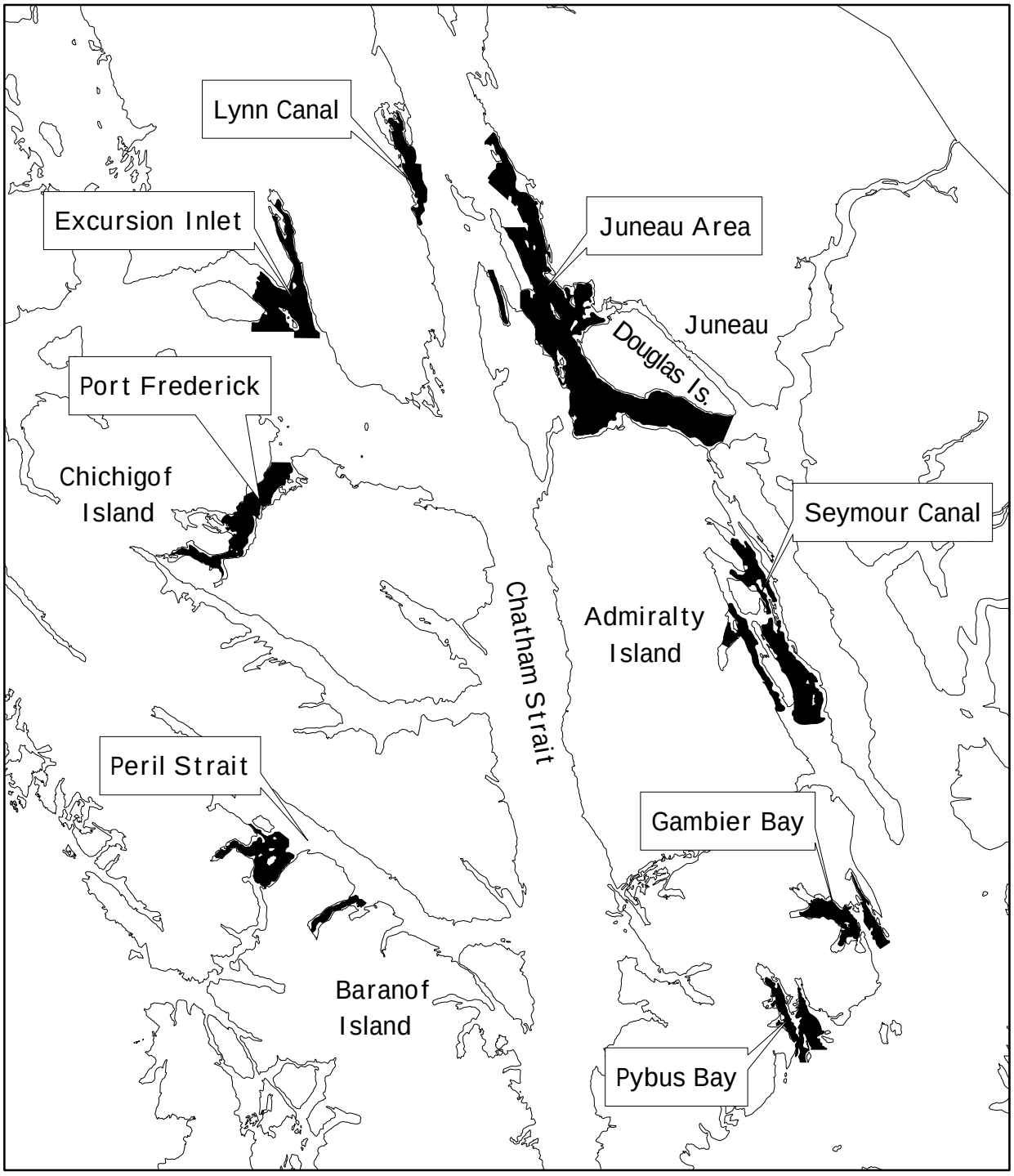


Figure 2. Areas currently surveyed in the Southeast Alaska red king crab stock assessment survey.

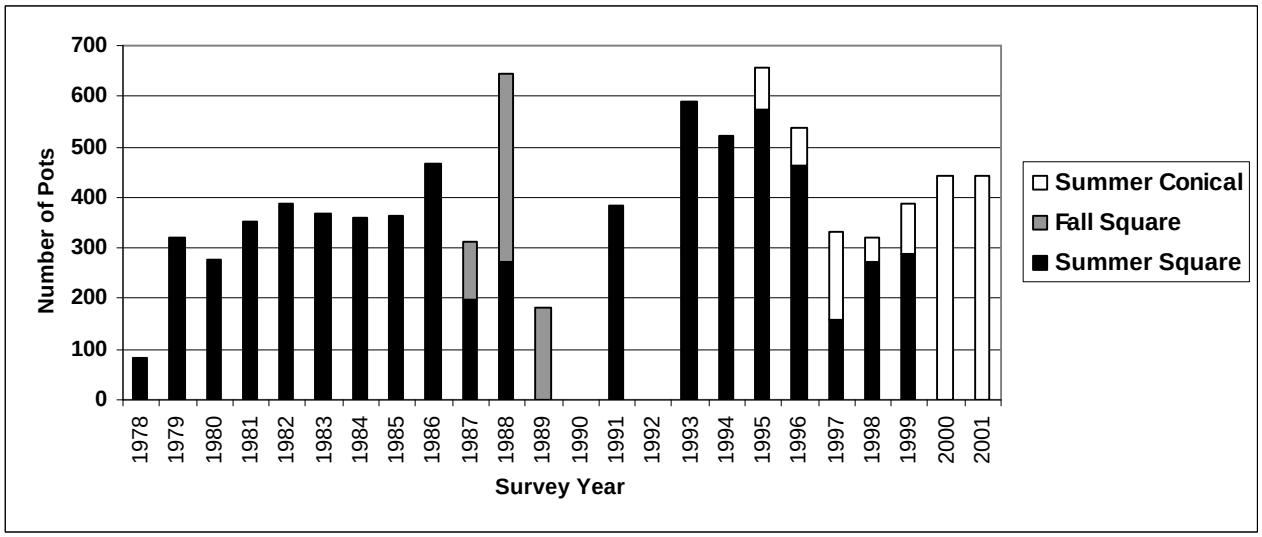


Figure 3. Number and type of pot used in the red king crab stock assessment survey from 1978 through 2001.

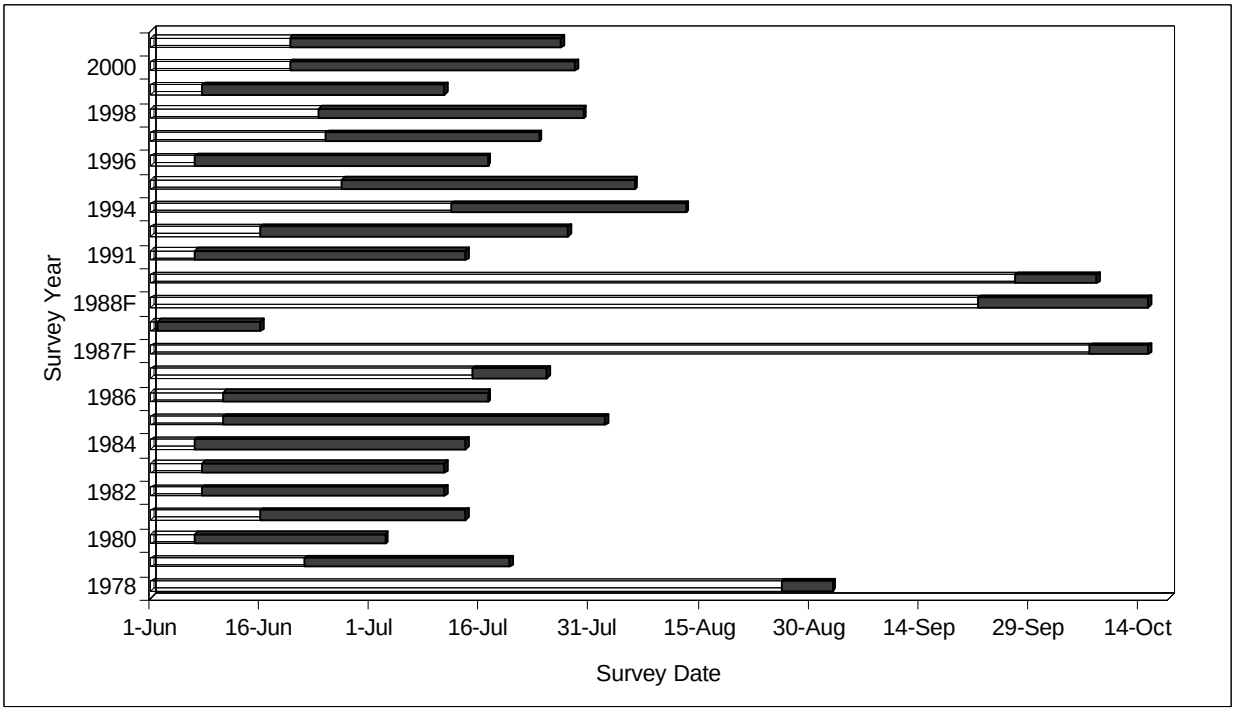


Figure 4. Timing of the red king crab stock assessment survey from 1978 through 2001. In some years the survey was split between a summer survey and a fall survey.

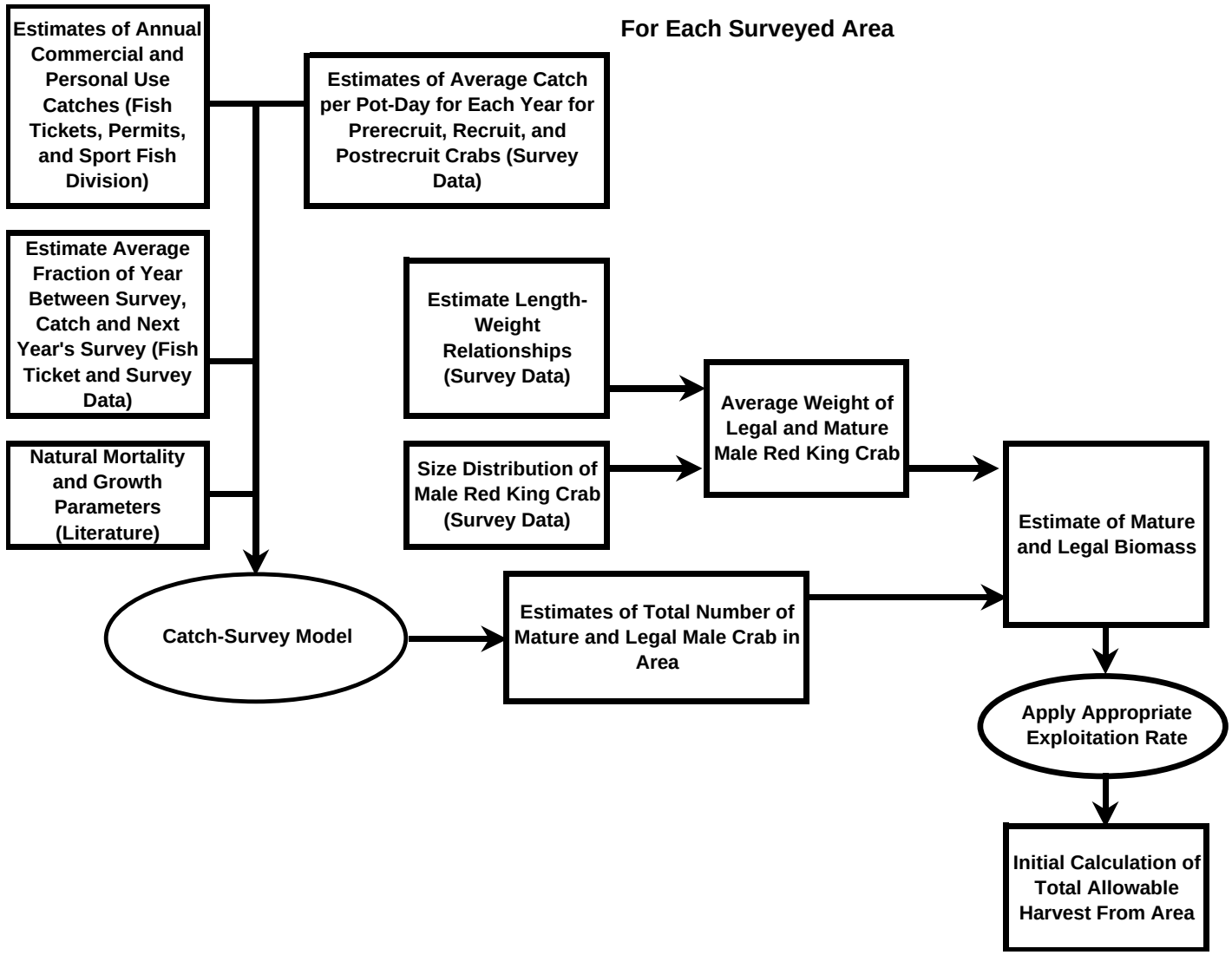


Figure 5a. Schematic list of data required and process in estimating the total allowable harvest from each of the 8 areas surveyed in Southeast Alaska.

