

PROJECT OPERATIONAL PLAN
FOR THE 1992 BRISTOL BAY
RED KING CRAB TEST FISHERY PROJECT

By

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ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

PROJECT OPERATIONAL PLAN

Title: Bristol Bay Red King Crab Test Fishery Project

Yellow Book Project No(s): TF-960 (Appendix A)

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Biometrician: Douglas Pengilly

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APPROVALS

Level	Signature	Date
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FOREWORD

This project is a continuation of Bristol Bay red king crab tagging studies conducted in 1990 and 1991 as documented by Pengilly and Watson (1992), Watson and Pengilly (1992), and Watson et al. (1991). The FY93 project has five components: 1) a 15-d project cost recovery and red king crab collection test fishery charter, 2) an 18-month holding tank study to assess passive integrated transponder (PIT) tag-induced mortality and PIT tag retention by red king crabs, 3) recovery of externally-tagged crabs from the 1992 Bristol Bay red king crab commercial fishery, 4) development of an imaging processor for Tanner and snow crab identification (W. Donaldson, Alaska Department of Fish and Game, Kodiak, personal communication), and 5) Tanner and snow crab genetic stock identification (S. Merkouris, Alaska Department of Fish and Game, Anchorage, personal communication). The total budget for the Bering Sea crab test fishery program is \$372,700; \$222,700 for Bristol Bay red king crab tagging work, \$100,000 for Tanner crab image processing, and \$50,000 for the genetics component (Appendix A).

For purposes of this operational plan, only the 18-month holding tank study will be described. Details on the cost recovery charter and collection of crabs for the 18-month holding study are contained in Appendix B.

INTRODUCTION

Since 1990 the Alaska Department of Fish and Game (ADF&G) has investigated the possible applications of passive integrated transponder (PIT) tags to mark-recapture studies of mature male red king crabs (*Paralithodes camtschaticus*) in the Bristol Bay fishery (Pengilly and Watson 1992, Watson et al. 1991). The primary objective of the ADF&G PIT tagging program on Bristol Bay red king crabs is to estimate the rates at which legal red king crabs are harvested by the commercial fishery. Secondary objectives are to estimate the annual survivorship rate of mature male crabs, the recruitment rate of pre-recruit crabs into the subsequent year's fishery, and the rate at which legal crabs carry over into the following year's fishery.

Tag retention and tagging induced mortality are two factors that affect the recapture rate of tagged crabs. Although sufficient data exists to show that retention of PIT tags injected into the right fifth leg is greater than 90% for mature male king crabs that survive for some 90 days after tagging (Watson et al. 1991), only scant data exists on the survivorship of PIT tagged crabs and on the retention of those tags through a molt (Donaldson et al. 1992). The project outlined here is the first phase of a study to determine whether survivorship and tag retention of mature male crabs injected with PIT tags in the right fifth leg is reduced relative to the survivorship of untagged crabs under controlled laboratory conditions.

The Bristol Bay fishery currently begins on 1 November and typically lasts one to two weeks (ADF&G 1992). Tagging of Bristol Bay red king crabs by ADF&G in a fully implemented mark-recapture study is expected to occur on an annual basis in late July or early August, roughly

90 days before the fishery. Molting of mature male king crabs during the 90 day period prior to the 1 November fishery opening date is rare. Hence, the suitability of PIT tags to the primary objective of ADF&G Bristol Bay mark-recapture studies requires only that PIT tagged crabs retain their tags without a reduction in survivorship for a 90 day molt-free period. However, estimates of tag retention and survivorship rates through the molt are a necessity for applicability of PIT tags to the secondary objectives of ADF&G Bristol Bay tagging studies.

Phase I Study

In the first phase of laboratory studies on PIT tag retention and tagging induced mortality of red king crabs we will perform the following hypothesis test,

$$H_0: S_t = S_u \text{ vs } H_a: S_t < S_u, \text{ where} \quad (1)$$

S_t denotes the probability that a PIT-tagged new-shell² crab with a carapace length of 120-134 mm survives and retains a functioning PIT tag for 90 days after tagging, during a non-molting period, and

S_u denotes the probability that a comparable untagged crab survives for 90 days, during a non-molting period under identical conditions.

If H_0 from hypothesis test (1) is retained, we will proceed with collecting data necessary to perform the following hypothesis test,

$$H_0: S_{mt} = S_{mu} \text{ vs } H_a: S_{mt} < S_{mu}, \text{ where} \quad (2)$$

S_{mt} denotes the probability that a PIT-tagged new-shell crab with a carapace length of 120-134 mm survives and retains a functioning PIT tag through a molt and for 30 days after completion of the molt, and

S_{mu} denotes the probability that a comparable untagged crab survives through a molt and for 30 days after completion of the molt.

Although crabs in the 120-134 mm carapace length (CL) range are sublegal in the Bristol Bay red king crab fishery we will first study the effects on crabs in that size class for two reasons. First, since we expect smaller crabs to be more susceptible to mortality from PIT tag injection than larger crabs, use of sublegal size crabs should afford greater sensitivity in detecting PIT tag related mortality than use of legal size crabs. Secondly, the 120-134 mm CL range is included in the size range defining "mature male crabs" in the current Bristol Bay red king crab harvest strategy (Schmidt and Pengilly 1990) and also corresponds to the size of male crabs that are one molt away from recruiting into the current legal size class (Otto 1985). Since the Bristol Bay king crab harvest strategy controls the fishery's removal rate of mature males and since a

² A new-shell crab is a crab that has molted in the preceding 12 months. An old-shell crab is one that has not molted in the preceding 12 months.

secondary objective of a fully implemented PIT tagging program is to estimate recruitment into the fishery, information on the effects of PIT tagging to crabs in the 120-134 mm CL size class has direct application to the objectives of a fully implemented PIT tagging program.

We will not define an "acceptable" level of survivorship reduction in PIT tag injected crabs for this study. We will consider any statistically demonstrable level of reduced survivorship from the Phase I study to be grounds for a serious reevaluation of the use of PIT tags in estimating harvest rates, annual survivorship, and recruitment. Mortality due to tagging may not be easily stereotyped from a single laboratory trial due to random effects that can cause large and unpredictable variation in the ratio of tagged crab survivorship to untagged crab survivorship (e.g., Potter et al. 1991). Hence, using one or a few trials to test for an "acceptable" level of survivorship reduction, to estimate a "minimal expected lifetimes" of PIT injected crabs, or to determine a "survivorship correction factor" would be an approach that is prone to error.

Phase II Study

Dependent upon the results of the Phase I study, a second phase of controlled laboratory studies on the effects of PIT tag injection will begin in July 1993. The Phase II study will examine the effects of PIT tag injection on new-shell and old-shell legal king crabs with PIT tag injection occurring in early August 1993. Plans for the Phase II study will be detailed in a separate Project Operational Plan (FY 94).

OBJECTIVES

The primary objectives of the Phase I study are to perform the following two hypothesis tests, each at a significance level of $\alpha = 0.1$ and with a probability of $\beta \leq 0.2$ of detecting a 20% reduction of survivorship in PIT tag injected crabs relative to uninjected crabs:

1)
$$H_0: S_t = S_u \text{ vs } H_a: S_t < S_u, \text{ where}$$

S_t denotes the probability that a PIT tag injected new-shell crab with a carapace length of 120-134 mm survives and retains a functioning PIT tag for 90 days after tagging, during a non-molting period, and

S_u denotes the probability that a comparable uninjected crab survives for 90 days, during a non-molting period under identical conditions.

and

2)
$$H_0: S_{mt} = S_{mu} \text{ vs } H_a: S_{mt} < S_{mu}, \text{ where}$$

S_{mt} denotes the probability that a PIT tag injected new-shell crab with a carapace length of 120-134 mm survives and retains a functioning PIT tag through a molt and for 30 days after completion of the molt, and

S_{mu} denotes the probability that a comparable uninjected crab survives through a molt and for 30 days after completion of the molt.

Secondary objectives are:

1. Collection of data sufficient for an informal assessment of any differences in the dimensions of the proximal segment of the right fifth walking leg between equivalent size male and female red king crabs in the 120-134 mm CL range, and
2. Collection of data on the location of PIT tags injected into the right fifth walking leg to examine for evidence of overinjection or migration of PIT tags out of that segment and into other leg segments or towards the tail section.

We will also collect data in this study for exploratory data analyses that would be contingent upon the results of the primary study objectives including: analyses of mortality in PIT tag injected and uninjected crabs as a function of time; analyses of PIT tag loss as a function of time; analyses of healing of the PIT tag wound as a function of time; and, analyses of effects of PIT tag injection on timing of molt onset.

METHODS

Tags and Tagging Equipment

Trovan model ID 100 implantable passive transponder tags individually packed in sterilized needles will be used in tandem with the Trovan model LID 500 hand-held tag scanner. The model ID 100 tag is cylindrical, glass-encapsulated, and measures 2.2 mm (0.1 in) in diameter by 12 mm (0.4 in) in length. Tags will be injected using a hand-held Trovan plastic implanter. Trovan equipment is used in this experiment because the one-use only design of the sterilized needle-tag package will ensure identical injection wounding and non-transferability of infectious materials between injected crabs.

Collection and Transport of Crabs for the Experiment

If possible, female, rather than male, crabs will be used in the Phase I study. Crabs will be collected from Bristol Bay during the October 5-22, 1992 test fishery charter. Initial tagging in our experiment on the effects of PIT tagging will begin in late November (see below) and space limitations will restrict the total sample size for the experiment to approximately 100-150 crabs. Male crabs may molt unpredictably in the 90 day period following initial tagging, whereas female crabs tend to molt in April or later (Wallace et al. 1949, A.J. Paul, University of Alaska, Seward

AK, and T. Shirley, University of Alaska, Juneau AK personal communication). Specifically, observations on the timing of male and female red king crab molting in SMC holding tanks indicates that the majority of males-almost 65%-molt during the Phase I study period (December - February), while less than 4% of the females molted during the same timeframe (Table 1). Hence, under the logistic restrictions of the Phase I experiment, female crabs would more efficiently provide the data necessary to perform hypothesis test (1) than male crabs. Additionally, since all female crabs in this size range molt annually, while male crabs in this size range may skip-molt, female crabs would more efficiently provide the data necessary to perform hypothesis test (2) than male crabs. There is no reason to expect different responses between male and female crabs to the injection of PIT tags into the right fifth leg based on the physiology or anatomy of the limb (A.J. Paul, T. Shirley, B. Donaldson, Alaska Department of Fish and Game, Kodiak AK, personal communication).

To assess the suitability of using females over males in Phase I, length and width of the proximal segment of the right fifth walking leg (Figure 1) will be measured and recorded from 10 male and 10 female red king crabs in each of the three size classes noted above. If the tagging segment of the females is too small to hold a 12-mm PIT tag, males will be collected in the 120-134 mm CL range as successful PIT-tagging of males in this size range has been documented (Watson et al. 1991).

One hundred fifty live ovigerous female red king crabs in good condition (e.g., no broken or lost limbs, no breaks or cracks in carapace) will be collected from Bristol Bay in October 1992 during the ADF&G test fishery charter. To assure representation of the entire 120-134 mm CL range in this sample of 150 crabs, 50 crabs will be collected from each of the following three size classes: 120-124 mm, 125-129 mm, and 130-134 mm CL.

Study crabs will be packaged 5-7 animals per box approximately four hours prior to shipping on the afternoon of October 22, 1992. Study crabs will be shipped via commercial airlines on a non-stop flight from Dutch Harbor to Anchorage in order to minimize overall time out of the water. It is anticipated that the study crabs will be out of a seawater environment for 12-15 hours. If the scheduled flight for shipment is delayed due to weather, crabs will not be packaged until the next available flight is assured of arrival in Dutch Harbor. Crabs will be packed in wet burlap (to keep gills moist) and newspaper (to reduce spine breakage), and with several one-lb Blue Ice packages to keep crabs cool. Seward Marine Center (SMC) personnel will meet the live crab shipment in Anchorage and transport the crabs to Seward on October 22, 1992.

Holding Tank, Feeding, and Daily Maintenance Procedures

Immediately upon arrival at the SMC, all crabs surviving transportation will be transferred to the holding tank that will be used for the study. After approximately 30 d, each crab will be tagged with a cable tag that identifies the crab with a unique identification number between 1 and 150 (or, up to the number of crabs transferred to the tank). Carapace length will be measured and recorded for each crab at the time of cable tagging; any additional observations concerning condition of the crab will also be recorded at that time (Form 1, Appendix C).