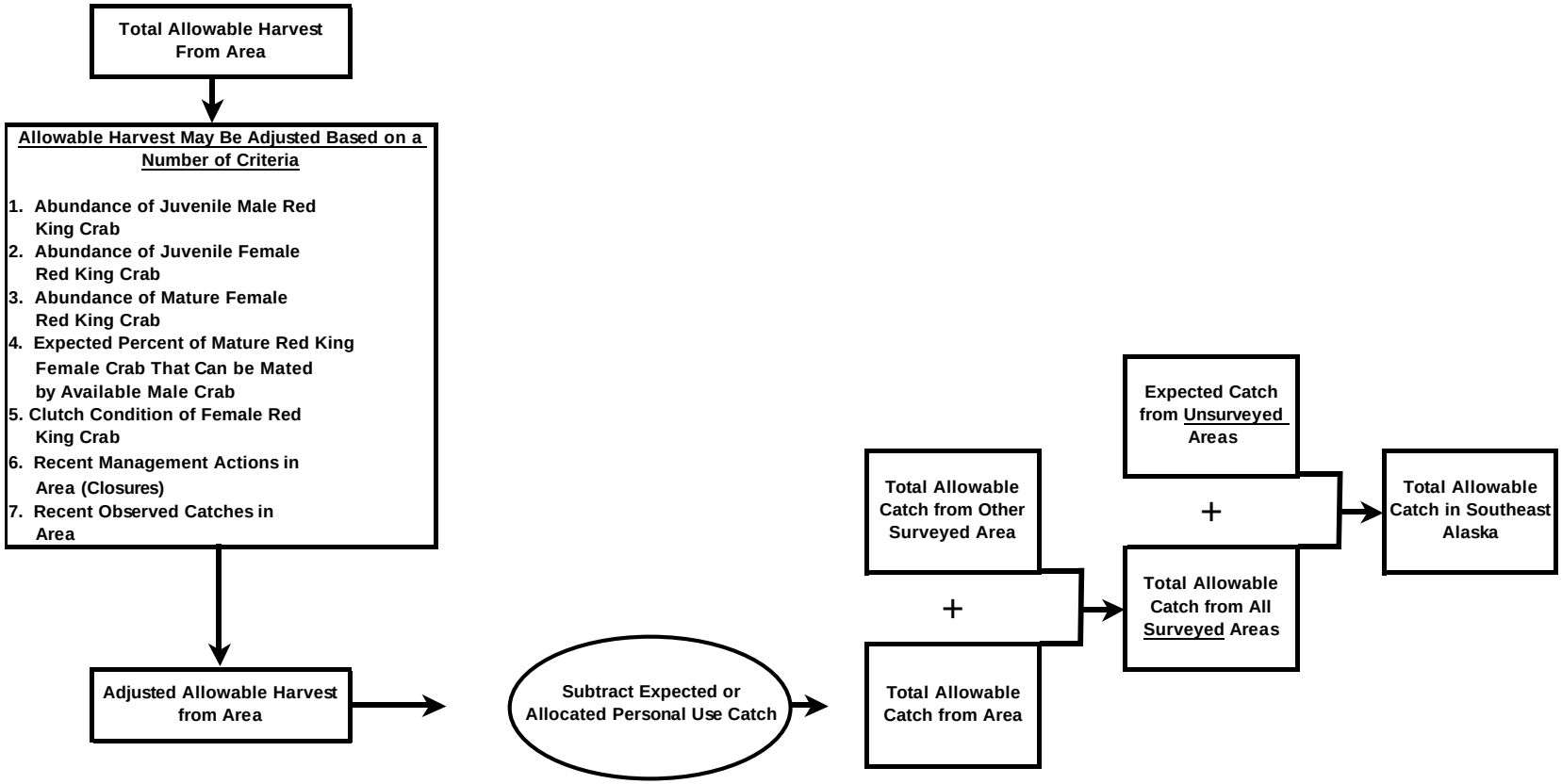


Figure 5b. Schematic list of data required and process in estimating the total allowable harvest from each area and for total Southeast Alaska.

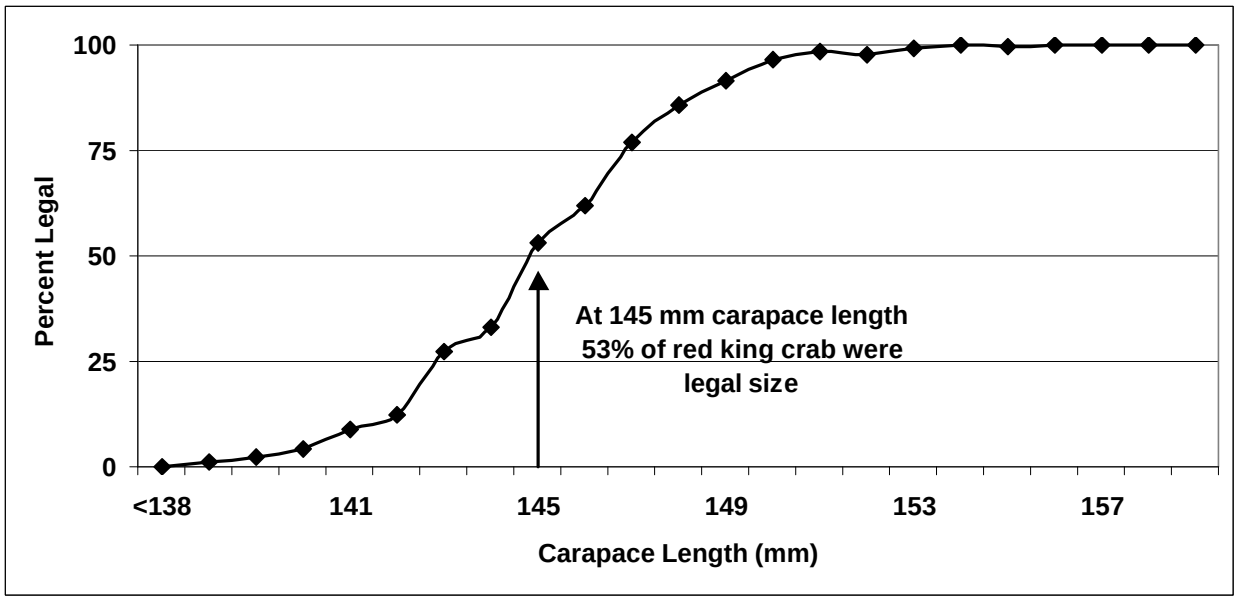


Figure 6. Percent of male red king crabs measured in the red king crab stock assessment survey that were legal size (7 inches carapace width) by carapace length. A total of 60,642 crab were measured for both carapace length and legal size.

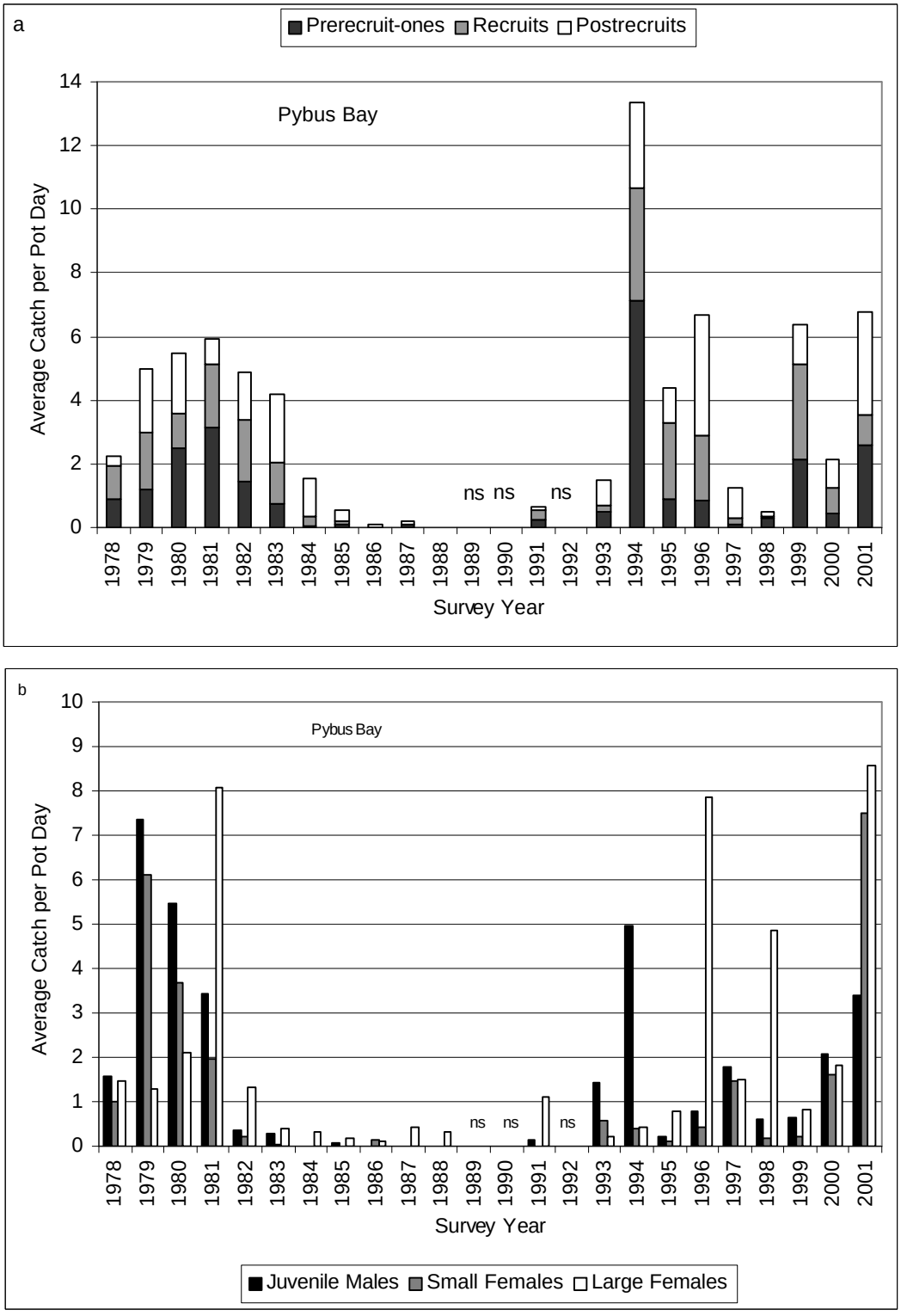


Figure 7. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Pybus Bay. Year of no survey is designated as ns.

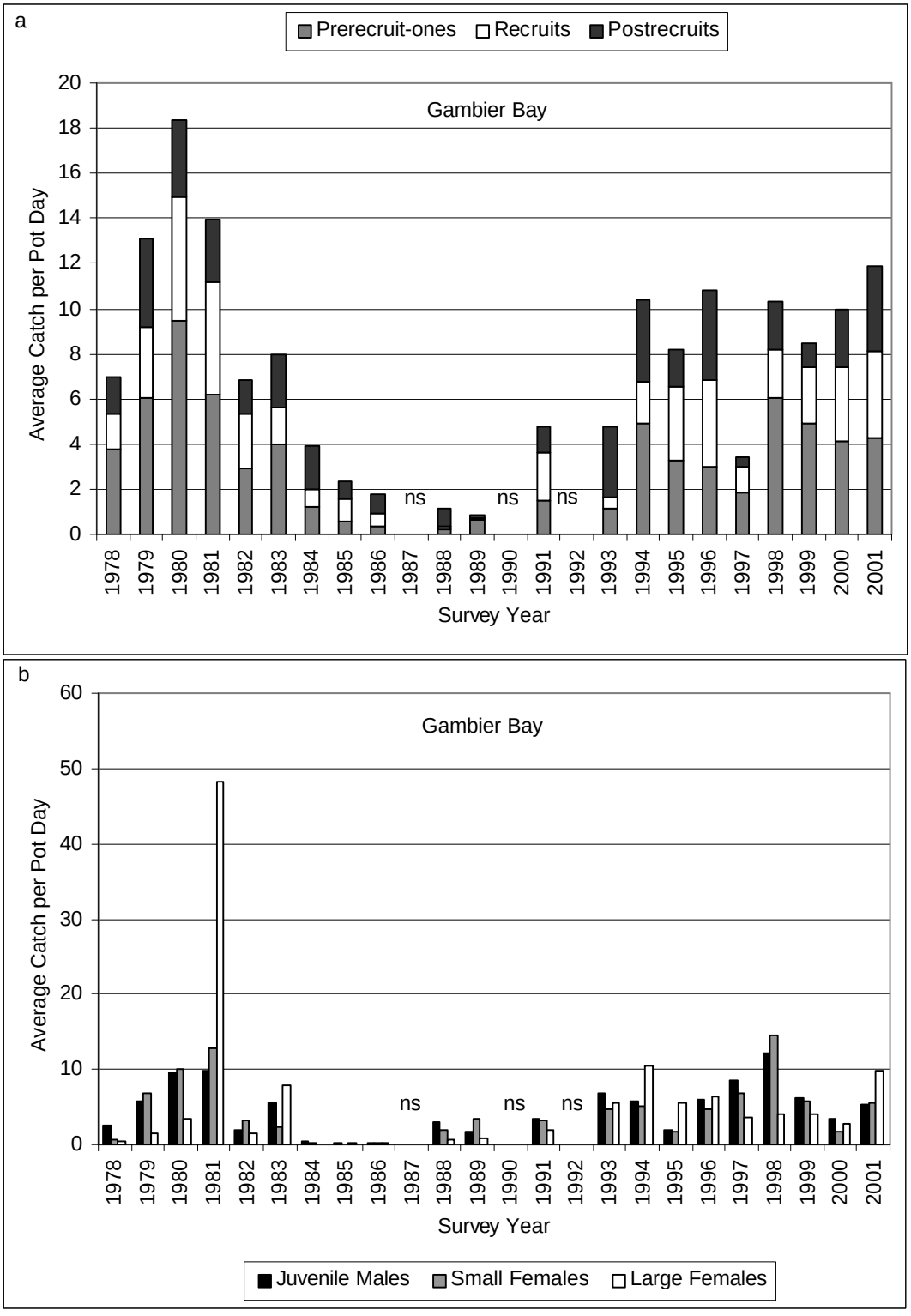


Figure 8. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) in Gambier Bay. Year of no survey is designated as ns.

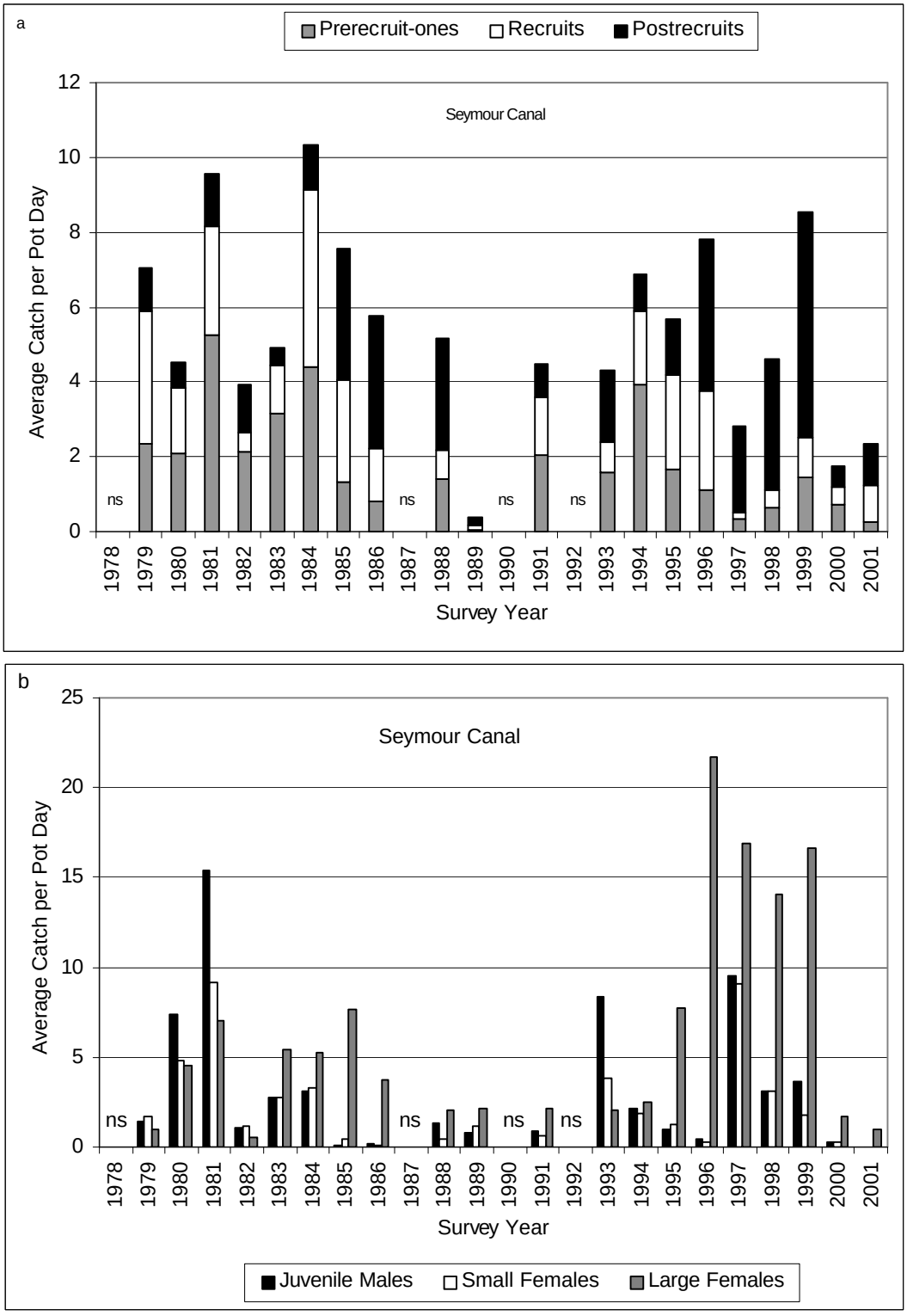


Figure 9. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Seymour Canal. Year of no survey is designated as ns.

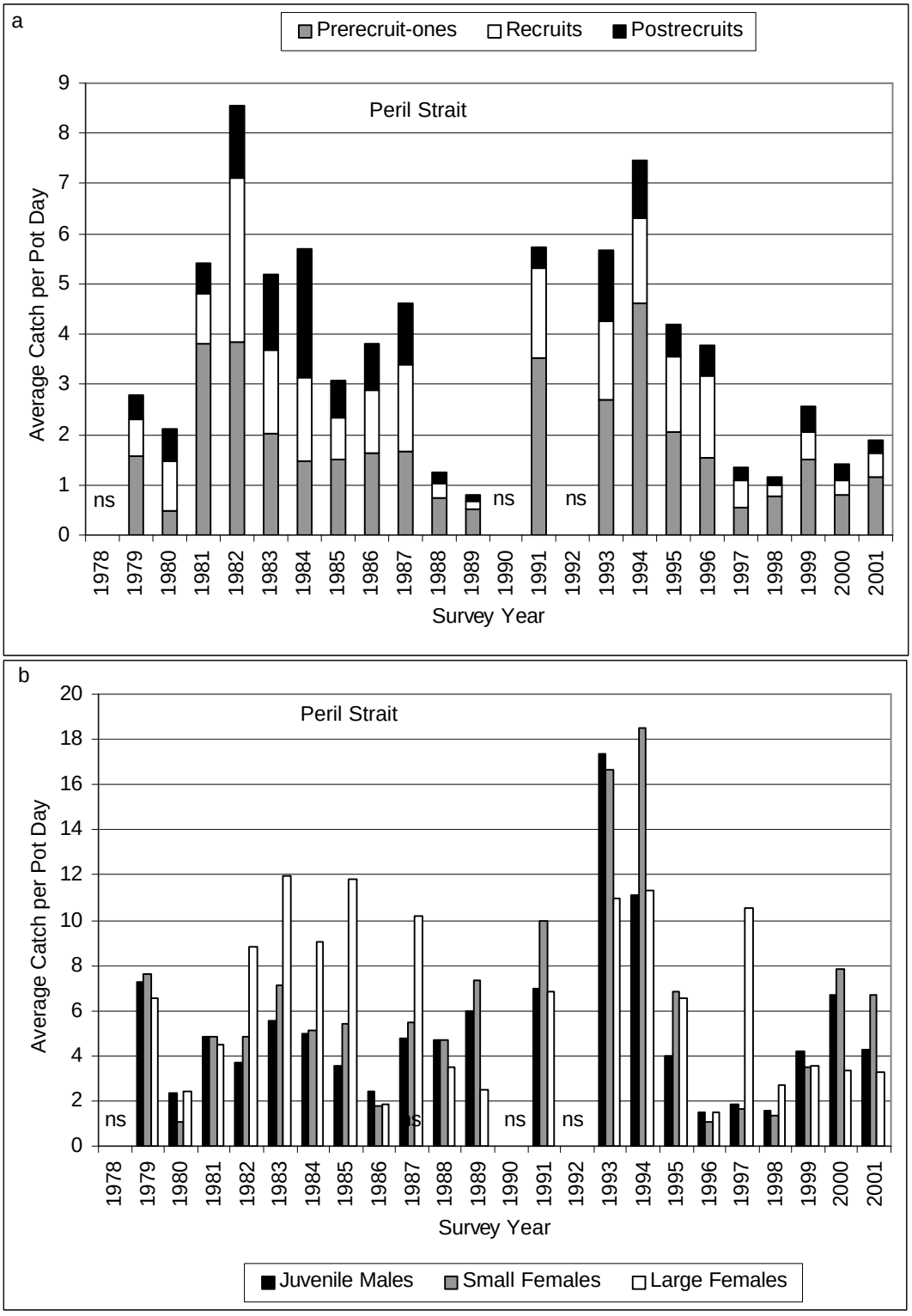


Figure 10. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Peril Strait. Year of no survey is designated as ns.

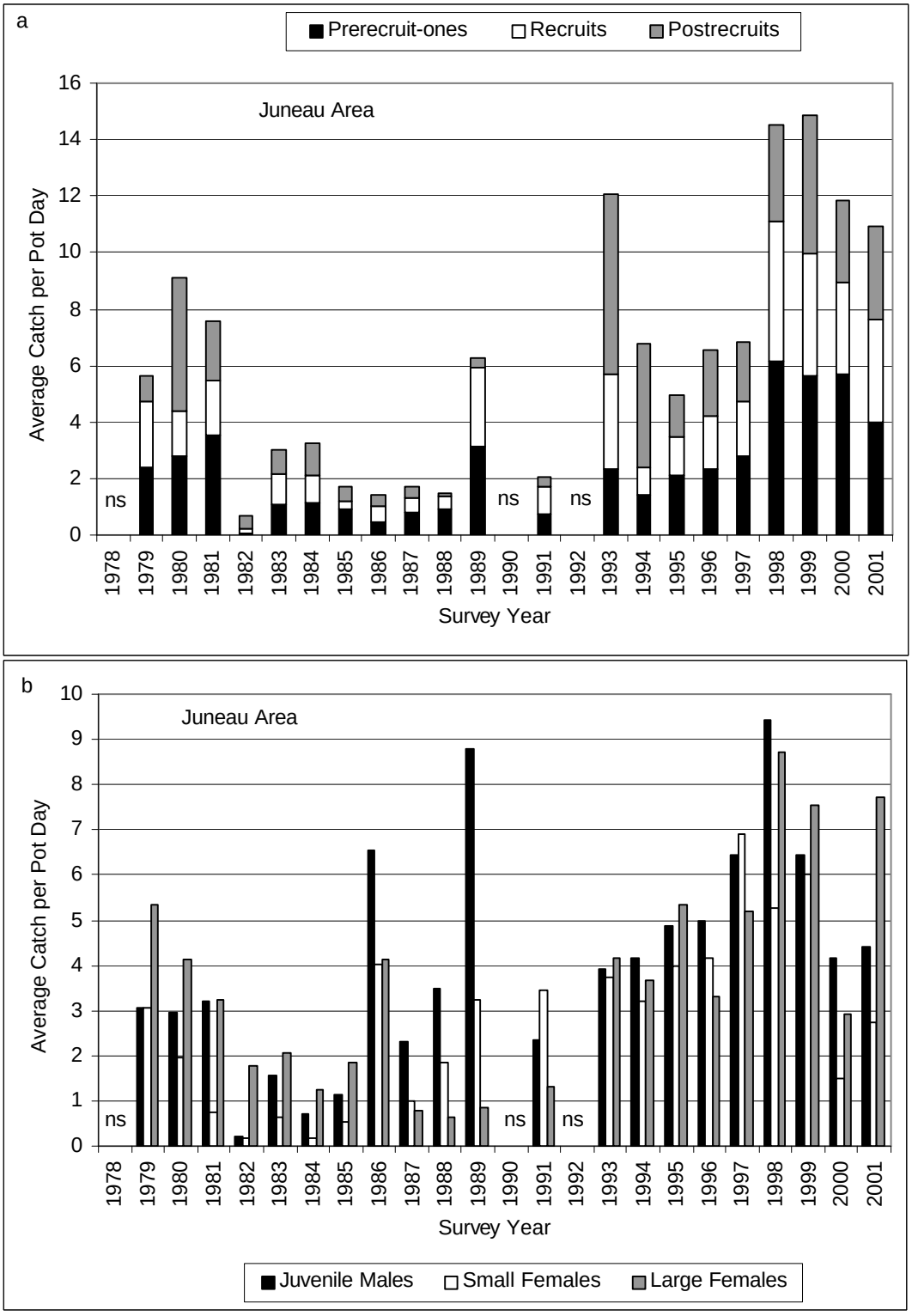


Figure 11. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Juneau Area. Year of no survey is designated as ns.

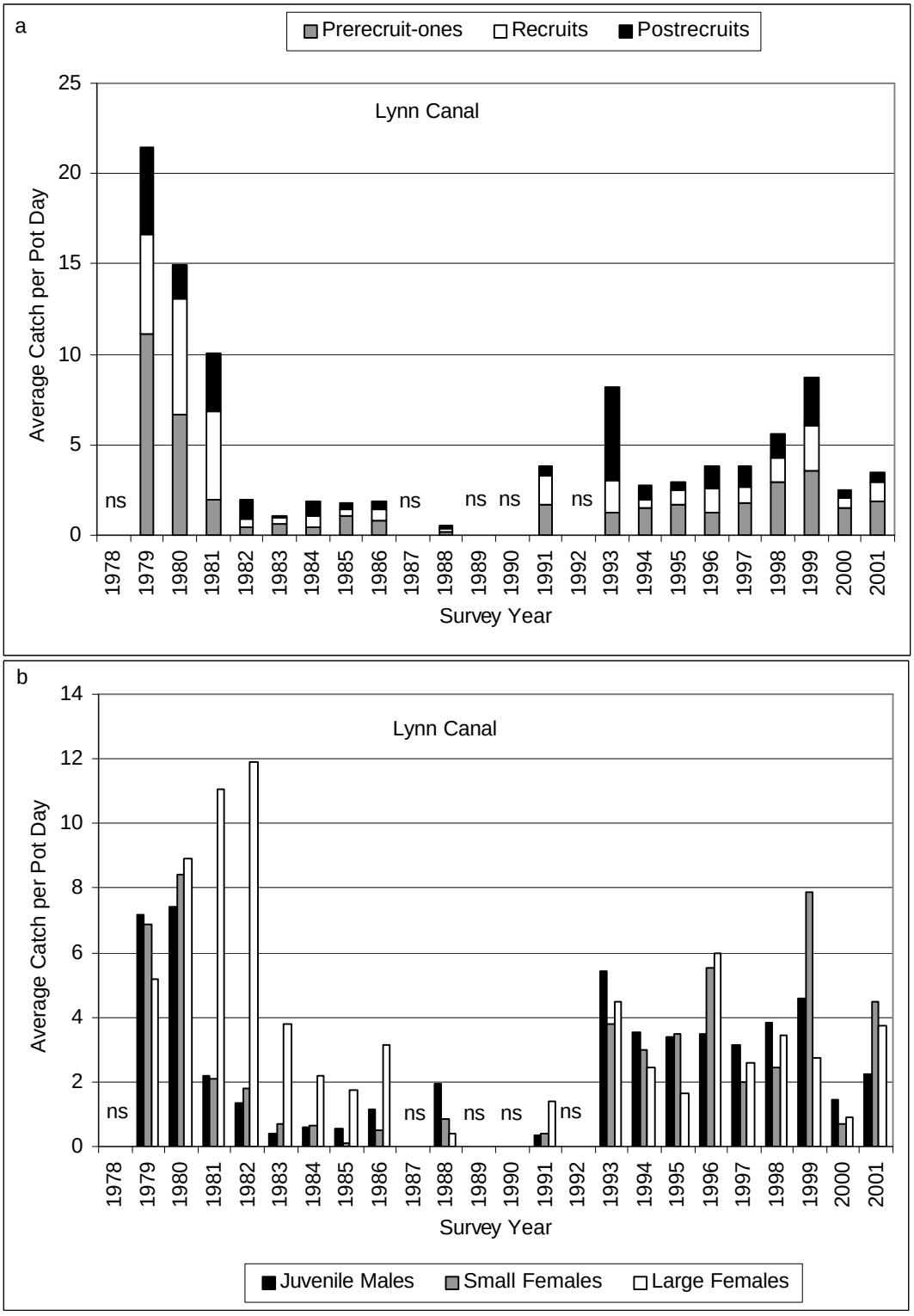


Figure 12. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Lynn Canal. Year of no survey is designated as ns.