The holding tank to be used is 3.7 m (12 ft) in diameter and 1.2 m (4 ft) in depth and is located indoors. The seawater source is an intake pipe located at a depth of 80 m in Resurrection Bay and the overall seawater exchange rate ranges from 15-20% per day. Salinity is fairly constant, ranging from 31-33‰ per day. Water temperatures in the holding tank for October, November, and December 1991, and January 1992 averaged 9.6, 9.1, 7.8, and 6.7 °C, respectively. If the holding tank water temperature is deemed to be too warm by attending SMC personnel, the study crabs will be transferred to exterior (outside) holding tanks where a cooler ambient environment can be provided (approximately 2 °C cooler than the interior holding tank temperature). The exterior tanks are 2.1 m (7 ft) in diameter and 0.9 m (3 ft) in height.

Study crabs will be fed to satiation twice per week. Uneaten food will be removed the day after feeding. The holding tank will be cleaned at least twice per week, or more, if necessary. All maintenance of the crabs and the tank will be done by SMC personnel.

PIT Tag Injection

Thirty days after the date that crabs are transferred into the holding tank, one half of the surviving crabs will be PIT tagged (if an odd number of crabs survive, the PIT tag injected crabs will outnumber the uninjected crabs by one). Crabs will be randomly selected for PIT tagging based on a simple random sample (without replacement) from the surviving crabs. The 30-d waiting period before experimental injection will allow for sorting out any crabs that were mortally injured during capture and transportation. We anticipate surviving crabs to number 100 or more. Crabs surviving the initial 30-d waiting period can be expected to have high survivorship (> 90%) if they are not subjected to additional trauma or injury (J. MacDonald and A.J. Paul, University of Alaska, Seward AK, personal communication).

All PIT tag injections will be completed in one day, which we anticipate to occur in late November. On the day of PIT tagging, each crab in the tank will be pulled from the tank one at a time and its cable tag number recorded (Form 1, Appendix C). Crabs previously designated for PIT tagging by random sampling of cable tag numbers will be tagged at that time; crabs not destined for PIT tagging will be immediately returned to the tank. All crabs are removed from and then returned to the tank on this day to insure that all crabs receive the same amount of handling, regardless of whether or not they are injected with a PIT tag.

Tagging will be performed by L. Watson based on her experience and skill in the PIT injection process. The PIT tag will be injected longitudinally into the muscle of the proximal segment of the right fifth leg (Figure 2) through the proximal articulation membrane of the leg segment. Following PIT tag injection, the PIT tag number will be read using the hand-held tag scanner and the PIT tag number will be recorded with the cable tag number. Any observations made during tagging, either on the condition of the crab or on the tagging process itself, will also be recorded. If an injected PIT tag was difficult to detect or required several passes before injection, that observation will be recorded. Throughout the tagging procedure, crabs will be handled as gently as possible; handling time and time out of water will be kept to the minimum possible for tagging and data recording. All data collected during the PIT tag injection process are to be recorded on Form 1 (Appendix C).

Bimonthly Monitoring of PIT Tagged and Non-PIT Tagged Crabs

All bimonthly monitoring will be conducted by ADF&G-approved staff of the Seward Marine Center. Fifteen days after PIT tagging, each crab in the tank will be pulled from the tank one at a time and its cable tag number recorded. Any observations on the condition of the crab can be recorded at this time. If the cable tag number corresponds to a PIT tagged crab the condition of the PIT tag injection wound will be checked and recorded as either "open", "closed, scar visible with no obvious infection", "closed, scar visible with obvious infection" or "wound or scar not visible, no obvious infection". Presence and proper functioning of the PIT tag in PIT injected crabs will be checked using the hand-held tag scanner. If a PIT tag is detected, the PIT tag number and the number of attempted readings necessary to detect the PIT tag (up to a maximum of six attempts) will be recorded. Otherwise, if six attempted readings yield no detection, the lack of detection should be recorded and the crab returned to the tank. This procedure will be repeated every 15 days up through the first 90 days after PIT tagging (i.e., this procedure will be performed 15, 30, 45, 60, 75, and 90 days after PIT tagging). Care should be taken to monitor outflow screens and other cleaning apparatus for (loose) unattached PIT tags. All data for bimonthly monitoring is to be recorded on Form 2 (Appendix C).

Bimonthly monitoring will continue after the first 90-d period (up to June 30, 1993 or the conclusion of Phase I) as described above. However, if a crab is noted to be in molting condition, the crab should not be handled beyond what is necessary to identify the cable tag number and record any observations related to molting (onset date, etc.). Care should be taken to monitor outflow screens and other cleaning apparatus for loose PIT tags.

Data Collection From Dead Crabs

Throughout the course of the experiment, any dead crabs discovered in the tank during the daily schedule of feeding and care will be removed from the tank. This includes crabs dying during a molt. The cable tag number, the date of death (or discovery of death), and any observations on the probable cause of death will be recorded. If the dead crab was PIT tagged, the presence of the PIT tag will be checked and the PIT tag number will be recorded. The condition of the PIT tag injection wound will be classified and recorded as described above in *Monitoring of PIT Tagged and Non-PIT Tagged Crabs* (Form 3, Appendix C). The tail sections of dead PIT tag injected crabs will be removed from the carapace without disruption of the proximal segment of the right fifth leg or the PIT tag. The removed tail section will be frozen in a sealed plastic bag that will be clearly identified by the cable tag number.

At the earliest possible time after death, ADF&G will collect the frozen tail sections of dead PIT tag injected crabs. Tail sections will be X-rayed to determine the placement of the PIT tag (if present). Presence or absence of the PIT tag will be recorded for each X-rayed tail section. In each tail section in which PIT tags were present, the distance of the PIT tag to the distal and the proximal articulating membranes will be measured from the X-ray and recorded. The presence of any PIT tags present in the tail section, but outside of the proximal segment of the right fifth walking leg will be noted and thoroughly described. The Kodiak Veterinary Clinic has tentatively agreed to perform the X-rays and aid ADF&G in the interpretation of the films (Dr.

A. Berry, Kodiak Veterinary Clinic, Kodiak AK, personal communication). All data related to X-ray examination will be recorded on Form 4 (Appendix C). If a histopathology examination is desirable, crabs and/or tail sections will be collected as described above and forwarded to ADF&G Pathology for evaluation (Form 5, Appendix C).

Data Collection From Molting Crabs

Throughout the course of the experiment, any molting crabs will be noted during daily feeding and care of the crabs. Crabs beginning to molt will have their cable tag number and the date of molt onset recorded. After the molt, the cable tag will be replaced as soon as possible without injuring the crab. If the molting crab is a PIT tagged crab, the presence of the PIT tag should then be checked using the hand-held tag scanner and the PIT tag number recorded (Form 3, Appendix C).

Among crabs that have survived the first 30 days after transport to holding tanks, molting related mortality occurs at a rate of approximately 10%, assuming that the crabs have not been injured or traumatized while held in the tank (A.J. Paul, University of Alaska, Fairbanks AK, personal communication). If a crab dies during a molt, the procedures described above in *Data Collection From Dead Crabs* will be followed.

Conclusion of Phase I Experiment

Phase I activities will end around June 30, 1993 or earlier/later depending on logistical timeframe for institution of Phase II work. In any event, all crabs that die or are sacrificed prior to Phase II will be sampled as described above (i.e, pull off PIT-tagged tail section, recover tag, find out where it is, whether or not it is still working, etc.).

DATA ANALYSIS

Differences in Dimensions of Male and Female Right Fifth Walking Legs

Our examination of possible differences due to gender in dimensions of the proximal segment of the right fifth walking leg for king crabs in the 120-134 mm carapace length range is intended to be purely exploratory. We have no formal hypotheses of interest to be statistically tested in this regard. Our intention here is to examine the measurement data for any indication of differences due to gender which could undermine generalizing the conclusions concerning the effects of PIT tag injection method to both sexes of red king crab. Sexual differences in the relationship between carapace length and the dimensions of the proximal segment of the right fifth leg of the measured crabs will be examined and described using canonical correlation analysis (Dillon W.R. and M. Goldstein, 1984. *Multivariate Analysis: Methods and Applications*. Wiley, New York) using sex and carapace length as predictor variables and segment width and segment length as response variables. Bivariate plots of measurements will also be employed

as descriptive tools to compare segment dimensions at carapace length between males and females.

Hypothesis Test 1:

Testing Effects of PIT Tag Injection on 90-d Survivorship of Non-molting Crabs

From the data collected during the first 90 days of this study the following statistics can be computed:

N_t := the initial number of PIT tag injected crabs,

N_u := the number of uninjected crabs on the day of PIT tag injection,

n_t := the number of PIT tag injected crabs that remain alive, have not molted, and retain a functioning PIT tag 90 days after injection,

n_u := the number of uninjected crabs that remain alive and have not molted 90 days after the day of PIT tag injection,

M'_t := the number of PIT tag injected crabs that molt within 90 days after tagging, and

M'_u := the number of uninjected crabs that molt within 90 days after the day of PIT tagging.

Values of N_t and N_u will depend upon the survivorship of the 150 crabs transported to Seward, as well as on the survivorship of crabs during the first 30 days in the study tank. We expect $N_t + N_u$ to be greater than 100. By design $N_t = N_u$ (unless $N_t + N_u$ is odd, in which case $N_t = N_u + 1$). We also expect both M'_t and M'_u to be small, perhaps 0, and we expect that PIT tag failures and tag loss to be negligible. So, we expect that the quantities $(N_t - n_t)$ and $(N_u - n_u)$ will be largely attributable to mortality, although any contribution to those quantities due to molting, PIT tag failure, or tag loss can be recovered from the data if necessary.

S_t and S_u can be estimated, respectively by

$$\hat{S}_t = \frac{n_t}{(N_t - M'_t)}, \text{ and } \hat{S}_u = \frac{n_u}{(N_u - M'_u)}.$$

The statistical significance of any reduction in S_t relative to S_u will be tested by summarizing the data in a 2 X 2 contingency table (Table 2) and performing Fisher's exact test for a one-sided alternative (Agresti 1990, p 60-61). The estimated power of this test (the probability of rejecting H_0 when H_0 is false) at a significance level of $\alpha = 0.10$ is shown in Figure 3 for various values of S_u and S_t . The power of the test for given values of S_t and S_u was estimated for Figure 1 by using the large sample normal approximation,

$$1 - \Phi \left\{ 1.2816 - \frac{(S_u - S_t)}{\sqrt{S_u(1-S_u)/50 + S_t(1-S_t)/50}} \right\},$$

where Φ is the standard normal cdf and 1.2816 is the 90th percentile of the standard normal distribution (Agresti 1990, p. 239-240). These power approximations are conservative estimates for actual power of the exact test. Since we anticipate S_u to be over 95% in this experiment, the power of this test will be greater than 0.90 when $S_t \leq 0.8(S_u)$; power is greatly reduced, however, when $S_t \geq 0.9(S_u)$ and for values of $S_u < 0.8$.

*Hypothesis Test 2:
Testing Effects of PIT Tag Injection on Survivorship of Molting Crabs*

From the data collected throughout the entire duration of this study the following statistics can be computed:

M_t := the number of PIT tag injected crabs that molt,

M_u := the number of uninjected crabs that molt,

m_t := the number of PIT tag injected crabs that survive a molt and retain a functioning PIT tag, and

m_u := the number of uninjected crabs that survive a molt.

Values of M_t and M_u will depend upon the number of crabs surviving to the time of molting (anticipated to occur in or near April). We anticipate all surviving crabs to molt by the end of May 1993 and for M_u to be roughly 95% of N_u , or about 47 crabs. If PIT tag injection has no effect on survivorship during the non-molting period, then we would also expect M_t to be in the range of 47 crabs. We do not anticipate effects on timing or onset of molt due to PIT tag injection, although information necessary to examine such effects could be recovered from the data if necessary.

S_{mt} and S_{mu} can be estimated, respectively by

$$\hat{S}_{mt} = \frac{m_t}{M_t}, \text{ and } \hat{S}_{mu} = \frac{m_u}{M_u}.$$

The statistical significance of any reduction in S_{mt} relative to S_{mu} will be tested by summarizing the data in a 2 X 2 contingency table (Table 3) and performing Fisher's exact test for a one-sided alternative. Figure 1 can be referred to for estimates of the power of this test at a significance level of $\alpha = 0.10$ for various survivorship scenarios when M_t and M_u are both close to 50.