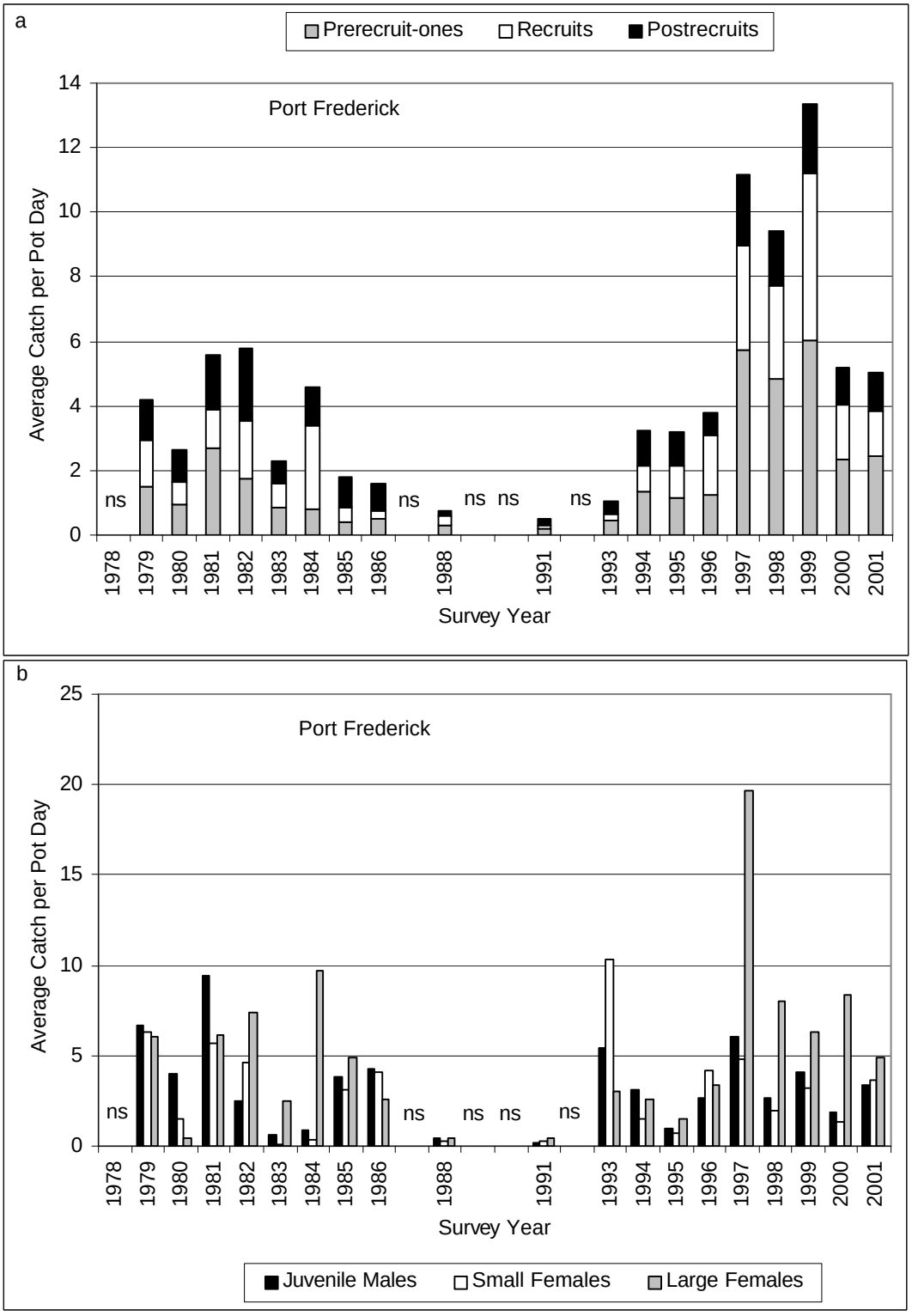


Figure 13. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Port Frederick. Year of no survey is designated as ns.

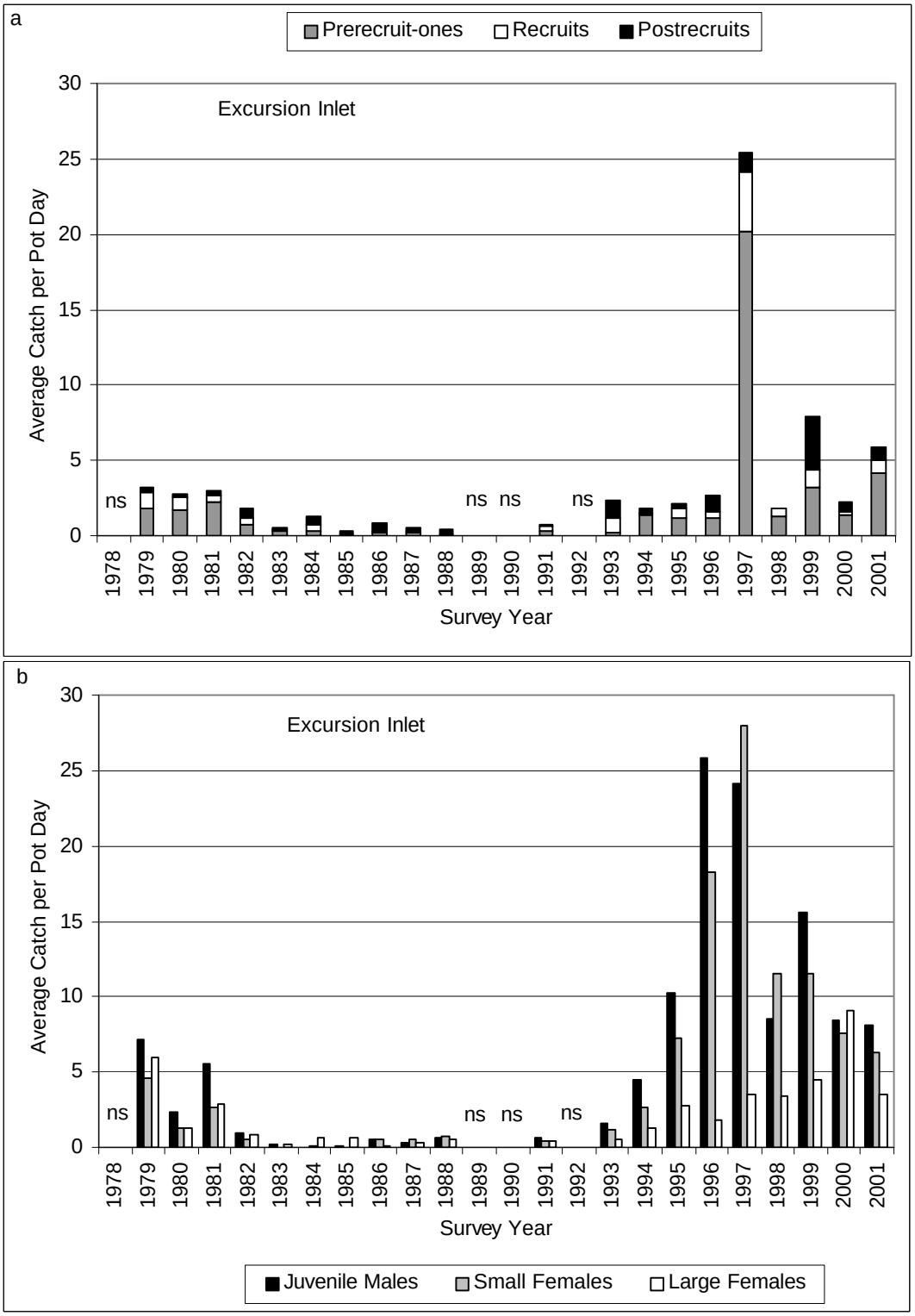


Figure 14. Catch per pot day for (a) mature red king crab (prerecruit-one, recruit, and postrecruit crab) and for (b) smaller or non-targeted groups of crab (juvenile male, small female, and large female crab) for Excursion Inlet. Year of no survey is designated as ns.

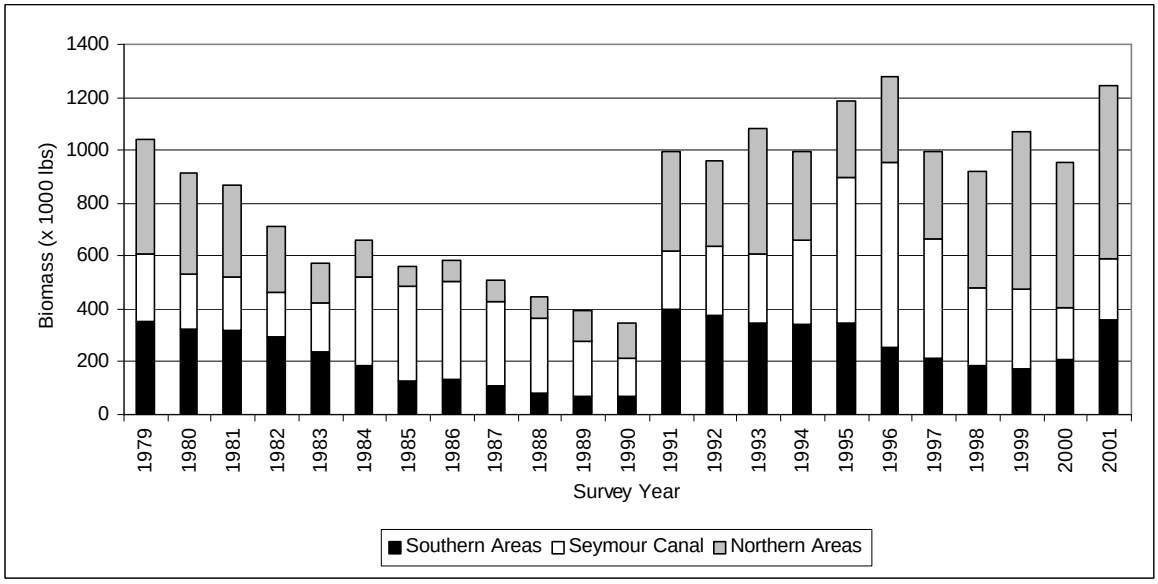


Figure 15. Estimated biomass in pounds for legal male red king crab in Southeast Alaska. Southern areas include Pybus Bay, Gambier Bay, and Peril Strait. Northern areas include Juneau area, Excursion Inlet, Lynn Canal, and Port Frederick.

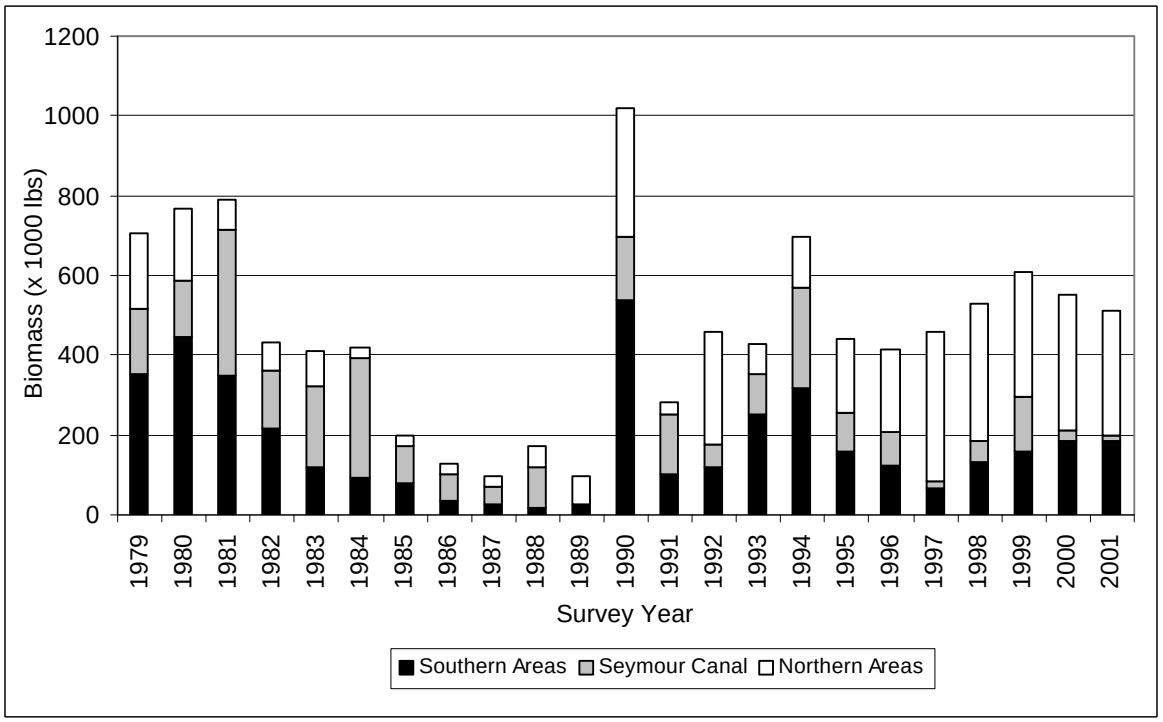


Figure 16. Estimated biomass in pounds of prerecruit-one male red king crab in Southeast Alaska. Southern areas include Pybus Bay, Gambier Bay, and Peril Strait. Northern areas include Juneau area, Excursion Inlet, Lynn Canal, and Port Frederick.

APPENDICES

Appendix Table 1a. Pot allocations to strata within bay areas for the 2001 red king crab survey in Southeast Alaska. Allocations are based on Neyman allocation scheme using the weighted standard deviation of mature male (>129 mm carapace length) and juvenile male and female catch rates (crabs per pot day). Averages and standard deviations are averaged from 1991 - 2000.

Bay	Substrata	Strata Number	Area (km^2)	Juvenile/Female Average	Juvenile/Female Std. Dev.	Mature Male Average	Mature Male Std. Dev.	Allocation No. Pots	Number of Pots	Sq. Km. Per Pot	1991-1999 Avg. No. Pots	2000 No. of Pots	Comments
Pybus Bay													Based on 20 mature male and 20 female/juvenile targeted
	West Outer	1	4.9	1.6	3.0	2.5	4.5	3.3	4	1.2	4.6	4	pots
	S.E. Outer	2	3.6	3.0	5.6	13.2	17.4	7.6	9	0.4	8.0	8	
	S.E. Inner	3	4.6	3.0	6.6	6.1	9.6	6.5	8	0.6	7.6	7	
	Central	4	2.8	3.6	6.1	0.8	1.0	1.6	2	1.4	2.3	4	
	East Mid Bay	5	4.6	3.1	4.5	0.7	1.1	2.1	2	2.3	2.5	0	
	N.E. Arm	6	2.1	0.3	0.4	0.0	0.0	0.1	1	2.1	1.8	0	
	West Mid Bay	7	4.6	2.9	3.0	0.7	0.8	1.4	2	2.3	2.8	2	
	W. Inner Bay	8	8.5	8.6	17.0	5.7	7.9	17.5	16	0.5	12.0	15	
Average / Total			35.8						44	0.8	41.5	40	
Gambier Bay													Based on 30 mature male and 10 female/juvenile targeted
	Outer Bay	1	6.5	3.0	5.2	5.5	9.0	5.7	6	1.1	5.6	9	pots
	Trench	2	3.2	7.6	11.5	5.4	8.6	2.9	3	1.1	10.0	4	
	North Arm	3	3.1	21.4	36.5	3.0	3.4	2.3	2	1.6	3.8	3	
	Snug Cove	4	6.5	37.7	49.6	6.2	6.4	7.5	8	0.8	6.6	6	
	Mid Bay	5	11.5	10.1	13.8	11.3	10.2	12.4	12	1.0	13.8	10	
	Inner W. Bay	6	8.9	17.7	21.9	8.6	8.8	9.3	9	1.0	12.5	8	
Average / Total			39.8						40	1.0	52.3	40	
Seymour Canal													Based on 30 mature male and 10 female/juvenile targeted
	Tiedeman Isl.	1	9.2	4.2	8.4	5.7	9.5	11.4	11	0.8	25.9	21	pots
	Swan Isl.	2	16.1	22.0	48.0	5.8	9.8	27.5	27	0.6	29.4	21	
	Windfall Harbor	3	3.9	14.0	8.8	1.7	1.7	1.2	4	1.0	2.8	5	
	East Tiedeman	5	24.0	4.3	13.7	1.7	4.4	20.0	20	1.2	0.0	20	First surveyed in 2000
Average / Total			53.2						62	0.9	58.0	67	
Deadmans Reach													Based on 40 mature male and 20 female/juvenile targeted
	East Beach	1	14.5	40.0	48.3	6.5	8.8	30.4	30	0.5	35.8	25	pots
	Mid Bay	2	8.7	18.4	23.2	2.7	3.1	7.3	7	1.2	5.6	7	
	Ushk Bay	3	5.9	29.6	26.4	2.1	1.9	4.1	4	1.5	4.6	3	
	Inner Bay	4	9.6	15.5	24.3	4.4	8.2	15.8	16	0.6	14.9	12	
	Outer Bay	5	5.7	2.0	4.2	1.5	2.2	2.3	3	1.9	6.0	3	
Rodman Bay			19.1	10.3	16.2	0.9	2.7	10.5	20	1.0	22.0	23	Survey resumed in 1997 with 24 pots
Average / Total			63.5						80	0.8	88.9	73	

Appendix Table 1b. Pot allocations to strata within bay areas for the 2001 red king crab survey in Southeast Alaska. Allocations are based on Neyman allocation scheme using the weighted standard deviation of mature male (>129 mm carapace length) and juvenile male and female catch rates (crabs per pot day). Averages and standard deviations are averaged from 1991–2000.

Bay	Substrata	Strata Number	Area (km^2)	Juvenile/Female Average	Juvenile/Female Std. Dev.	Mature Male Average	Mature Male Std. Dev.	Allocative No. Pots	Number of Pots	Sq. Km. Per Pot	1991-1999 Avg. No. Pots	2000 No. of Pots	Comments
Port Frederick													Based on 30 mature male and 10 female/juvenile targeted
	Salt Lake Bay	1	14.2	9.5	18.7	3.3	4.8	8.3	8	1.8	15.3	8	pots
	Inner Bay	2	13.1	7.6	8.4	3.6	3.7	5.2	6	2.2	4.6	6	
	Neka Bay	3	6.3	53.9	49.7	3.9	3.8	5.1	6	1.0	3.6	7	
	Mid Outer Bay	4	16.9	5.9	8.9	4.9	4.9	8.4	9	1.9	7.6	9	
	Outside Bay	5	16.2	8.7	9.2	11.0	8.6	13.1	13	1.2	3.9	10	
Average / Total			66.7						42	1.6	35.0	40	
Excursion Inlet													Based on 30 mature male and 10 female/juvenile targeted
	Outside	1	44.4	11.5	23.4	3.1	4.9	23.6	24	1.9	17.8	24	pots
	Icy Passage	2	16.9	8.9	15.4	0.7	1.4	3.2	3	5.6	8.8	3	
	Mid Inlet	3	9.7	57.6	50.6	6.4	5.4	6.8	7	1.4	5.4	7	
	Inside Inlet	4	8.1	57.1	57.2	6.1	6.1	6.4	6	1.3	10.4	6	
Average / Total			79.2						40	2.0	42.3	40	
Lynn Canal													Based on 20 mature male and 10 female/juvenile targeted
	Southern	1	3.6	12.1	15.8	1.7	1.9	2.3	3	1.2	4.5	3	pots
	Mid Inside	2	7.7	0.5	0.9	5.5	6.5	6.8	7	1.1	13.4	7	
	Mid Outside	3	5.6	1.8	4.3	0.6	1.3	1.6	2	2.8	4.3	3	
	Northern	4	4.2	6.8	9.2	9.3	6.9	4.8	5	0.8	9.3	5	
	St. James Bay	5	9.9	21.3	27.8	5.4	5.8	14.5	14	0.7	23.1	11	
Average / Total			31.0					30.0	31.0	1.0	54.5	29	

Appendix Table 1c. Pot allocations to strata within bay areas for the 2001 red king crab survey in Southeast Alaska. Allocations are based on Neyman allocation scheme using the weighted standard deviation of mature male (>129 mm carapace length) and juvenile male and female catch rates (crabs per pot day). Averages and standard deviations are averaged from 1991–2000.

Bay Substrata	Strata Number	Area (km^2)	Juvenile/Female		Mature Male		Allocative No. Pots	Number of Pots	Sq. Km. Per Pot	1991-1999 Avg. No. Pots	2000 No. of Pots	Comments
			Average	Std. Dev.	Average	Std. Dev.						
Eagle River												Based on 15 mature male and 5 female/juvenile targeted pots
Inside Beach	1	11.3	64.0	84.7	3.0	3.3	6.0	6	1.9	8.8	6	
Outside Beach	2	8.7	0.3	0.4	2.6	4.0	2.2	2	4.4	3.1	2	
Southern	3	14.0	12.4	18.5	10.3	10.3	10.0	10	1.4	23.3	10	
Northern	4	5.4	10.1	9.9	9.7	4.8	1.8	2	2.7	2.0	2	
Average / Total		39.5						20	2.0	37.1	20	
Barlow Cove												Based on 15 mature male and 5 female/juvenile targeted pots
Inner Cove	1	1.4	146.4	126.1	13.2	8.1	6.0	6	0.2	7.6	5	
Mid Cove	2	2.8	50.5	45.1	7.0	5.2	6.5	6	0.5	5.5	5	
Outer Cove	3	2.2	81.1	72.5	10.6	7.8	7.6	8	0.3	9.1	8	
Average / Total		6.4						20	0.3	22.3	18	
Juneau Area												Survey initiated in 1995 (Substrata 1 - 4) and expanded in 1996
North	1	34.6	7.1	13.8	9.5	10.2	5.6	6	5.8	29.6	7	(substrata 5 and 6). Based on 40 mature male and 20
W. Portland Isl	2	41.2	8.7	20.2	13.8	17.3	10.8	11	3.7	19.6	10	female/juvenile
Auke Bay	3	43.0	34.0	51.0	15.4	12.8	13.4	13	3.3	7.2	15	
Horse and Colt Isl	4	28.6	11.5	18.5	12.6	13.2	6.0	6	4.8	3.8	3	
Youngs Bay	5	60.9	18.1	21.3	8.8	7.9	9.7	10	6.1	14.5	11	
South Douglas	6	72.2	7.5	11.1	11.3	14.7	14.6	15	4.8	6.8	14	
Average / Total		280.6						61	4.6	81.5	60	
Survey Total		695.6						440	1.6	513	427	

Appendix Table 2. Catch per pot day of juvenile (< 128 mm CL) male red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	1.56	2.59	ns	ns	ns	ns	ns	ns	2.07
1979	7.36	5.73	1.47	7.26	3.07	7.19	6.70	7.11	5.74
1980	5.47	9.62	7.41	2.37	2.97	7.41	3.97	2.37	5.20
1981	3.45	9.74	15.43	4.86	3.20	2.20	9.43	5.51	6.73
1982	0.34	1.89	1.08	3.72	0.21	1.36	2.48	0.99	1.51
1983	0.28	5.49	2.75	5.53	1.56	0.40	0.61	0.17	2.10
1984	0.00	0.47	3.08	4.99	0.71	0.62	0.86	0.00	1.34
1985	0.06	0.30	0.10	3.57	1.15	0.56	3.85	0.06	1.21
1986	0.00	0.31	0.22	2.43	6.53	1.14	4.31	0.56	1.94
1987	0.00	ns	ns	4.76	2.30	ns	ns	0.36	1.85
1988	0.00	3.07	1.32	4.70	3.49	1.92	0.48	0.68	1.96
1989	ns	1.74	0.78	6.01	8.78	ns	ns	ns	4.33
1990	No Survey was conducted								
1991	0.14	3.46	0.88	7.00	2.34	0.33	0.14	0.64	1.87
1992	No Survey was conducted								
1993	1.43	6.89	8.33	17.37	3.90	5.43	5.46	1.62	6.31
1994	4.96	5.69	2.13	11.13	4.17	3.54	3.10	4.53	4.91
1995	0.21	1.83	0.94	4.01	4.87	3.40	1.00	10.22	3.31
1996	0.79	6.04	0.47	1.50	4.97	3.51	2.64	25.85	5.72
1997	1.79	8.55	9.51	1.86	6.45	3.12	6.07	24.15	7.69
1998	0.62	12.11	3.08	1.54	9.43	3.84	2.68	8.51	5.23
1999	0.64	6.18	3.65	4.20	6.44	4.60	4.13	15.62	5.68
2000	2.07	3.52	0.25	6.69	4.16	1.45	1.87	8.42	3.55
2001	3.38	5.25	0.03	4.24	4.41	2.24	3.40	8.09	3.88
Average	1.64	4.78	3.15	5.23	4.05	2.86	3.32	6.27	3.82

Appendix Table 3. Catch per pot day of prerecruit-one male red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	0.89	3.78	ns	ns	ns	ns	ns	ns	2.33
1979	1.21	6.05	2.34	1.58	2.40	11.08	1.49	1.77	3.49
1980	2.51	9.50	2.10	0.49	2.79	6.66	0.95	1.73	3.34
1981	3.15	6.17	5.24	3.82	3.51	1.92	2.69	2.23	3.59
1982	1.46	2.92	2.14	3.85	0.08	0.49	1.72	0.72	1.67
1983	0.73	3.96	3.14	2.02	1.10	0.60	0.87	0.32	1.59
1984	0.03	1.18	4.38	1.48	1.17	0.40	0.81	0.31	1.22
1985	0.08	0.60	1.30	1.51	0.91	1.09	0.40	0.06	0.75
1986	0.00	0.35	0.83	1.62	0.46	0.82	0.51	0.18	0.60
1987	0.09	ns	ns	1.67	0.82	ns	ns	0.20	0.70
1988	0.00	0.23	1.42	0.75	0.91	0.21	0.32	0.02	0.48
1989	ns	0.66	0.03	0.50	3.13	ns	ns	ns	1.08
1990	No Survey was conducted								
1991	0.27	1.52	2.03	3.54	0.74	1.69	0.21	0.32	1.29
1992	No Survey was conducted								
1993	0.51	1.16	1.58	2.70	2.32	1.20	0.45	0.21	1.27
1994	7.11	4.92	3.94	4.61	1.45	1.48	1.33	1.35	3.27
1995	0.91	3.25	1.65	2.05	2.13	1.65	1.17	1.19	1.75
1996	0.83	2.97	1.13	1.53	2.32	1.29	1.23	1.22	1.56
1997	0.09	1.83	0.32	0.53	2.80	1.75	5.71	20.14	4.15
1998	0.28	6.02	0.66	0.78	6.17	2.94	4.85	1.29	2.87
1999	2.16	4.92	1.44	1.50	5.65	3.53	6.02	3.24	3.56
2000	0.44	4.14	0.72	0.81	5.67	1.55	2.35	1.39	2.13
2001	2.61	4.28	0.26	1.14	3.98	1.84	2.45	4.15	2.59
Average	1.21	3.35	1.83	1.83	2.41	2.22	1.87	2.10	2.06