SCHEDULES

6/92-6/93	Project planning
10/5-22/92	Byersdorfer-Dutch Harbor-Cost recovery and SMC crab collection
10/20-23/92	Watson-Dutch Harbor-PIT tag practice and pack SMC crabs
10/23-25/92	Watson/Pengilly-Seward-SMC crab check
11/20-22/92	Watson/Pengilly-Seward-SMC crab PIT tagging
11/23/92- 6/30/93	SMC Personnel/Watson & Pengilly-Phase I study: Survival of non-molting crabs (includes 2 trips to check on crabs)

REPORTS

1. A summary of biological data collected during the 1992 Bristol bay red king crab cost recovery charter. Tech. Fish. Rep. Byersdorfer and Watson. June 1993. (final report)
2. PIT tag retention and tag-induced mortality studies of Bristol Bay red king crab: Phase I, November 1992 - June 1993. Reg. Info. Rep. Watson and Pengilly. August 1993. (interim report)
3. PIT tag retention and tag-induced mortality studies of Bristol Bay red king crab: Phase II, June 1993 - March 1994. Reg. Info. Rep. Watson and Pengilly. June 1994. (interim report)
4. PIT tag retention and tag-induced mortality studies of Bristol Bay red king crab, November 1992 - March 1994. Fish. Res. Bull. Watson and Pengilly. June 1994. (final report)

OTHER NECESSARY RESOURCES

1. A five year plan chart (Appendix D.)

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- Watson, L.J., and D. Pengilly. 1992. Project operational plan for the 1991 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K92-31, Kodiak.

Table 1. Molt timing of male and female red king crabs held at the Seward Marine Center, 1986-1989. (Data source: J. MacDonald, University of Alaska, Fairbanks AK, personal communication).

Month	Males 1988-1989		Females 1986-1989	
	Number	%	Number	%
Jan	17	22.1		
Feb	11	14.3	8	3.7
Mar	9	11.7	26	12.1
Apr	5	6.5	92	43.0
May			50	23.4
Jun	1	1.3	29	13.6
Jul			9	4.2
Aug	1	1.3		
Sep	2	2.6		
Oct	7	9.1		
Nov	2	2.6		
Dec	22	28.5		
Total	77		214	

Table 2. Contingency table from study on effects of PIT tag injection on 90 day survivorship of non-molting crabs.

PIT Tag Injected	Survives 90 Days Without Molting		Total
	Yes ^a	No	
Yes	n_t	$N_t - M'_t - n_t$	$N_t - M'_t$
No	n_u	$N_u - M'_u - n_u$	$N_u - M'_u$
Total	$n_t + n_u$	$N_t + N_u - M'_t - M'_u - n_t - n_u$	

^a"Survivorship" of PIT injected crabs includes retaining a functioning PIT tag.

Table 3. Contingency table from study on effects of PIT tag injection on survivorship of molting crabs.

PIT Tag Injected	Survives Molt		Total
	Yes ^a	No	
Yes	m_t	$M_t - m_t$	M_t
No	m_u	$M_u - m_u$	M_u
Total	$m_t + m_u$	$M_t + M_u - m_t - m_u$	

^a"Survivorship" of PIT injected crabs includes retaining a functioning PIT tag.

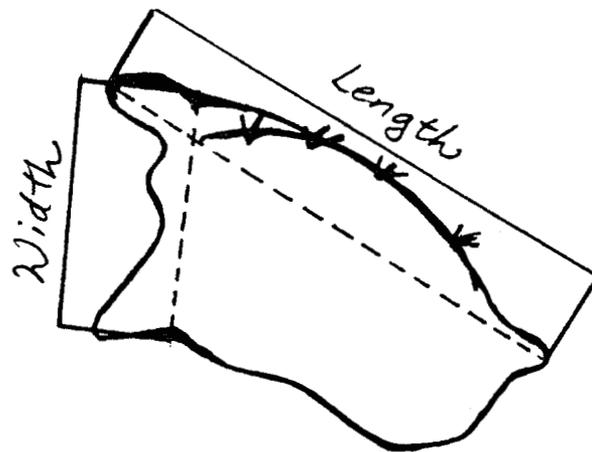


Figure 1. Length and width measurements for the proximal segment of the fifth right leg of a red king crab.

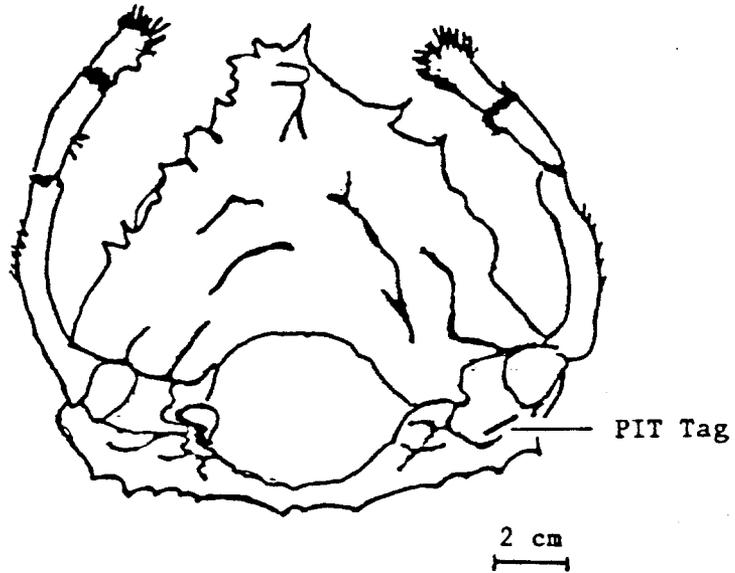


Figure 2. Ventral aspect of a red king crab abdomen showing the placement of the PIT tag in the proximal segment of the right, fifth leg.

Testing $S_t = S_u$ vs $S_t < S_u$ with $n=100$

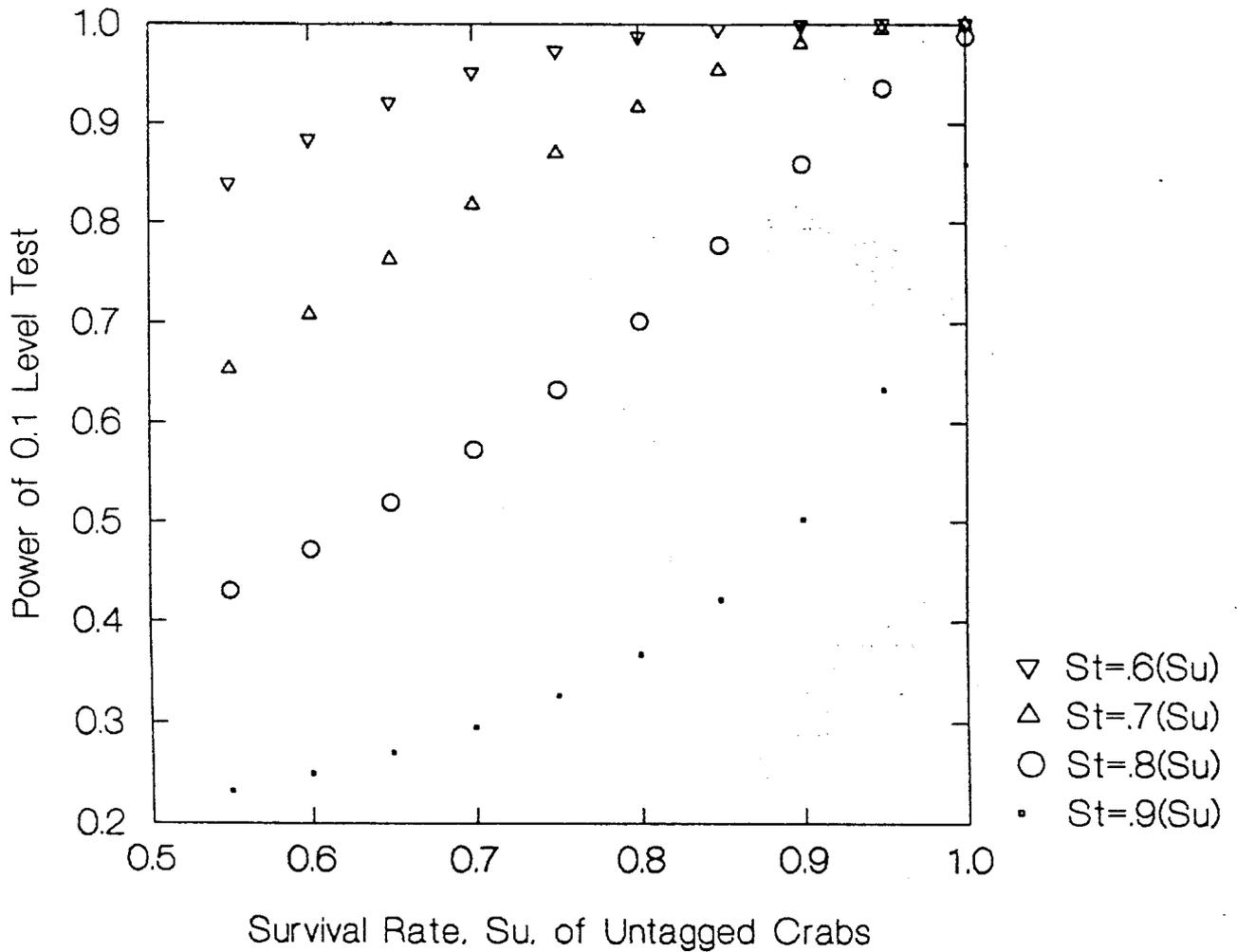


Figure 3. Estimated power function for $\alpha = 0.1$ significance level test of reduced survivorship in PIT tag injected crabs relative to untagged crabs for various values of PIT tag injected survivorship, S_t , and untagged survivorship, S_u . A total sample size of 100 crabs with equal numbers of PIT tag injected and untagged crabs is assumed.

APPENDICES

Appendix A. FY93 Yellowbook: Bering Sea Test Fishery Project

PROJECT TITLE: Bering Sea Crab Test Fishing	PROJECT NUMBER: TF-960
FISHERY UNIT: Bering Sea/Aleutians Crab	LEDGER: 74119751
COMPONENT: COMMERCIAL FISH BPS# 3800	PRINTORD: No order
LOCATION: Kodiak	REGION: 4
SUBCOMPONENT: Test Fish Funds	PRIORITY: 1.00
LEGISLATIVE DISTRICTS : 27	

PROGRAM ELEMENT: Test Fish Survey
 FISHERIES AFFECTED: Bering Sea Crab

USER GROUPS AFFECTED: Commercial

SPECIES AFFECTED: King Crab and Tanner Crab

PROJECT DESCRIPTION

Funding from this project will support the State's direct expenses for conducting shellfish tagging projects and genetics investigations in the Bering Sea. The Bristol Bay red king crab harvest was valued recently in excess of \$100 million. Error in estimating natural mortality rates and population abundances can jointly provide major errors in development of Guideline harvest levels. Additional Bering Sea Tanner species and stock I.D. development research can be conducted.

PROJECT OBJECTIVES

Bering Sea crab populations are assessed to provide information for development of guideline harvest levels. Data will be collected on all crab captured during the surveys. Long term tag recovery data should provide information on natural mortality rates to be used in estimating harvest rates designed to meet conservation and economic objectives established by the BOF.

BUDGET MANAGER: 1857 - Leslie J. Watson - Marine Fisheries Biologist

BUDGET DETAIL: CODE/LINE ITEM	PRIOR YEAR ALLOCATIONS			PAGE2 SUMMARY	
	FY89	FY90	FY91		
100 PERSONAL SERV	0.0	0.0	0.0	160.7	77.9 PFT
200 TRAVEL	0.0	0.0	0.0	22.1	82.8 Other
300 CONTRACTUAL	116.0	0.0	28.9	223.2	
400 COMMODITIES	0.0	0.0	0.0	53.5	
500 EQUIPMENT	0.0	0.0	0.0	0.0	
700 GRANTS	***	***		0.0	
PROJECT TOTALS:	0.0	0.0	28.9	459.5	
FEDERAL RECEIPTS	0.0	0.0	0.0	0.0	
GENERAL FUND	0.0	0.0	0.0	0.0	
INTERAGENCY RECPTS	***	***	0.0	0.0	
PROGRAM RECEIPTS	116.0	0.0	28.9	459.5	
GENERAL FUND MATCH	***	***	0.0	0.0	
STAFF MONTHS	0.	0.	0.	26.	

Appendix A. (page 2 of 2)
Salaries computed using FY93 rates.

PROJECT TITLE: Bering Sea Crab Test Fishing
 UNIT: Bering Sea/Aleutians Crab
 COMPONENT: COMMERCIAL FISH BPS# 3800

PROJECT NUMBER: TF-960
 LEDGER CODE: 74119751
 PRINT ORDER: No order
 REGION: 4

PERSONAL SERVICES DATA

PCN	TITLE & NAME	R	S	LOC	Range		MM	days		hours			TOTAL COST
					91	93		SEADUTY	Premium Pay	OT	HAZ	SHIFT	
1117	FB I - Byersdorfer, Su	A	S	CAA	14C	14D	6.0	40	14	0.	0.	0	\$36,836
1351	FB II - Beers, Dean	A	S	BKB	16b	16c	3.0	11	4	0.	0.	0	\$20,959
1390	FB II - Merkouris, Sus	A	S	EBA	16E	16F	4.0	0	0	0.	0.	0	\$20,926
1825	FT III - Phillips, Kim	P	S	CAA	11E	11F	0.5	0	0	0.	0.	0	\$2,042
1843	FT III - Rudge, Kimber	P	S	CAA	11F	11F	0.5	0	0	0.	0.	0	\$2,062
1857	FB III - Watson, Lesli	P	F	CAA	18E	18F	12.0	11	4	0.	0.	0	\$77,872
Personnel Totals -							26.0	12,261			\$0		\$160,700

PROJECT LINE ITEM DETAIL

LINE#	DESCRIPTION	Thousand \$\$\$ AMOUNT	COMMENT
72240	Field Travel	14.8	Travel
72500	Per Diem	7.3	Per Diem expences.
73100	Professional Services	100.0	Image Processing
73100	Professional Services	3.0	F.I.T.C.
73100	Professional Services	2.5	Photo processing.
73300	Communication	2.0	Telephone
73400	Trasportation	0.6	Excess baggage
73500	Advertising, Printing & Bind	0.6	Printing
73860	Rental Machinery & Equipment	2.0	Truck Rental
73860	Rental Machinery & Equipment	110.0	Test Fish Charters.
73900	Other Expenditures & Services	2.5	Freight
74220	Office & Library Supplies	2.0	Office Supplies
74220	Office & Library Supplies	2.0	Tag rewards
74480	Household & Institutional	1.0	Groceries
74480	Household & Institutional	1.5	Gloves, hardware, (etc).
74520	Professional & Scientific	21.2	Lab Equipment
74600	Other Operating Supplies	1.0	Dry Ice
74600	Other Operating Supplies	24.8	Was equipment
75870	Laboratory & Scientific Equip	0.0	Pit Tag Supplies
75870	Laboratory & Scientific Equip	0.0	Pit Readers
75870	Laboratory & Scientific Equip	0.0	Misc. Computer
75870	Laboratory & Scientific Equip	0.0	Genetics Lab & Chem Supplies
TOTAL LINES 200 - 700		298.8	
TOTAL PROJECT COST		459.5	

Appendix B. Shipboard instructions for the 1992 Bristol Bay red
king crab test fishery charter.

Shipboard Instructions
for the
1992 Bristol Bay Test Fishery Charter

by

Leslie J. Watson

September 30, 1992

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SAFETY BRIEFING

*** Check your suit, EPIRB, and strobe prior to departure ***

Instruct the captain and crew to run through the shipboard safety drill with you, including pulling the general alarm, and where you should be in case of an emergency. Do not go on the back deck or anywhere outside when seas are rough, especially alone (no photo or video is worth it). If you assist in working the gear, pay attention to buoy lines and trailers, slick decks and pots (especially if you are baiting, which I'd prefer you not do). Be careful.

You MUST check in DAILY with Ken Griffin (or his designee) via radio. If you cannot contact ADF&G, Brian can check in daily with Unisea or Royal Aleutian.

OBJECTIVES

Listed below are the major objectives of the test fishery charter. Each item is explained along with necessary forms and documentation under the appropriate section under Methods. Carefully review all of this; get your questions answered before the vessel leaves the dock.

1. **Cost Recovery.** Catch approximately 75,000 lbs red king crab ≥ 6 in CW (approximately 11,600 crabs at 6.5 lbs average weight) for delivery to Royal Aleutian Seafoods in Dutch Harbor on October 22, 1992.
2. **Seward Marine Center (SMC) Crab Collection.** Collect 210 each new-shell male and female red king crabs for transport to the SMC on October 22, 1992.
3. **Observer Practicum Crab Collection.** Collect crabs for the observer practicum to be conducted onboard the F/V Kristen Gail at Royal Aleutian Seafoods, October 22-23, 1992.
4. **Proximal Segment Measurements.** Measure length and width of the proximal segment of 30 each new-shell male and female red king crab.
5. **Length Frequency Distributions.** Measure red king crab and C. bairdi from 5 preselected pots per day.
6. **Miscellaneous Data Collections and Side Projects.** See section for description).

METHODS

Cost Recovery

Catch approximately 75,000 lbs red king crab ≥ 6 in CW (approximately 11,600 crabs at 6.5 lbs average weight). For reference, last year's survey average C/P of legal (≥ 6.5 in) crabs was 16.7. For this year's needs, this translates to around 700 pot lifts, probably much less when you add in 6 inch crabs. We need a total of \$373,000 to cover the cost of the project (total includes the price of the charter). Bid price per pound is \$5.12 for red king crab and \$1.60 for C. bairdi crab. To get started fishing, you may want to review to the station summaries for the previous 2 years with the captain (Appendix A). Check with the captain about placing the cost recovery crabs in one tank and the Seward and observer crabs in the other.

Ensure that the Pilot House Log (Form 1, Appendix B) is completely filled out including the catch per pot (C/P) at the end of each day. As cruise leader, it's your responsibility to make sure the captain completes this task. If you sleep while fishing occurs, make sure the deck boss hails the C/P to the captain for recording.

Please ask Ken Griffin to provide you with a code sheet for reporting via radio a daily tally (or cumulative total, if preferred) of the catch aboard.

Keep a daily log of activities, dates, any miscellaneous observations, Floy tag recoveries, problems, a running tally of how many crabs you have aboard, etc. Review all data forms for accuracy and completeness at the end of each day. You will be writing up the survey as an RIR; the first draft is due before Christmas break (you may want to start on this after the survey ends while you are in Dutch Harbor).

Watson will handle the paperwork for the delivery of crabs to Royal Aleutian (fish ticket and receipt of check). In the event she fails to make it to Dutch Harbor, Griffin will take care of this duty.

Seward Marine Center (SMC) Crab Collection

The vessel must return to Dutch Harbor the evening of October 21, 1992 as Watson wants to look at the Seward crabs the night before they are packaged. Be prepared to pack crabs on the morning of October 22 with or without Watson. Before the vessel leaves Dutch Harbor, have all packaging (paper and burlap), boxes, labels and tape aboard. Sometime during the trip, practice packaging a box of crabs to get an estimate of how much time it will take to package, tape up, and label each box and how many crabs can be packed per box.

Collect 210 each new-shell, pristine, non-injured, disease and parasite free male and female red king crabs for the Seward Marine Center study. Collect approximately 70 of each sex in each of three size classes and record all required data as shown in Form 2 (Appendix B). **The three size classes are: 120-124 mm, 125-129 mm, and 130-134 mm CL.**

A tally form is also provided to help you keep track of the collection (Form 3, Appendix B). These crabs should be collected near the very end of the charter. Each collected crab should be carefully examined for broken limbs, cracked carapace, and obvious infections and egg clutch parasites. The bottom line is, if the crab is less than perfect, don't collect it. These crabs should be placed in a hold separate from the cost recovery crabs, if at all possible. Otherwise we'll have a terrible time separating these crabs at the dock.

On the evening of October 21, Watson will look the females over to see if they can be PIT-tagged and will make the final decision on which sex will be sent to SMC. Weather permitting on the morning of October 22, SMC will be called (224-5261) to alert them as to the status of the crab shipment for the day (no later than mid-morning). Form 4 (Appendix B) will be used to tally the crabs packed in the three size groups. Labels for shipping are in Appendix F.

Observer Practicum Crab Collection

Collect crabs for the observer practicum. This will include 200 red king crabs (male and female), 200 *C. bairdi* (male and female), any Korean hair crabs, brown and blue king crabs, *C. opilio*, and any other odd-ball crabs. Rance and Donn will brief you on the observer practicum crab collection when you get to Dutch Harbor. These crabs can be put in the hold with the SMC crabs (remember to keep the cost recovery crabs in the other, if at all possible). Record and tally crabs as they are collected (Form 5, Appendix B).

Proximal Segment Measurements

Measure length and width of the proximal segment of the right, fifth leg of 30 each new-shell male and female red king crab as shown in Figure 1. Remember, the right, fifth leg is the leg of the right side of the crab when you are holding it in the Floy-tagging position (Figure 2). Measure 10 of each sex in each of the three size classes (see above). If this is done at sea, it will be very apparent whether or not the proximal segment of male and female red king crabs of similar size are, in fact, the same size. If you can excise the right, fifth leg without sacrificing the animal, fine. Generally, red king crabs will autotomize at the articulation membrane between each leg segment. However, you may

not be able to open the carapace widely enough to perform the excision without destroying the leg segment or mortally wounding the crab. If not, sacrifice the animal as this information is vital to the decision of using females over males for the SMC study. Record all required data as shown in Form 2 (Appendix B). Make a good line drawing (real scale or larger) of the proximal segment with the length and width measurements noted. Use specimens from shipboard sampling; the drawing will likely go into a future report.

Length Frequency Distributions

Measure carapace lengths of red king crab and carapace widths of C. bairdi catches from 5 pre-selected pots per day; record all required data as shown in Form 6. Use a separate form for each species and sex; this is necessary because you may have different sampling factors (see next paragraph). You must randomly pre-select your pots each day prior to actually seeing the pots come aboard. Once you have pre-selected the 5 pots for the day, you cannot change your mind (whether or not the pot is empty or chock-full!). This is to be done using the Table of Random Digits (Appendix C). Here's an example of how to use the random digit table:

The captain says he will pull 75 pots today. You need to sample 5 of those. In order to select the five pots, you decide to start with the 7th number in the first column, count by multiples of 10 and pick the first 5 numbers between 1 and 75 (looking at the first 2 digits).

You must use a different random selection scheme every day. We'll go over this before you leave. If the weather is too rough, or you have worked to exhaustion and can't sample the randomly-selected pots, note these anomalies in your daily log.

Measure all male red king crabs ≥ 120 mm CL. If subsampling is desirable, measure 20 each male red king crab < 120 mm CL, females ≥ 90 mm CL, and females < 90 mm CL. C. bairdi crabs can be subsampled by measuring 5 of each sex. This is the same subsampling scheme we used last year. For all subsampled crabs, record the sampling factor as shown in Form 6 (e.g., 20/87 means you measured 20 of 87 animals caught in that pot). If you measure all the crab of a species/sex group, just write 'all' through the sampling factor data columns. If 5 pots per day is too much (or too little) work, you can reduce-or increase-the number of pots sampled per day.

Miscellaneous Data Collection and Side Projects

Floy-Tagged Crab Recovery. Document recovery of all tagged crabs on Form 7. Measure, record all required data and return to the sea as soon as possible. If the tagged crab is one of ours and the number is 1-3,421 (less than 3,422), scan for the PIT tag and record the number. If the scanner is working but you cannot detect the PIT tag, sacrifice the animal, and collect, label and freeze the tail section. Collection labels are in Appendix F. We'll look these over in Dutch Harbor when the vessel comes in. Instruct the crew to wake you up if they catch a tagged crab while you are asleep so that you can sample it.

Red King Crab and C. bairdi Crab Collection for Paralytic Shellfish Poison (PSP) Testing. Ken Griffin has received a request from DEC for the collection of crabs during our charter. You will need to collect, label and freeze 3 red king crabs and 3 C. bairdi crabs from each statistical area the vessel pulls gear in. The captain can tell you when you're in a new area (refer to the Bristol Bay statistical area chart, Figure 3). Labels for collection are in Appendix F. As no sampling plan came with this request, just take

Appendix B. (page 11 of 56)

3 small males of each species (put red king crabs in one bag w/label, C. bairdi crabs in another w/label) from a single pot in each statistical area at your convenience. Box up these crabs and affix labels (Appendix F). For documentation's sake, record all data required using Form 6. At survey's end, please xerox these data sheets for my records and put originals in one of the boxes for DEC. Notify Ken upon arrival and ask him if he needs you to ship these off (can do after SMC crabs are shipped out).

Video and Slide Collection (lowest priority). Document your footage and slides. Close-up photo of female red king crab tail section with fifth legs attached would be especially great. Can continue this project during tag recovery. For the record, here's the wish list:

1. A complete photo set of male and female red king crab and C. bairdi crab internal and external anatomy. Close-ups desired.
2. Photos and video of fishing activities (setting gear, other vessels, weather, etc.
3. Photos and video of processing activities during November fishery (off-loading, butchering, packing, etc. - get permission from processors prior to taking pictures inside the processing facility.
4. General scenic shots of Dutch Harbor area.

Collection of Crabs for Display (lowest priority). Regional office needs to replace the male red king crab (~110 mm CL) and the C. tanneri that were damaged.