Appendix Table 4. Catch per pot day of recruit male red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	1.04	1.58	ns	ns	ns	ns	ns	ns	1.31
1979	1.80	3.10	3.54	0.73	2.32	5.58	1.43	1.06	2.45
1980	1.09	5.46	1.76	0.99	1.59	6.38	0.70	0.82	2.35
1981	1.98	4.98	2.93	0.98	1.95	4.94	1.21	0.45	2.43
1982	1.91	2.43	0.51	3.27	0.12	0.38	1.82	0.40	1.35
1983	1.32	1.63	1.29	1.66	1.07	0.40	0.72	0.14	1.03
1984	0.34	0.81	4.75	1.64	0.97	0.71	2.59	0.46	1.53
1985	0.11	0.94	2.74	0.82	0.31	0.32	0.42	0.05	0.71
1986	0.00	0.59	1.38	1.25	0.57	0.56	0.21	0.12	0.59
1987	0.01	ns	ns	1.72	0.47	ns	ns	0.12	0.58
1988	0.00	0.15	0.78	0.28	0.47	0.12	0.26	0.12	0.27
1989	ns	0.04	0.12	0.16	2.82	ns	ns	ns	0.79
1990	No Survey was conducted								
1991	0.27	2.09	1.57	1.79	0.97	1.56	0.07	0.33	1.08
1992	No Survey was conducted								
1993	0.18	0.46	0.80	1.57	3.34	1.84	0.20	0.91	1.16
1994	3.53	1.86	1.93	1.69	0.94	0.44	0.82	0.19	1.43
1995	2.35	3.29	2.55	1.50	1.37	0.80	0.96	0.66	1.68
1996	2.07	3.88	2.63	1.65	1.91	1.25	1.87	0.43	1.96
1997	0.21	1.19	0.21	0.56	1.94	0.88	3.27	3.98	1.53
1998	0.06	2.15	0.47	0.22	4.91	1.31	2.88	0.49	1.56
1999	2.97	2.46	1.08	0.54	4.29	2.54	5.21	1.16	2.53
2000	0.79	3.26	0.46	0.27	3.29	0.49	1.66	0.21	1.30
2001	0.91	3.82	0.98	0.50	3.64	1.06	1.39	0.87	1.65
Average	1.09	2.20	1.62	1.13	1.87	1.66	1.46	0.65	1.42

Appendix Table 5. Catch per pot day of postrecruit male red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	0.30	1.61	ns	ns	ns	ns	ns	ns	0.95
1979	1.98	3.98	1.17	0.48	0.92	4.78	1.25	0.33	1.86
1980	1.88	3.41	0.68	0.61	4.73	1.90	0.99	0.27	1.81
1981	0.78	2.78	1.38	0.62	2.09	3.17	1.71	0.30	1.60
1982	1.53	1.46	1.29	1.45	0.49	1.08	2.23	0.72	1.28
1983	2.12	2.41	0.47	1.51	0.83	0.05	0.72	0.10	1.03
1984	1.17	1.89	1.18	2.56	1.08	0.79	1.18	0.55	1.30
1985	0.36	0.80	3.49	0.75	0.51	0.33	0.99	0.18	0.93
1986	0.08	0.84	3.55	0.94	0.39	0.44	0.87	0.59	0.96
1987	0.08	ns	ns	1.22	0.43	ns	ns	0.16	0.47
1988	0.01	0.77	2.96	0.23	0.10	0.25	0.15	0.34	0.60
1989	ns	0.16	0.21	0.14	0.32	ns	ns	ns	0.21
1990	No Survey was conducted								
1991	0.10	1.18	0.87	0.42	0.31	0.58	0.24	0.05	0.47
1992	No Survey was conducted								
1993	0.80	3.12	1.91	1.39	6.39	5.15	0.38	1.27	2.55
1994	2.69	3.60	1.02	1.17	4.39	0.84	1.09	0.32	1.89
1995	1.10	1.66	1.47	0.62	1.46	0.51	1.05	0.33	1.03
1996	3.81	3.95	4.04	0.58	2.30	1.27	0.66	1.00	2.20
1997	0.97	0.40	2.28	0.27	2.09	1.23	2.16	1.34	1.34
1998	0.17	2.18	3.47	0.15	3.42	1.40	1.70	0.07	1.57
1999	1.23	1.13	6.02	0.54	4.95	2.70	2.11	3.55	2.78
2000	0.92	2.57	0.58	0.34	2.88	0.44	1.19	0.69	1.20
2001	3.25	3.81	1.12	0.24	3.28	0.58	1.21	0.82	1.79
Average	1.21	2.08	1.96	0.77	2.06	1.45	1.15	0.65	1.36

Appendix Table 6. Catch per pot day of small (< 113 mm CL) female red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

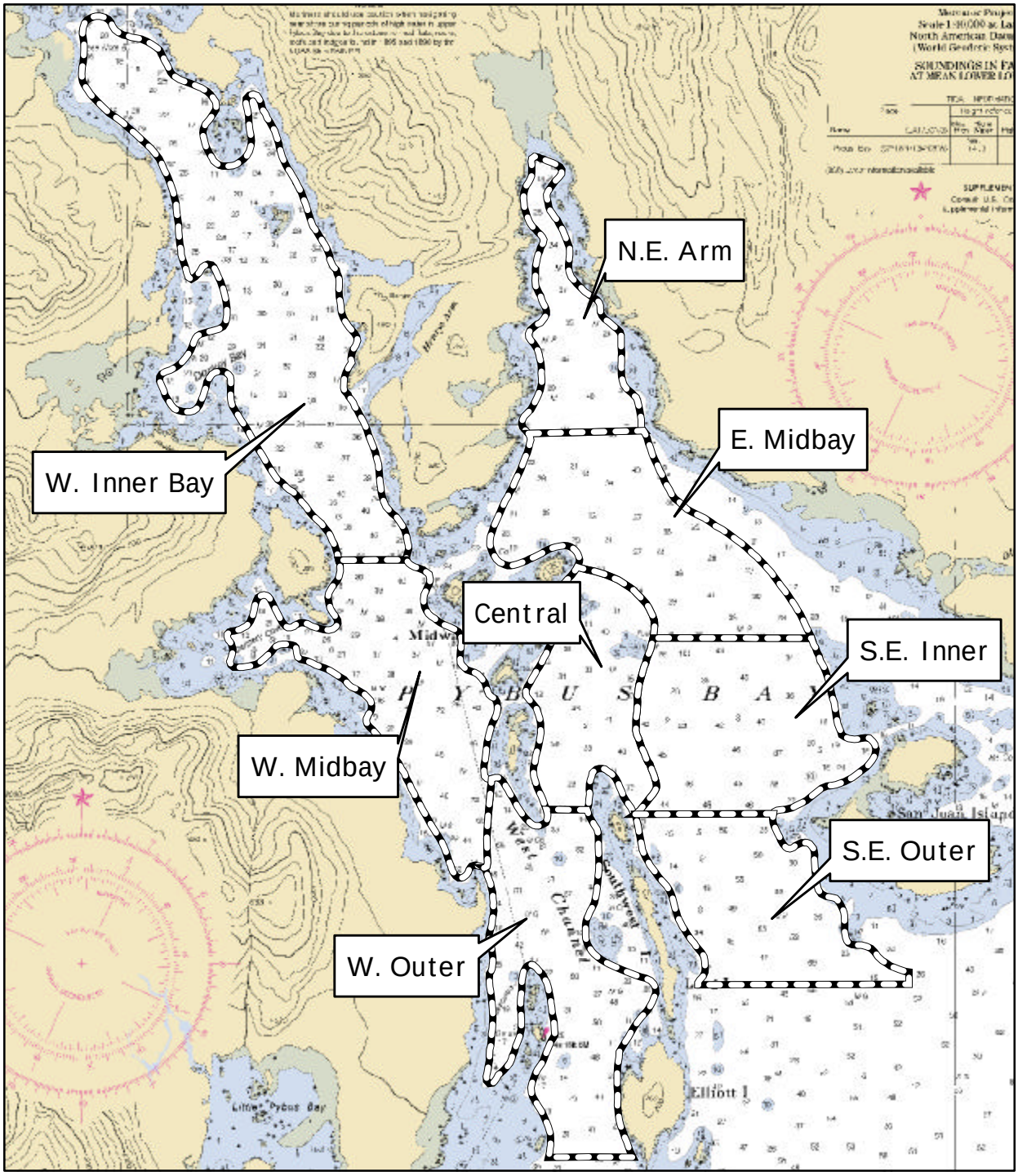
Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	1.00	0.58	ns	ns	ns	ns	ns	ns	0.79
1979	6.12	6.80	1.67	7.63	3.06	6.85	6.35	4.59	5.38
1980	3.69	10.13	4.82	1.09	1.96	8.41	1.55	1.26	4.11
1981	1.95	12.85	9.15	4.86	0.74	2.07	5.66	2.72	5.00
1982	0.22	3.12	1.15	4.87	0.16	1.80	4.59	0.54	2.06
1983	0.04	2.25	2.73	7.11	0.64	0.72	0.08	0.02	1.70
1984	0.00	0.11	3.30	5.14	0.19	0.66	0.33	0.05	1.22
1985	0.00	0.00	0.48	5.39	0.54	0.11	3.11	0.02	1.21
1986	0.13	0.17	0.09	1.78	4.02	0.48	4.10	0.54	1.41
1987	0.00	ns	ns	5.48	1.00	ns	ns	0.51	1.75
1988	0.00	1.89	0.44	4.73	1.86	0.86	0.31	0.72	1.35
1989	ns	3.31	1.11	7.33	3.25	ns	ns	ns	3.75
1990	No Survey was conducted								
1991	0.00	3.30	0.66	9.98	3.46	0.42	0.28	0.41	2.31
1992	No Survey was conducted								
1993	0.58	4.79	3.82	16.66	3.73	3.80	10.30	1.13	5.60
1994	0.40	5.04	1.86	18.49	3.22	2.97	1.51	2.65	4.52
1995	0.11	1.72	1.23	6.85	3.97	3.48	0.69	7.24	3.16
1996	0.43	4.79	0.30	1.05	4.15	5.53	4.19	18.25	4.84
1997	1.46	6.93	9.07	1.61	6.89	2.01	4.84	28.01	7.60
1998	0.19	14.44	3.13	1.38	5.28	2.43	1.99	11.53	5.05
1999	0.22	5.82	1.81	3.51	6.01	7.88	3.19	11.57	5.00
2000	1.62	1.61	0.23	7.84	1.48	0.68	1.32	7.58	2.79
2001	7.49	5.63	0.00	6.71	2.73	4.46	3.67	6.32	4.63
Average	1.22	4.54	2.35	6.17	2.78	2.93	3.06	5.28	3.42

Appendix Table 7. Catch per pot day of large (> 114) female red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

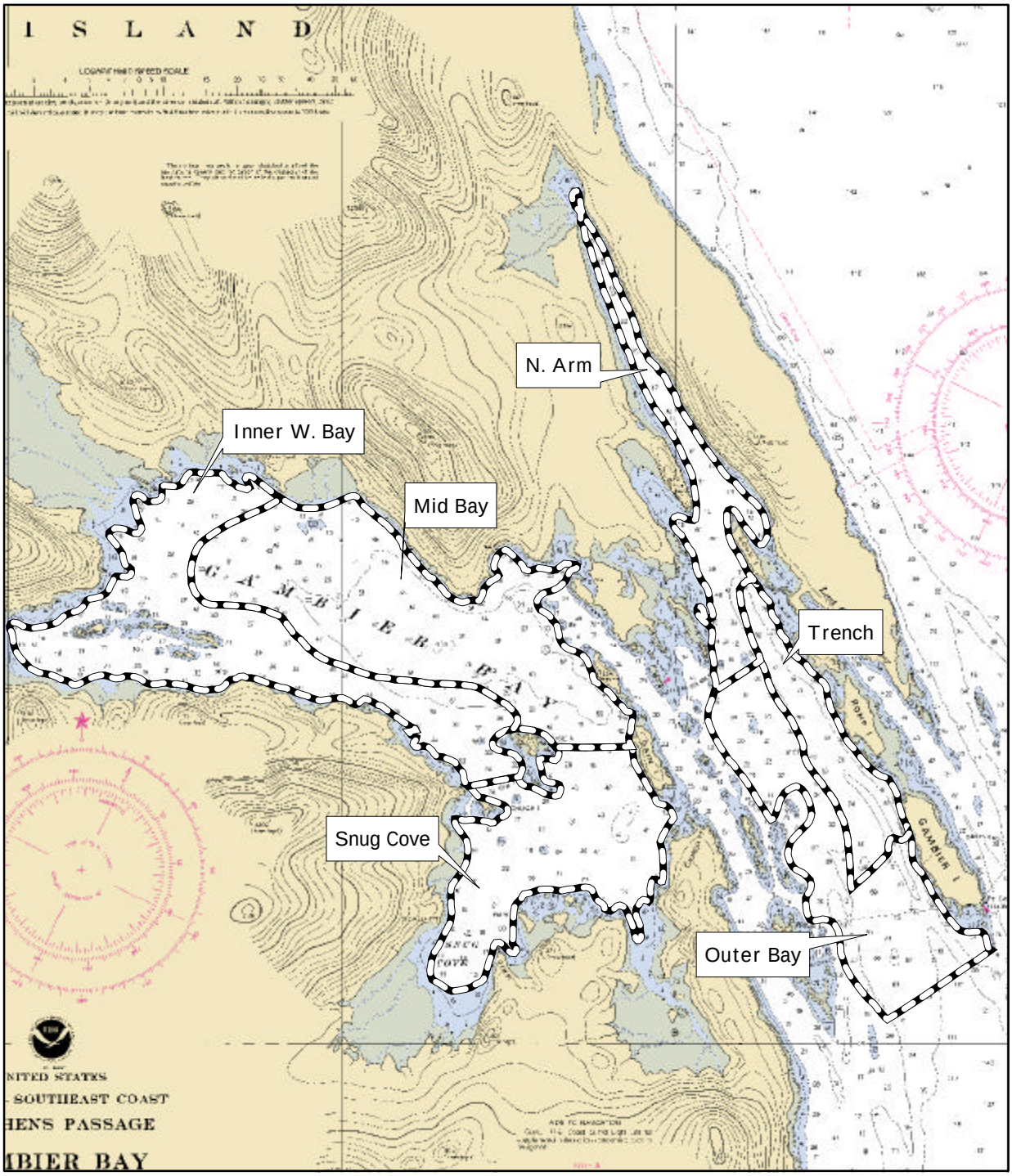
Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	1.47	0.44	ns	ns	ns	ns	ns	ns	0.95
1979	1.29	1.56	0.94	6.52	5.34	5.19	6.05	5.96	4.11
1980	2.11	3.43	4.58	2.39	4.14	8.91	0.48	1.24	3.41
1981	8.07	48.27	7.02	4.49	3.24	11.05	6.12	2.83	11.39
1982	1.33	1.41	0.55	8.85	1.79	11.89	7.41	0.85	4.26
1983	0.38	7.87	5.40	11.94	2.05	3.80	2.45	0.20	4.26
1984	0.33	0.00	5.22	9.04	1.24	2.19	9.67	0.66	3.54
1985	0.18	0.23	7.67	11.81	1.85	1.74	4.90	0.66	3.63
1986	0.12	0.28	3.73	1.87	4.14	3.15	2.62	0.10	2.00
1987	0.43	ns	ns	10.18	0.80	ns	ns	0.33	2.93
1988	0.32	0.72	2.02	3.50	0.64	0.41	0.49	0.55	1.08
1989	ns	0.82	2.11	2.50	0.87	ns	ns	ns	1.57
1990	No Survey was conducted								
1991	1.09	1.84	2.16	6.85	1.32	1.40	0.47	0.41	1.94
1992	No Survey was conducted								
1993	0.21	5.53	2.03	10.93	4.16	4.48	2.99	0.52	3.85
1994	0.44	10.45	2.53	11.30	3.68	2.44	2.58	1.25	4.33
1995	0.80	5.62	7.70	6.57	5.34	1.67	1.47	2.73	3.99
1996	7.86	6.36	21.73	1.46	3.31	5.99	3.37	1.85	6.49
1997	1.51	3.68	16.87	10.54	5.18	2.58	19.70	3.53	7.95
1998	4.86	4.04	14.08	2.70	8.74	3.46	7.99	3.43	6.16
1999	0.83	4.00	16.61	3.59	7.55	2.72	6.28	4.52	5.76
2000	1.82	2.71	1.69	3.36	2.91	0.91	8.34	9.05	3.85
2001	8.57	9.84	0.95	3.29	7.73	3.74	4.88	3.55	5.32
Average	2.10	5.67	6.28	6.37	3.62	4.09	5.17	2.21	4.22