MISCELLANEOUS INSTRUCTIONS/REMINDERS

1. Leave CFEC cards with Ken.
2. Check your survival suit prior to departure.
3. Check your supply of forms, sampling equipment, and rain gear prior to departure (Appendix D).
4. Charter itinerary and schedules are reviewed in Appendix E.
5. Write down any specific instructions for the observer practicum crab collection from Rance and Donn (save for my records).
6. Leave all receipts for purchases with Marilyn.
7. While at sea, you are being paid for 11 hours per day, Monday -Friday and 16 hours on Saturday and Sunday. Please record the actual hours you worked on a daily basis (start and stop times). I will submit a timesheet for you for the October 1-15 period; please let Donn know date and time of your departure from the dock.
8. If there are no forms to record other data you collect, make them up. The Pilot House Log must be completed at the end of each day. Complete every column in every form as required. The data you collect is literally worth a fortune (the cumulative value of this project is now over a million dollars). I know you'll do a great job.
9. Be careful; let's make October an injury-free month.
10. Have fun. See you on the evening of October 21st; the first round's on me!

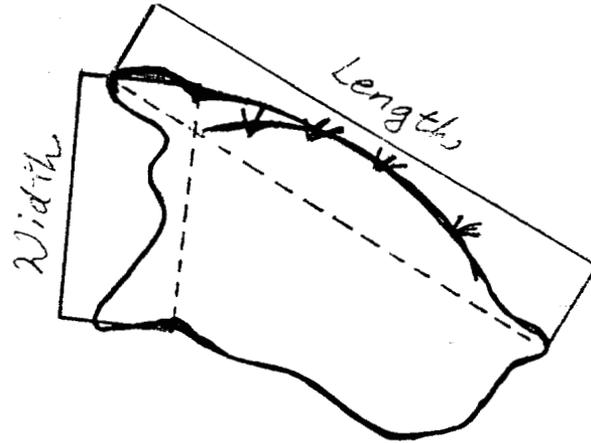


Figure 1. Length and width measurements for the proximal segment of the fifth right leg of a red king crab.

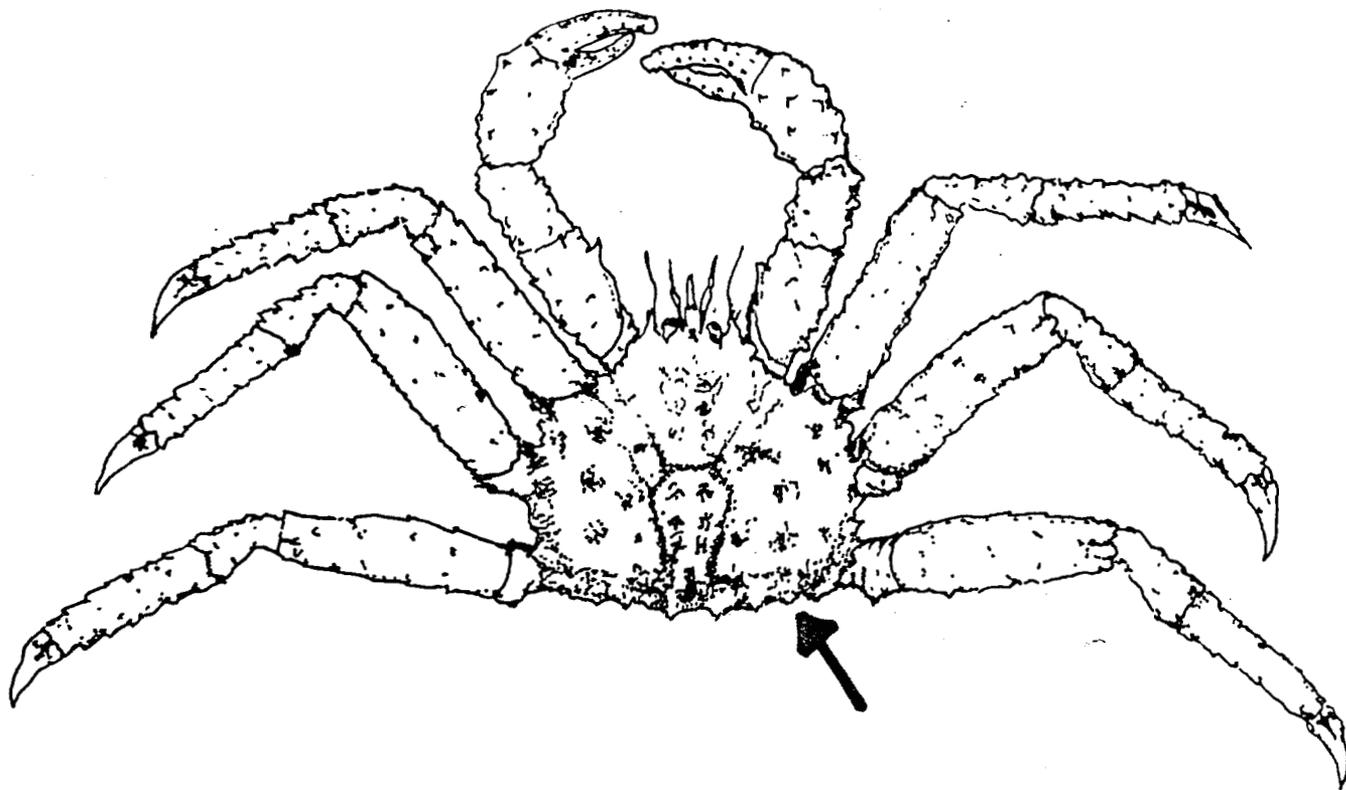


Figure 2. Dorsal view of a red king crab depicting location of right, proximal leg segment.

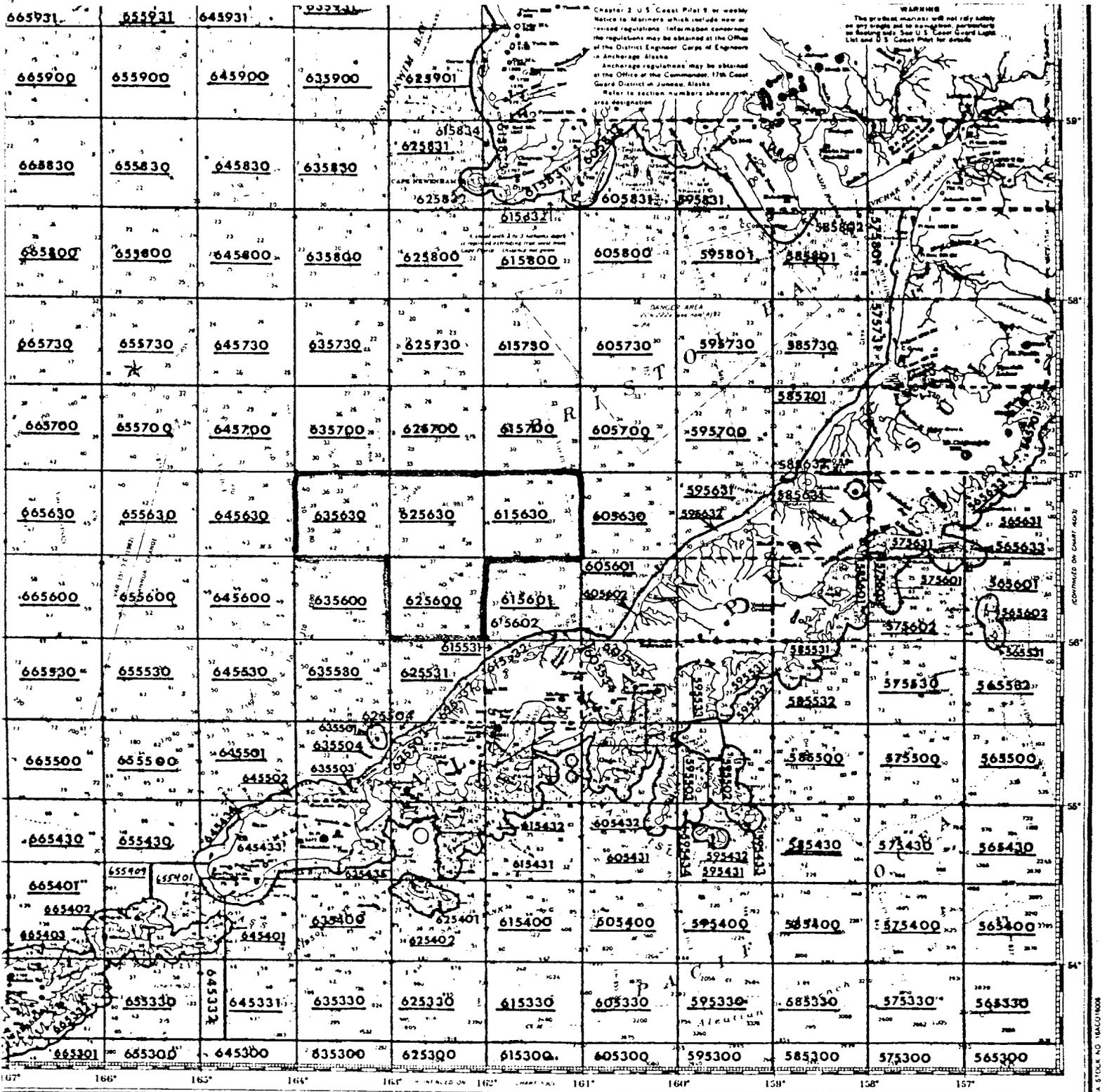


Figure 3. Statistical area chart for Bristol Bay.

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Appendix A. 1990 and 1991 survey report catch data

A Pilot Mark-Recapture Study Using External Tags and Implantable
Passive Integrated Transponder (PIT) Tags on Red King Crab in
Bristol Bay, Alaska

by

Leslie J. Watson, Douglas Pengilly, William E. Donaldson

and

Dana Schmidt

Regional Information Report¹ No. 4K91-21

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

October 1991

¹The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

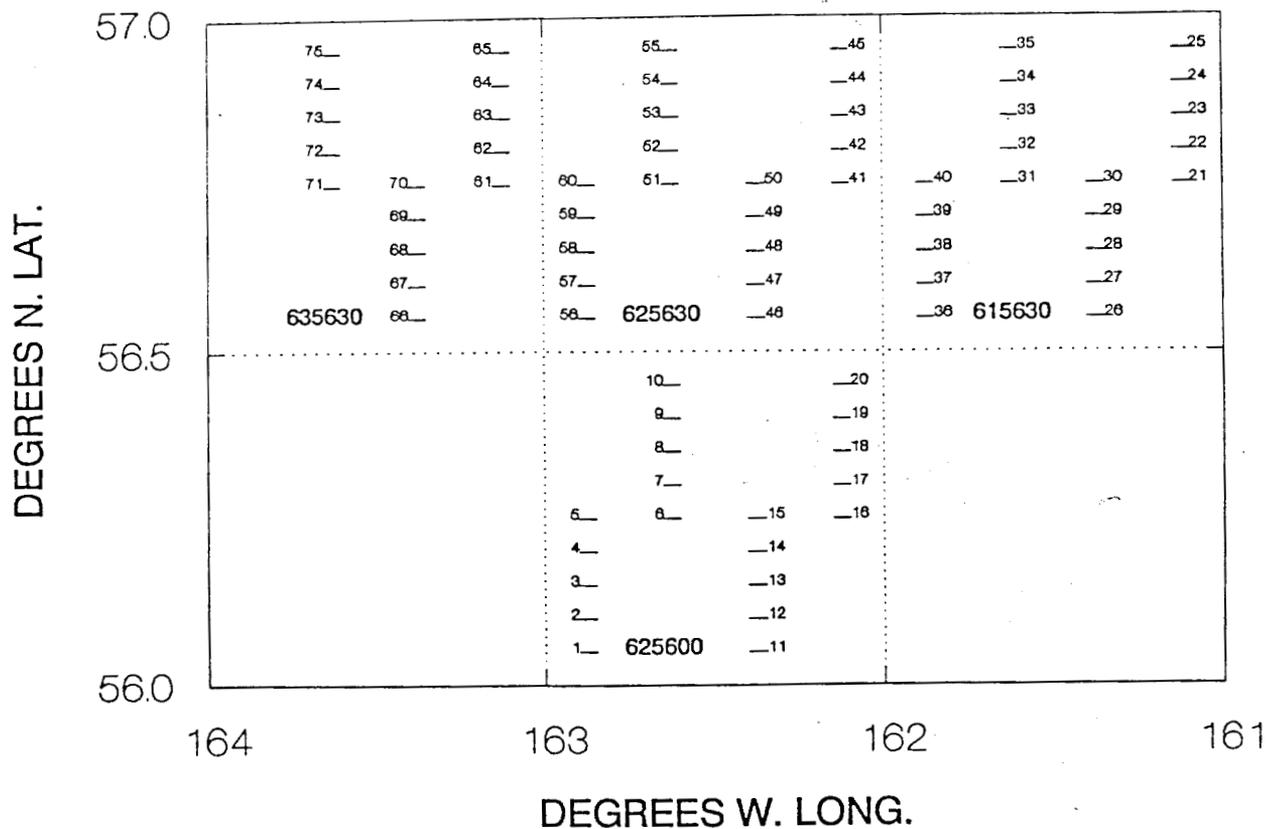


Figure 2. Layout of the 75 tagging stations in the 1990 Bristol Bay red king crab tagging study. Note that stations 21-25 were not sampled.

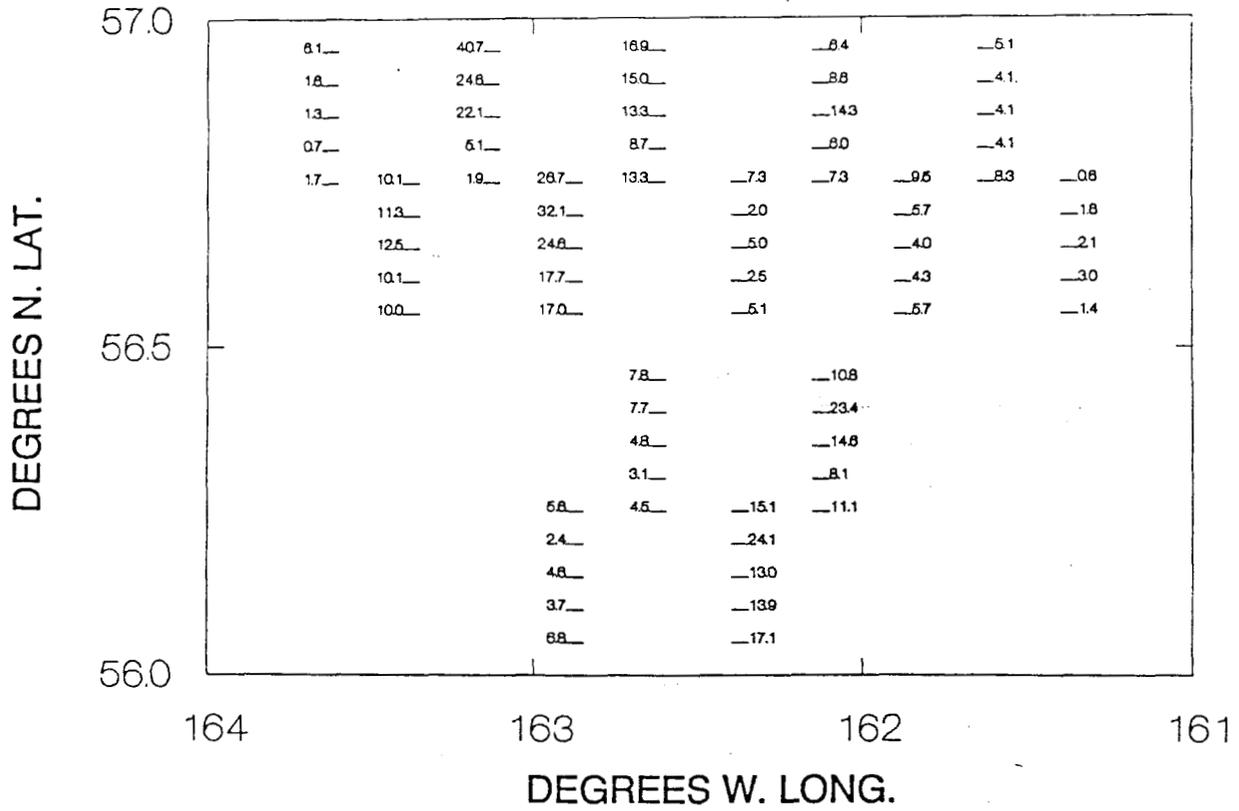


Figure 5. Average catch per pot of legal male red king crabs at 70 stations sampled during the 1990 Bristol Bay red king crab tagging study.

Appendix B. (page 20 of 56)

Appendix A. Summary data from the 1990 Bristol Bay tagging survey where red king crabs were taken.

Sta- tion	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Females	Males			Average Catch/Pot Of Legals (>134 MM)	
								<110 MM	110- 134 MM	>134 MM		Total
1	8/9	56 3	162 52	472273 339992	44	14	264	28	178	95	301	24.0
2	8/9	56 6	162 51	472218 339846	44	14	77	6	92	52	150	3.7
3	8/10	56 9	162 52	472264 339739	45	14	90	31	145	65	241	4.6
4	8/10	56 12	162 52	472275 339613	44	14	76	3	41	34	78	2.4
5	8/10	56 15	162 52	472263 339477	45	14	4	3	60	78	141	5.6
6	8/10	56 15	162 37	471272 339678	42	14	335	8	77	63	148	4.5
7	8/10	56 18	162 37	471284 338952	43	13	86	8	30	40	78	3.1
8	8/10	56 21	162 37	471287 338818	43	14	123	6	42	67	115	4.8
9	8/11	56 24	162 37	471290 338682	42	14	179	6	52	108	166	7.7
10	8/11	56 27	162 37	471256 338530	41	15	240	36	123	117	276	7.8
11	8/11	56 3	162 22	470291 339203	41	14	1216	14	208	239	461	17.1
12	8/12	56 6	162 22	470293 339075	40	14	2921	30	208	194	432	13.9
13	8/12	56 9	162 23	470318 338960	41	7	551	12	58	91	161	13.0
14	8/12	56 12	162 22	470301 338825	38	7	491	22	166	169	357	24.1
15	8/12	56 15	162 22	470301 338693	41	7	143	11	59	106	176	15.1
16	8/13	56 15	162 8	469323 338310	42	8	613	10	75	89	174	11.1
17	8/13	56 18	162 7	469283 338162	44	7	415	5	53	57	115	8.1
18	8/13	56 21	162 7	469273 338021	40	7	248	7	54	102	163	14.6
19	8/13	56 24	162 6	469266 337886	47	7	154	5	78	164	247	23.4
20	8/13	56 27	162 7	469273 337749	38	8	530	234	113	86	433	10.8
26	8/15	56 33	161 22	466266 336324	39	7	43	2	7	10	19	1.4
27	8/15	56 36	161 22	466241 336169	36	7	205	5	16	21	42	3.0
28	8/15	56 39	161 22	466242 336028	36	7	78	5	16	15	36	2.1
29	8/15	56 42	161 22	466211 335873	42	8	59	2	8	13	23	1.6
30	8/15	56 45	161 22	466207 335722	40	7	112	71	7	4	82	0.6
31	8/17	56 45	161 37	467219 336100	38	8	369	123	65	66	254	8.3
32	8/17	56 48	161 37	467184 335938	43	7	10	9	23	29	61	4.1
33	8/16	56 51	161 37	467194 335792	41	7	20	3	25	29	57	4.1
34	8/16	56 54	161 37	467189 335636	38	7	50	4	25	29	58	4.1
35	8/16	56 57	161 38	467200 335484	37	7	22	7	22	36	65	5.1
36	8/14	56 33	161 52	466262 337078	43	7	122	6	25	40	71	5.7
37	8/14	56 36	161 52	468246 336928	37	7	765	19	38	30	87	4.3
38	8/14	56 39	161 52	468253 336787	43	7	97	8	28	28	64	4.0
39	8/14	56 42	161 52	468237 336631	43	7	109	123	16	40	179	5.7
40	8/14	56 45	161 52	468196 336469	43	6	31	4	15	57	76	9.5
41	8/18	56 45	162 7	469236 336871	37	7	46	8	35	51	94	7.3
42	8/18	56 48	162 7	469193 336702	39	7	70	29	32	42	103	6.0
43	8/18	56 51	162 7	469204 336555	39	7	31	40	75	100	215	14.3
44	8/18	56 54	162 7	469202 336397	37	7	62	193	99	60	352	8.6
45	8/18	56 57	162 8	469220 336248	33	8	410	22	55	51	128	6.4
46	8/19	56 33	162 22	470237 337843	40	7	31	5	19	36	60	5.1
47	8/19	56 36	162 22	470236 337708	40	8	16	2	18	20	40	2.5
48	8/19	56 39	162 22	470233 337553	37	7	14	7	28	35	70	5.0
49	8/19	56 42	162 22	470258 337419	38	8	7	15	14	16	45	2.0

-Continued-

Appendix B. (page 21 of 56)

Appendix A. (page 2 of 2)

Sta- tion	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Males					Average Catch/Pot Of Legals (>134 MM)
							<110 MM	110- 134 MM	>134 MM	Total	(>134 MM)	
50	8/19	56 45	162 22	470204 337247	38	7	59	116	39	51	206	7.3
51	8/20	56 45	162 37	471231 337652	37	7	57	63	93	93	249	13.3
52	8/20	56 48	162 37	471222 337496	36	7	220	27	117	61	205	8.7
53	8/20	56 51	162 37	471198 337334	35	7	301	33	135	93	261	13.3
54	8/20	56 54	162 37	471194 337177	36	7	420	1	85	105	191	15.0
55	8/20	56 57	162 37	471181 337013	35	7	345	2	41	118	161	16.9
56	8/21	56 33	162 52	472273 338658	42	7	3	3	52	119	174	17.0
57	8/22	56 36	162 52	472242 338501	41	7	2	4	55	124	183	17.7
58	8/21	56 39	162 52	472255 338360	40	7	1	7	85	172	264	24.6
59	8/21	56 42	162 52	472262 338214	39	7	0	6	162	225	393	32.1
60	8/21	56 45	162 52	472243 338057	37	7	1	16	314	187	517	26.7
61	8/22	56 45	163 7	473247 338465	38	7	1	0	1	13	14	1.9
62	8/22	56 48	163 7	473254 338316	37	7	0	0	17	36	53	5.1
63	8/23	56 51	163 7	473222 338151	36	7	0	1	75	155	231	22.1
64	8/23	56 54	163 7	473237 337998	36	7	0	8	111	172	291	24.6
65	8/23	56 57	163 7	473206 337830	35	7	0	29	275	285	589	40.7
66	8/24	56 33	162 22	474273 339475	44	7	1	5	39	70	114	10.0
67	8/24	56 36	162 22	474284 339333	42	7	0	1	19	71	91	10.1
68	8/24	56 39	162 22	474269 339181	41	6	1	0	23	75	98	12.5
69	8/24	56 42	162 22	474277 339037	40	7	1	0	11	79	90	11.3
70	8/24	56 45	162 22	474245 338875	39	7	2	2	11	71	84	10.1
71	8/24	56 45	162 38	475276 339300	40	7	0	0	2	12	14	1.7
72	8/24	56 48	162 37	475258 339138	39	7	0	0	0	5	5	0.7
73	8/25	56 51	162 37	475253 338983	38	7	0	0	2	9	11	1.3
74	8/25	56 54	163 37	475255 338826	38	7	0	0	2	11	13	1.6
75	8/25	56 57	163 37	475218 338657	37	7	0	0	5	43	48	6.1
TOTALS						579	12950	1521	4394	5329	11244	9.2

Appendix B. (page 22 of 56)

Appendix B. Summary data from the 1990 Bristol Bay tagging survey where *C. bairdi* Tanner crabs were taken.