Appendix Table 8. Catch per pot day of all red king crab in the Southeast Alaska red king crab stock assessment survey. Years of no survey are designated as ns.

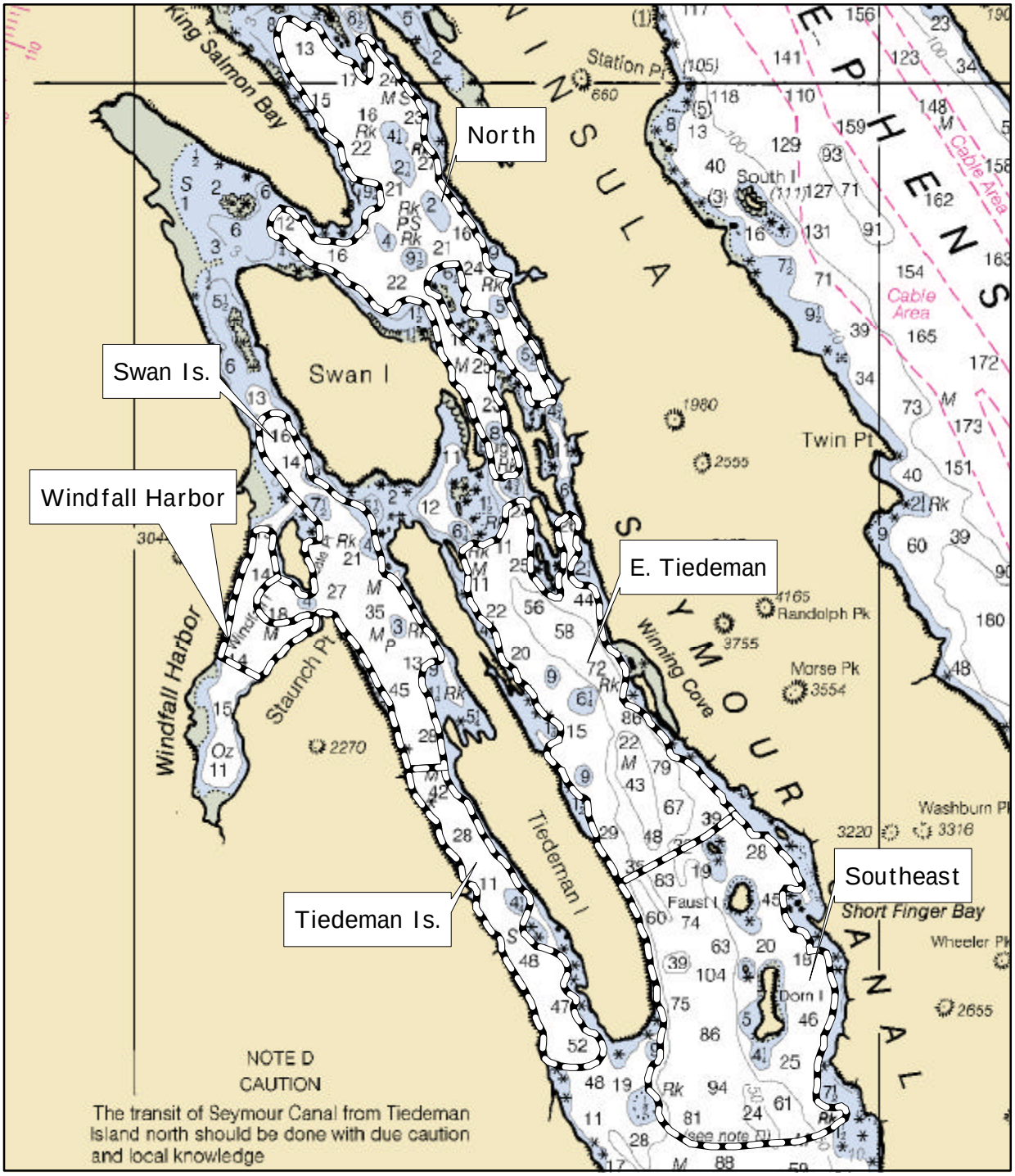
Survey Year	Pybus Bay	Gambier Bay	Seymour Canal	Peril Strait	Juneau Area	Lynn Canal	Port Frederick	Excursion Inlet	Total
1978	6.26	10.57	ns	ns	ns	ns	ns	ns	8.41
1979	19.76	27.21	11.13	24.21	17.10	40.67	23.26	20.82	23.02
1980	16.74	41.55	21.34	7.94	18.18	39.67	8.64	7.69	20.22
1981	19.38	84.78	41.15	19.64	14.71	25.35	26.80	14.04	30.73
1982	6.79	13.22	6.72	26.01	2.85	16.99	20.25	4.22	12.13
1983	4.88	23.61	15.78	29.77	7.25	5.98	5.44	0.95	11.71
1984	1.87	4.47	21.91	24.86	5.35	5.38	15.42	2.04	10.16
1985	0.79	2.86	15.80	23.85	5.27	4.15	13.68	1.04	8.43
1986	0.33	2.53	9.79	9.90	16.12	6.59	12.61	2.09	7.50
1987	0.61	ns	ns	25.03	5.83	ns	ns	1.68	8.29
1988	0.33	6.81	8.94	14.19	7.47	3.77	2.00	2.42	5.74
1989	ns	6.73	4.37	16.64	19.16	ns	ns	ns	11.73
1990	No Survey was conducted								
1991	1.88	13.39	8.18	29.58	9.14	5.99	1.41	2.16	8.97
1992	No Survey was conducted								
1993	3.70	21.94	18.48	50.62	23.85	21.89	19.79	5.66	20.74
1994	19.13	31.56	13.41	48.39	17.84	11.71	10.45	10.29	20.35
1995	5.48	17.37	15.54	21.61	19.14	11.51	6.34	22.37	14.92
1996	15.77	27.99	30.31	7.77	18.96	18.83	13.97	48.59	22.77
1997	6.02	22.58	38.27	15.37	25.35	11.57	41.75	81.15	30.25
1998	6.19	40.94	24.89	6.76	37.94	15.37	22.08	25.31	22.43
1999	8.04	24.50	30.62	13.88	34.88	23.96	26.93	39.65	25.31
2000	7.66	17.82	3.92	19.31	20.39	5.52	16.73	27.33	14.84
2001	26.21	32.64	3.33	16.13	25.78	13.91	17.00	23.80	19.85
Average	8.47	22.62	17.19	21.50	16.79	15.20	16.03	17.16	16.30



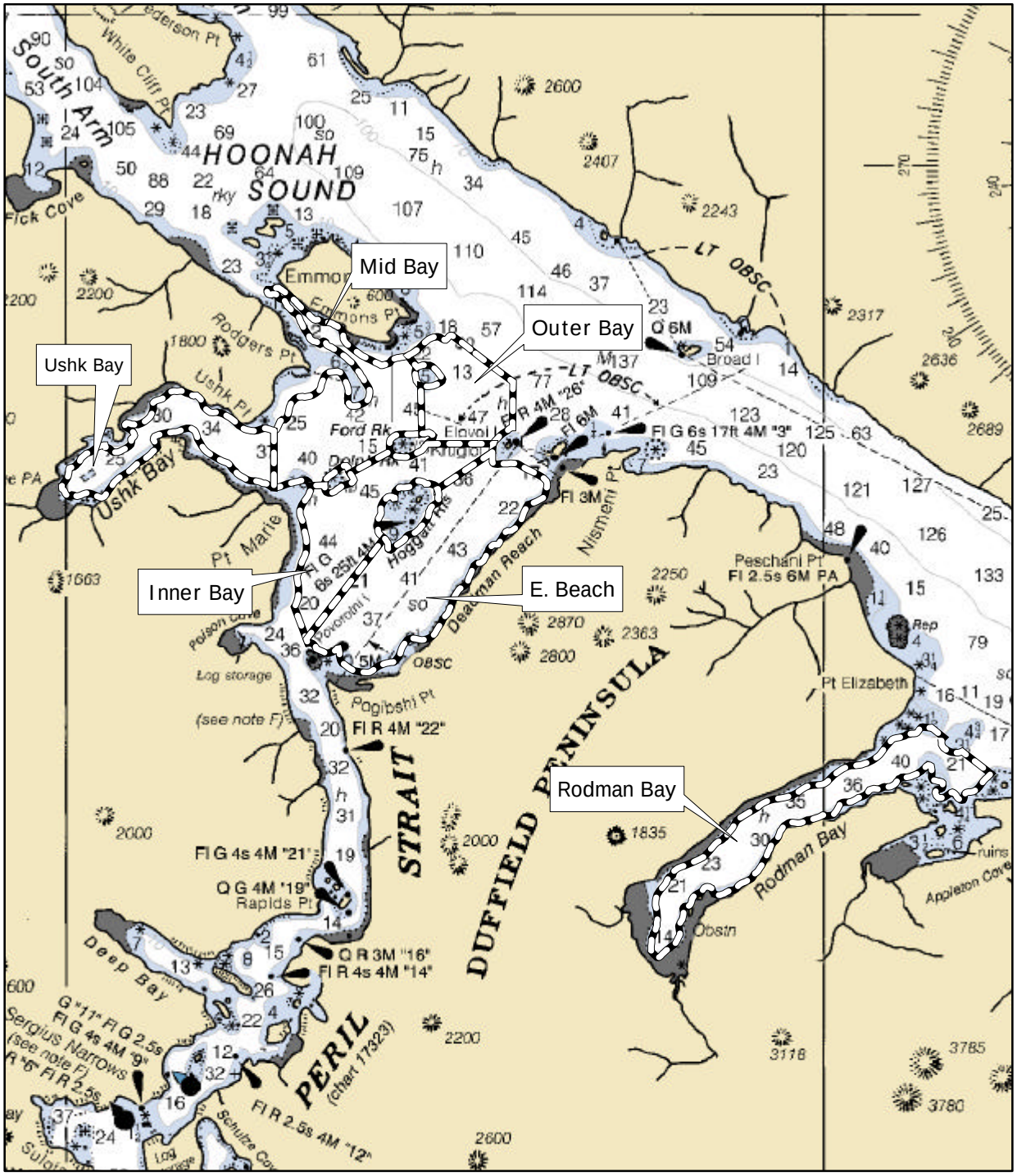
Appendix Figure 1. Strata designations for Pybus Bay in the Southeast Alaska red king crab stock assessment survey.