Station	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Females	110-			Males		Average Catch/Pot Of Legals (>134 MM)
								<110 MM	134 MM	>134 MM	Total	>134 MM	
1	8/9	56 3	162 52	472273 339992	44	14	4	30	155	69	254	4.9	
2	8/9	56 6	162 51	472218 339846	44	14	3	6	22	30	58	2.1	
3	8/10	56 9	162 52	472264 339739	45	14	2	1	22	22	45	1.6	
4	8/10	56 12	162 52	472275 339613	44	14	3	1	10	8	19	0.6	
5	8/10	56 15	162 52	472263 339477	45	14	9	2	21	41	64	2.9	
6	8/10	56 15	162 37	471272 339678	42	14	3	1	17	21	39	1.5	
7	8/10	56 18	162 37	471284 338952	43	13	2	2	14	9	25	0.7	
8	8/10	56 21	162 37	471287 338818	43	14	1	0	6	10	16	0.7	
9	8/11	56 24	162 37	471290 338682	42	14	1	0	3	8	11	0.6	
10	8/11	56 27	162 37	471256 338530	41	15	0	1	5	35	41	2.3	
11	8/11	56 3	162 22	470291 339203	41	14	3	22	25	9	56	0.6	
12	8/12	56 6	162 22	470293 339075	40	14	1	51	60	14	125	1.0	
13	8/12	56 9	162 23	470318 338960	41	7	2	0	10	11	21	1.6	
14	8/12	56 12	162 22	470301 338825	38	7	0	2	4	3	9	0.4	
15	8/12	56 15	162 22	470301 338693	41	7	0	2	6	23	31	3.3	
16	8/13	56 15	162 8	469323 338310	42	8	2	2	16	22	40	2.8	
17	8/13	56 18	162 7	469283 338162	44	7	39	2	49	148	199	21.1	
18	8/13	56 21	162 7	469273 338021	40	7	41	5	37	42	84	6.0	
19	8/13	56 24	162 6	469266 337886	47	7	1	0	6	61	67	8.7	
20	8/13	56 27	162 7	469273 337749	38	8	0	0	4	36	40	4.5	
26	8/15	56 33	161 22	466266 336324	39	7	1	1	6	24	31	3.4	
27	8/15	56 36	161 22	466241 336169	36	7	1	1	4	56	61	8.0	
28	8/15	56 39	161 22	466242 336028	36	7	3	0	2	120	122	17.1	
29	8/15	56 42	161 22	466211 335873	42	8	3	0	4	172	176	21.5	
30	8/15	56 45	161 22	466207 335722	40	7	2	0	2	67	69	9.6	
31	8/17	56 45	161 37	467219 336100	38	8	37	0	5	185	190	23.1	
32	8/17	56 48	161 37	467184 335938	43	7	18	1	28	227	256	32.4	
33	8/16	56 51	161 37	467194 335792	41	7	22	0	8	150	158	21.4	
34	8/16	56 54	161 37	467189 335636	38	7	17	0	10	235	245	33.6	
35	8/16	56 57	161 38	467200 335484	37	7	3	3	9	142	154	20.3	
36	8/14	56 33	161 52	466262 337078	43	7	18	0	3	151	154	21.6	
37	8/14	56 36	161 52	468246 336928	37	7	0	0	7	146	153	20.9	
38	8/14	56 39	161 52	468253 336787	43	7	1	2	4	39	45	5.6	
39	8/14	56 42	161 52	468237 336631	43	7	6	1	8	54	63	7.7	
40	8/14	56 45	161 52	468196 336469	43	6	17	1	7	124	132	20.7	
41	8/18	56 45	162 7	469236 336871	37	7	0	0	3	50	53	7.1	
42	8/18	56 48	162 7	469193 336702	39	7	1	0	1	78	79	11.1	
43	8/18	56 51	162 7	469204 336555	39	7	3	9	29	193	231	27.6	
44	8/18	56 54	162 7	469202 336397	37	7	2	0	2	43	45	6.1	
45	8/18	56 57	162 8	469220 336248	33	8	0	1	3	20	24	2.5	
46	8/19	56 33	162 22	470237 337843	40	7	0	2	7	30	39	4.3	
47	8/19	56 36	162 22	470236 337708	40	8	0	1	4	29	34	3.6	
48	8/19	56 39	162 22	470233 337553	37	7	1	4	10	31	45	4.4	
49	8/19	56 42	162 22	470258 337419	38	8	0	2	3	32	37	4.0	
50	8/19	56 45	162 22	470204 337247	38	7	1	2	10	96	108	13.7	

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Station	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Females	Males			Average Catch/Pot Of Legals (>134 MM)	
								<110 MM	110-134 MM	>134 MM		Total
51	8/20	56 45	162 37	471231 337652	37	7	0	2	18	145	165	20.7
52	8/20	56 48	162 37	471222 337496	36	7	0	1	8	95	104	13.6
53	8/20	56 51	162 37	471198 337334	35	7	4	1	5	70	76	10.0
54	8/20	56 54	162 37	471194 337177	36	7	2	0	3	84	87	12.0
55	8/20	56 57	162 37	471181 337013	35	7	2	1	10	86	97	12.3
56	8/21	56 33	162 52	472273 338658	42	7	2	1	4	99	104	14.1
57	8/22	56 36	162 52	472242 338501	41	7	2	2	10	90	102	12.9
58	8/21	56 39	162 52	472255 338360	40	7	3	2	24	114	140	16.3
59	8/21	56 42	162 52	472262 338214	39	7	0	4	12	181	197	25.9
60	8/21	56 45	162 52	472243 338057	37	7	3	2	14	125	141	17.9
61	8/22	56 45	163 7	473247 338465	38	7	3	1	11	232	244	33.1
62	8/22	56 48	163 7	473254 338316	37	7	3	1	34	302	337	43.1
63	8/23	56 51	163 7	473222 338151	36	7	3	0	5	275	280	39.3
64	8/23	56 54	163 7	473237 337998	36	7	1	0	10	282	292	40.3
65	8/23	56 57	163 7	473206 337830	35	7	2	0	27	171	198	24.4
66	8/24	56 33	162 22	474273 339475	44	7	5	2	2	118	122	16.9
67	8/24	56 36	162 22	474284 339333	42	7	10	1	19	220	240	31.4
68	8/24	56 39	162 22	474269 339181	41	6	0	0	20	242	262	40.3
69	8/24	56 42	162 22	474277 339037	40	7	3	0	29	284	313	40.6
70	8/24	56 45	162 22	474245 338875	39	7	2	0	15	396	411	56.6
71	8/24	56 45	162 38	475276 339300	40	7	0	1	13	85	99	12.1
72	8/24	56 48	162 37	475258 339138	39	7	2	2	11	62	75	8.9
73	8/25	56 51	162 37	475253 338983	38	7	0	0	2	35	37	5.0
74	8/25	56 54	163 37	475255 338826	38	7	2	2	18	85	105	12.1
75	8/25	56 57	163 37	475218 338657	37	7	0	2	7	68	77	9.7
TOTALS						579	328	189	1002	7062	8253	12.2

Appendix B. (page 24 of 56)

A SUMMARY OF BIOLOGICAL DATA COLLECTED DURING
THE 1991 BRISTOL BAY RED KING CRAB TAGGING STUDY

By

Susan Byersdorfer

and

Leslie J. Watson

Technical Fishery Report No.

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

July 1992

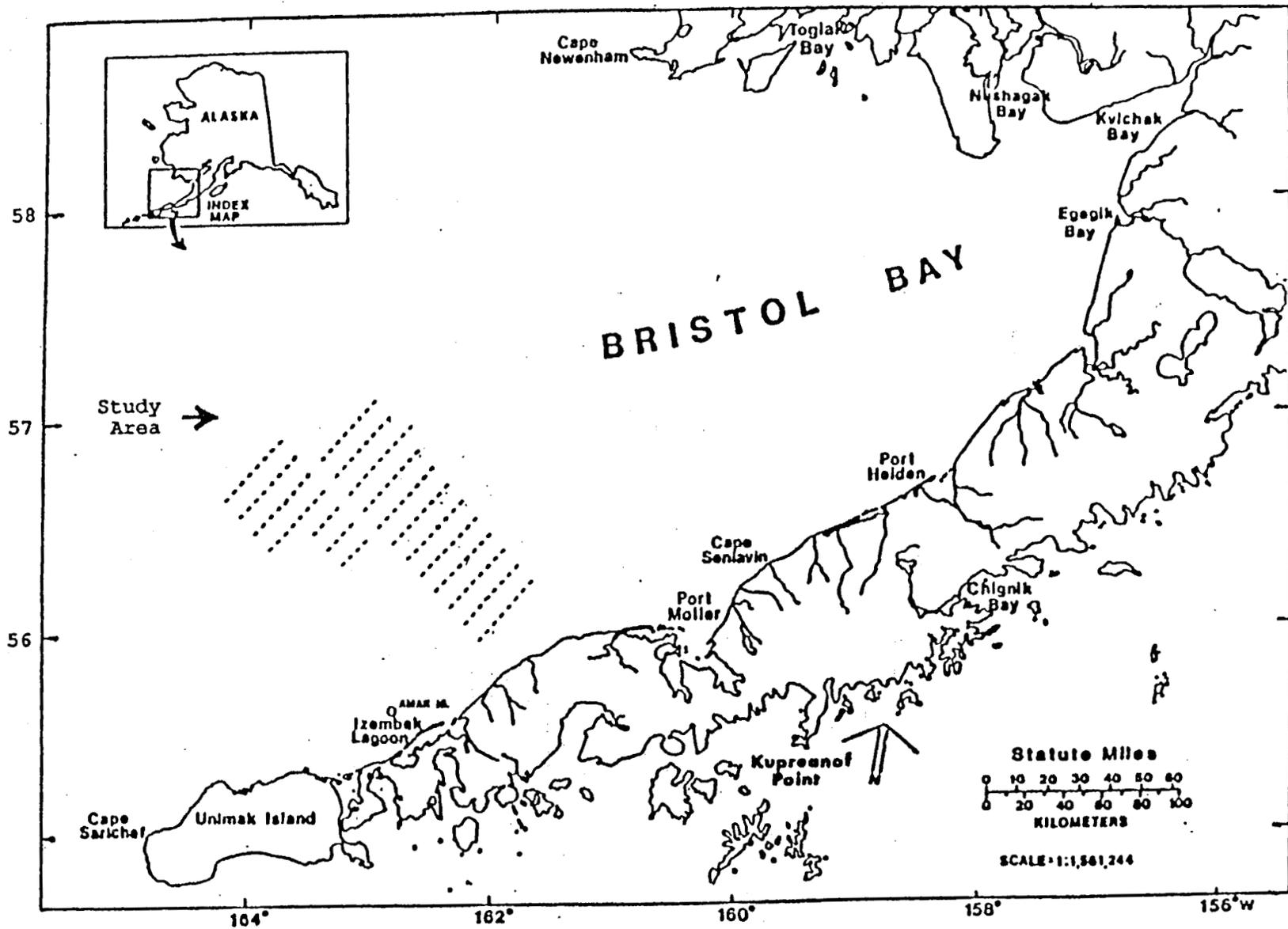


Figure 1. Location of 1991 Bristol Bay red king crab tagging study.

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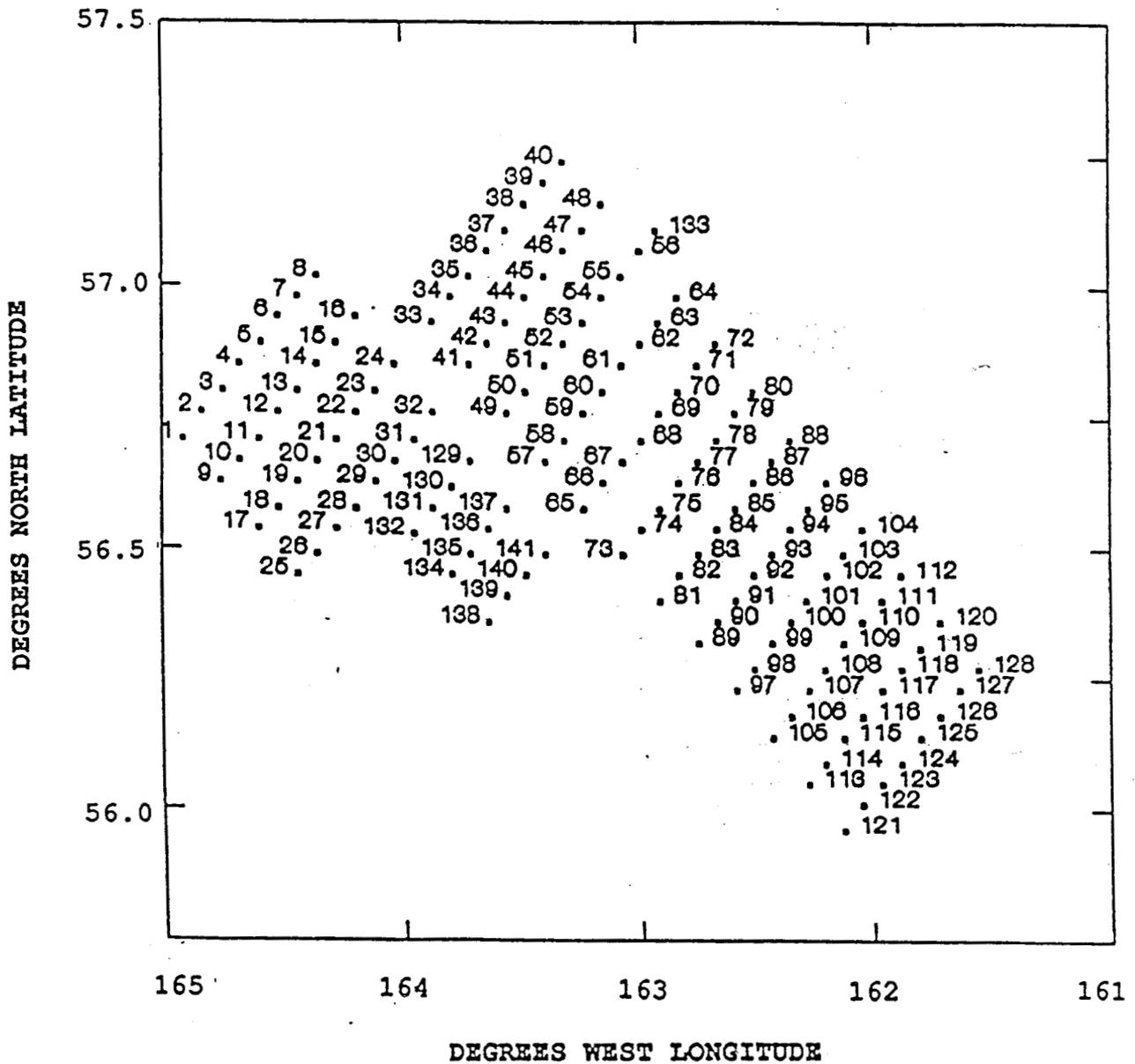


Figure 2. Layout of the 141 tagging stations in the 1991 Bristol Bay red king crab tagging study.