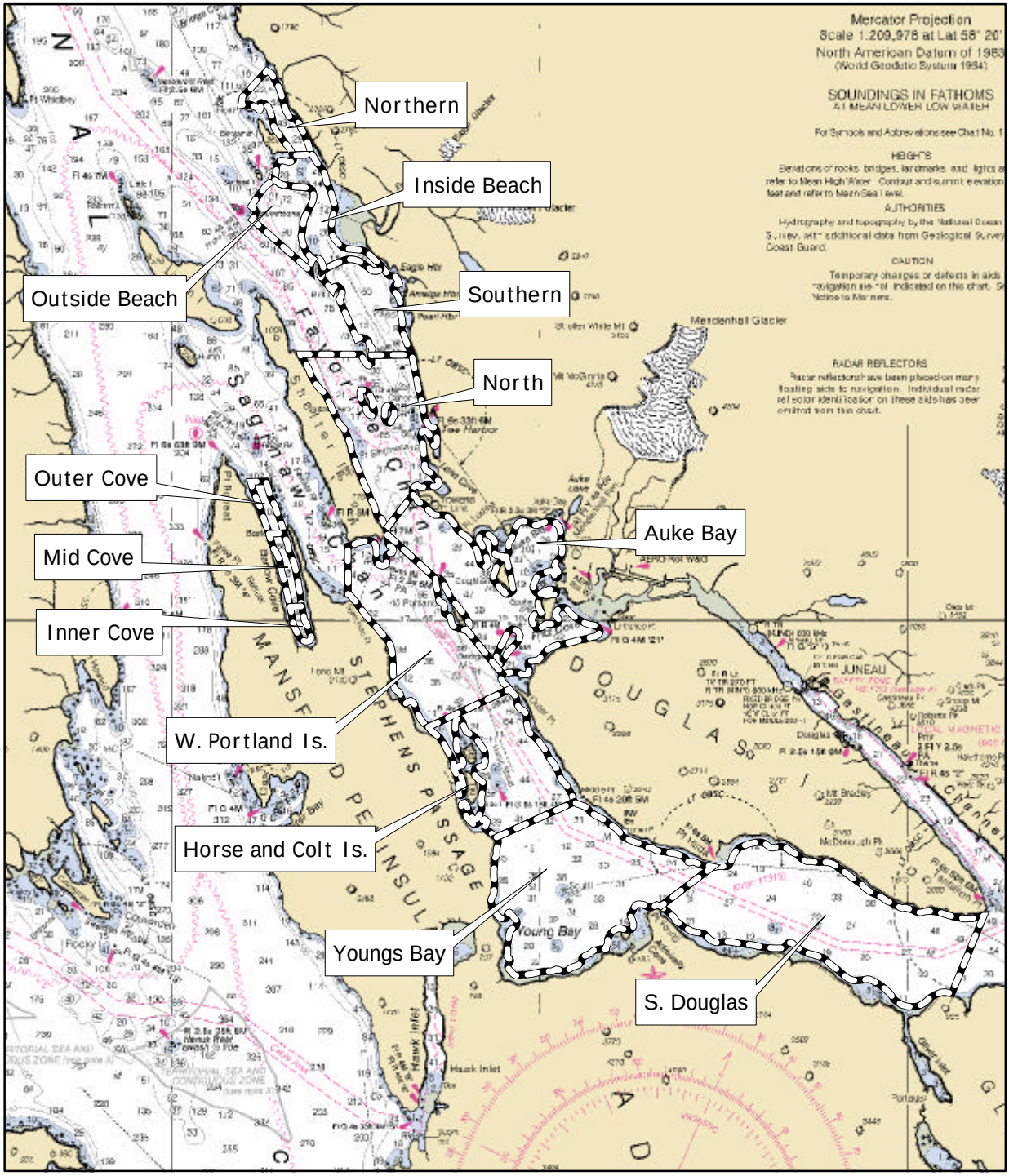
Appendix Figure 2. Strata designations for Gambier Bay in the Southeast Alaska red king crab stock assessment survey.



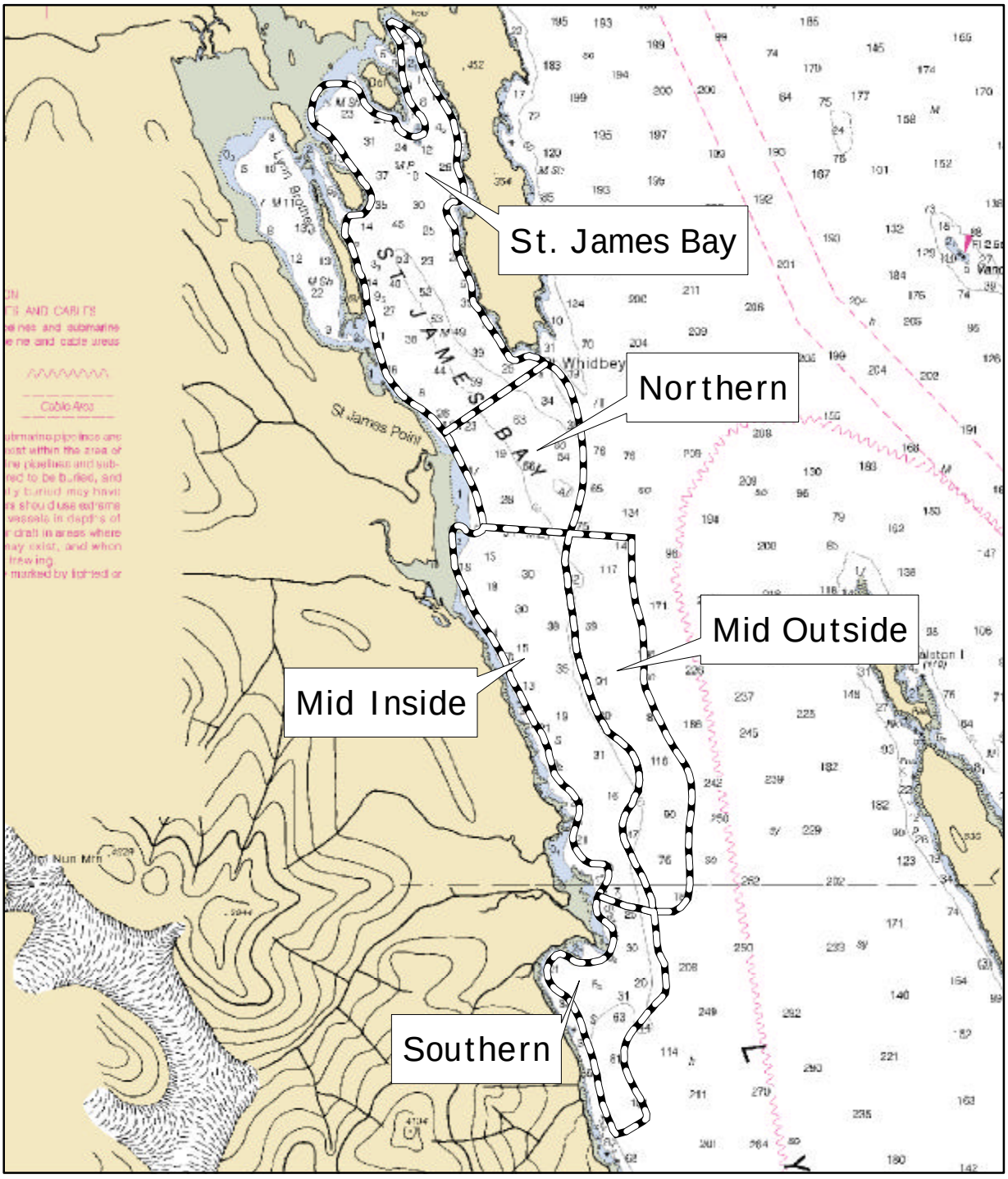
Appendix Figure 3. Strata designations for Seymour Canal in the Southeast Alaska red king crab stock assessment survey.



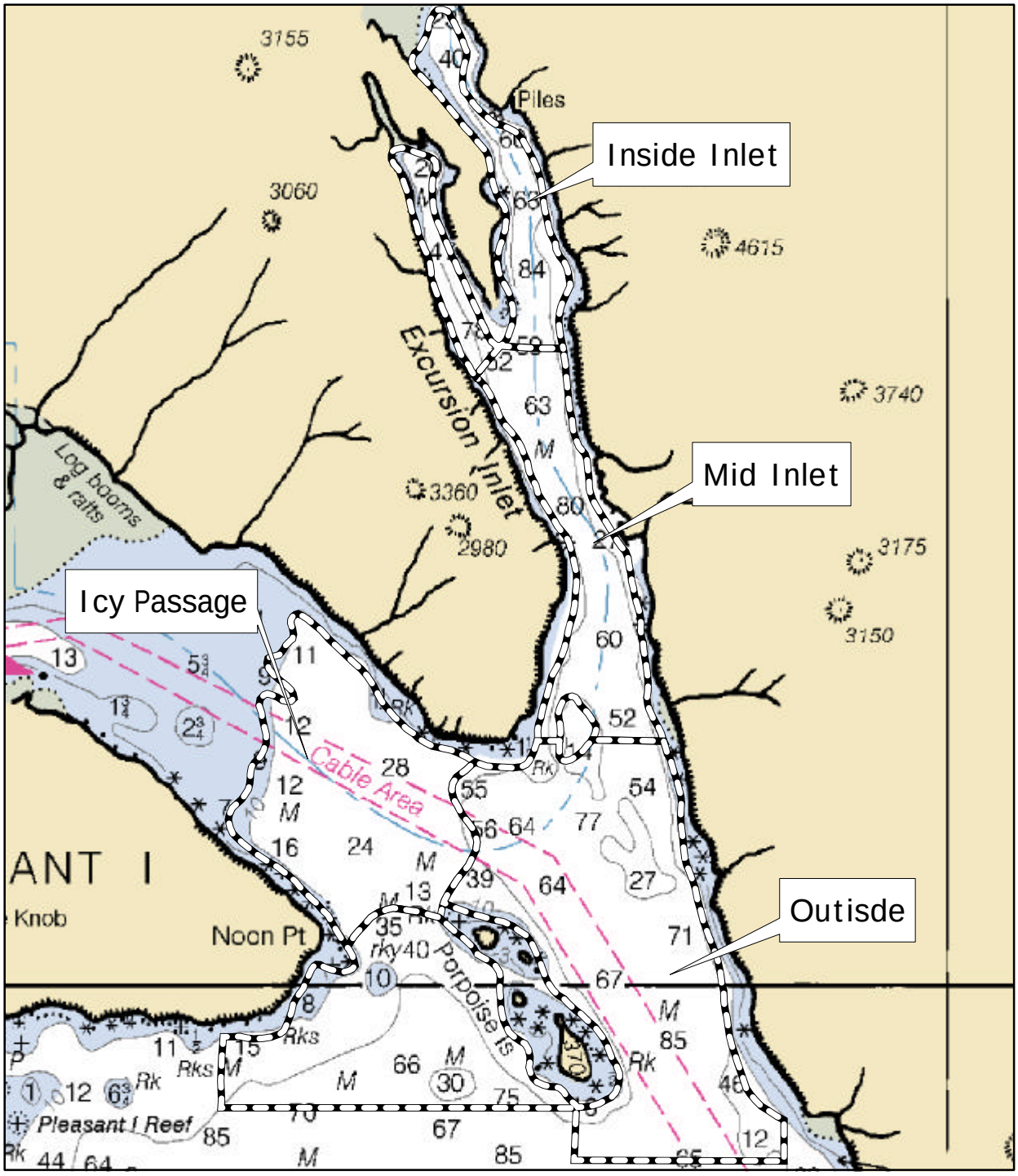
Appendix Figure 4. Strata designations for Peril Strait in the Southeast Alaska red king crab stock assessment survey.



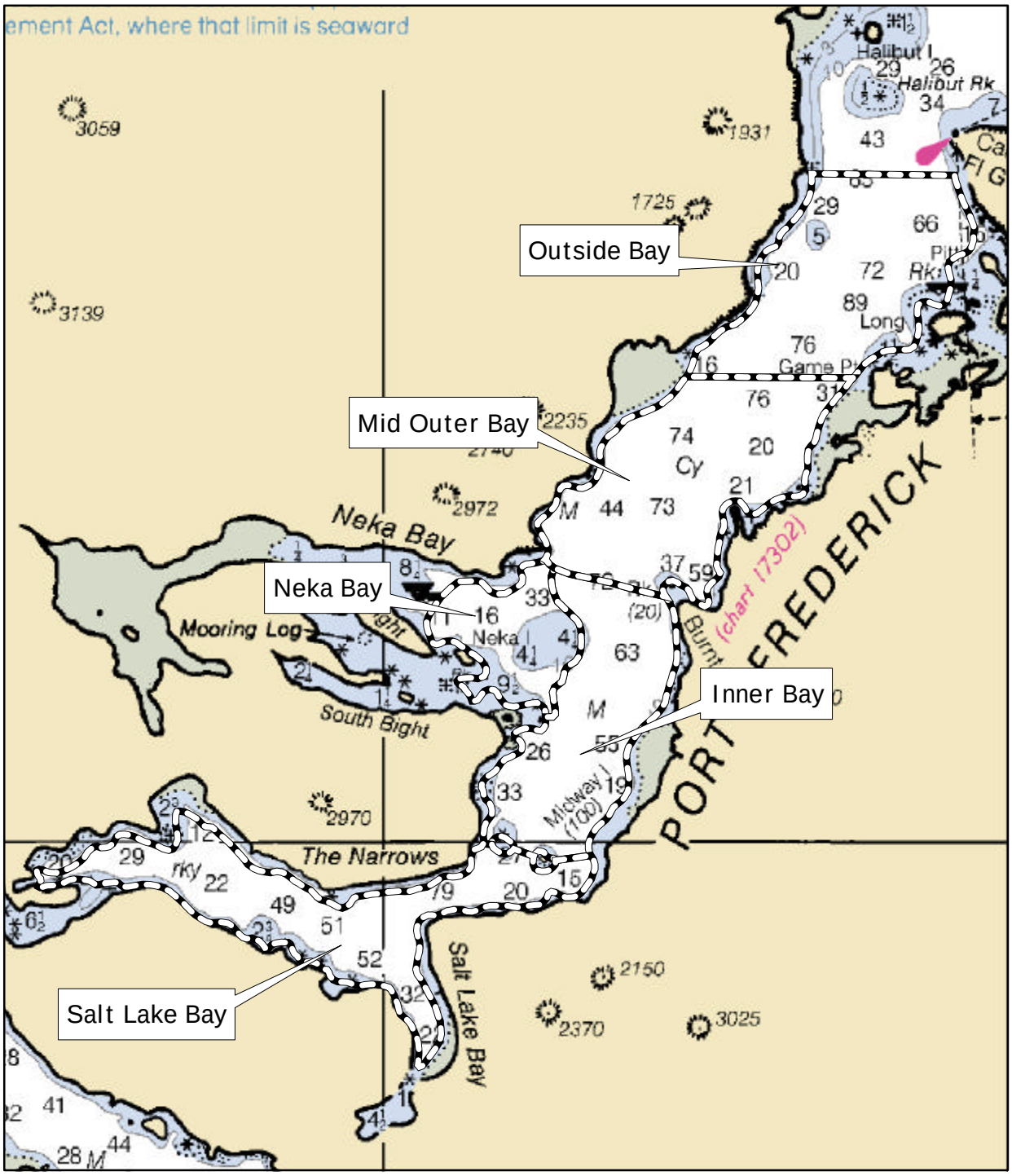
Appendix Figure 5. Strata designations for Juneau Area in the Southeast Alaska red king crab stock assessment survey.



Appendix Figure 6. Strata designations for Lynn Canal in the Southeast Alaska red king crab stock assessment survey.



Appendix Figure 7. Strata designations for Excursion Inlet in the Southeast Alaska red king crab stock assessment survey.



Appendix Figure 8. Strata designations for Port Frederick in the Southeast Alaska red king crab stock assessment survey.