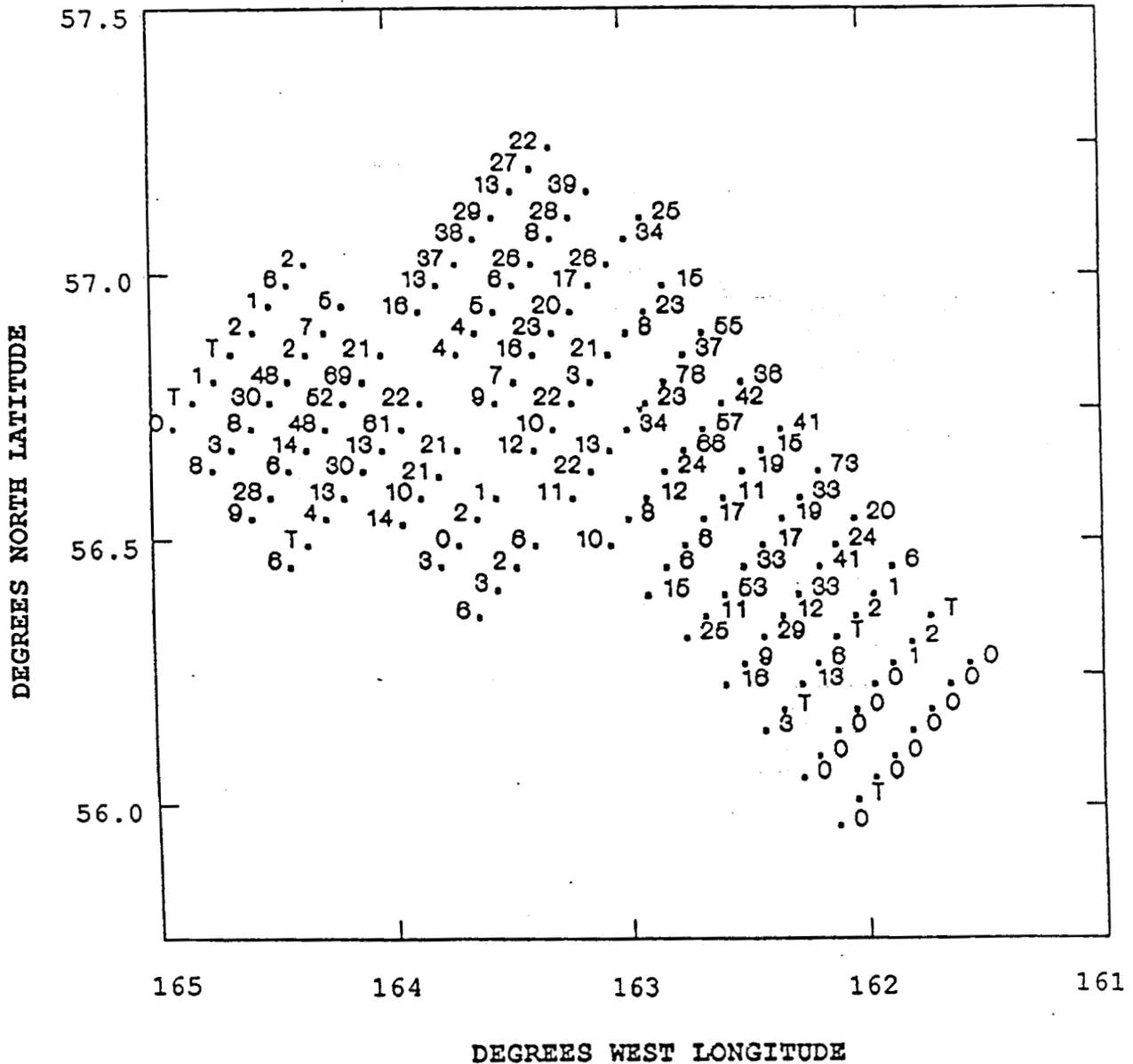
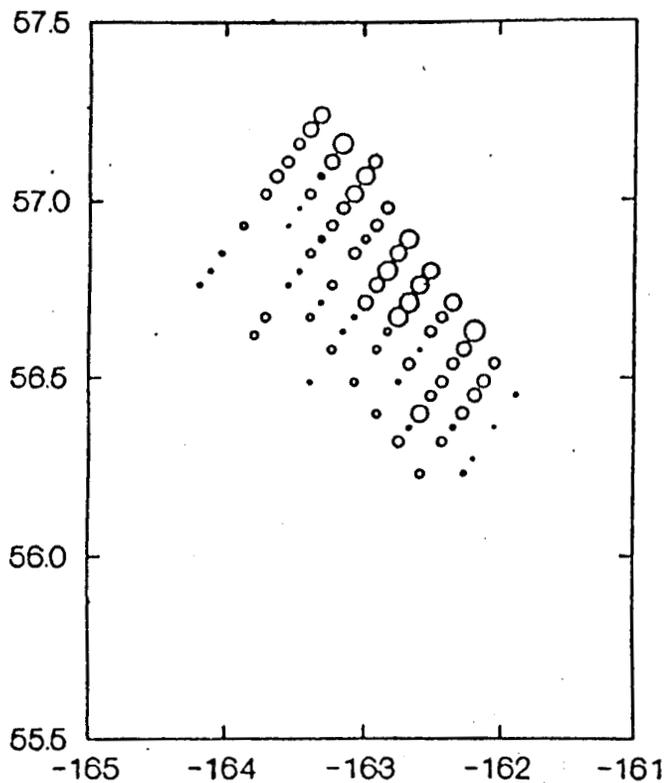


Figure 3. Average catch per pot of legal male red king crabs at 141 stations sampled during the 1991 Bristol Bay red king crab tagging study. Values are rounded down to the nearest whole integer, except for trace (T), which is between 0 and 1.

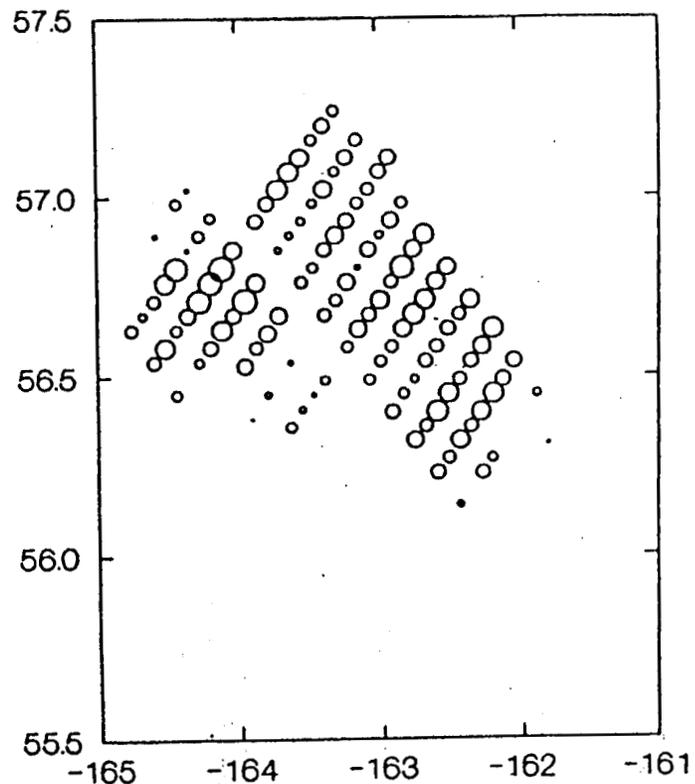
49 25

DEGREES NORTH LATITUDE

LEGAL MALE OLD SHELL



LEGAL MALE NEW SHELL



DEGREES WEST LONGITUDE

Figure 6. Distribution by station of legal male old-shell and new-shell red king crabs, caught during the 1991 Bristol Bay tagging study. Circle size in the above graphs is proportional to the log of the catch per pot.

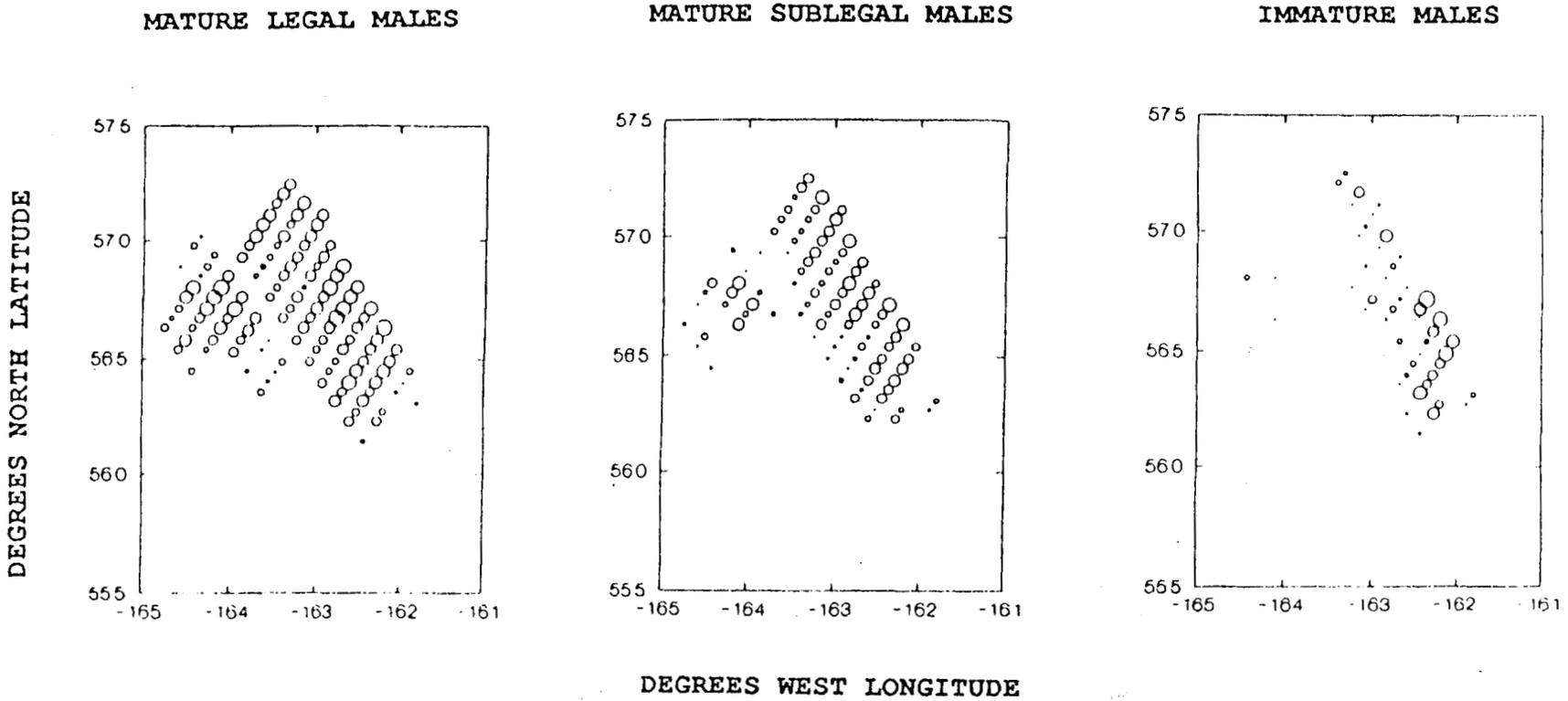


Figure 7. Distribution by station of mature legal and sublegal, and immature male red king crabs caught during the 1991 Bristol Bay tagging study. Circle size in the above graphs is proportional to the log of the catch per pot.

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MATURE FEMALES

IMMATURE FEMALES

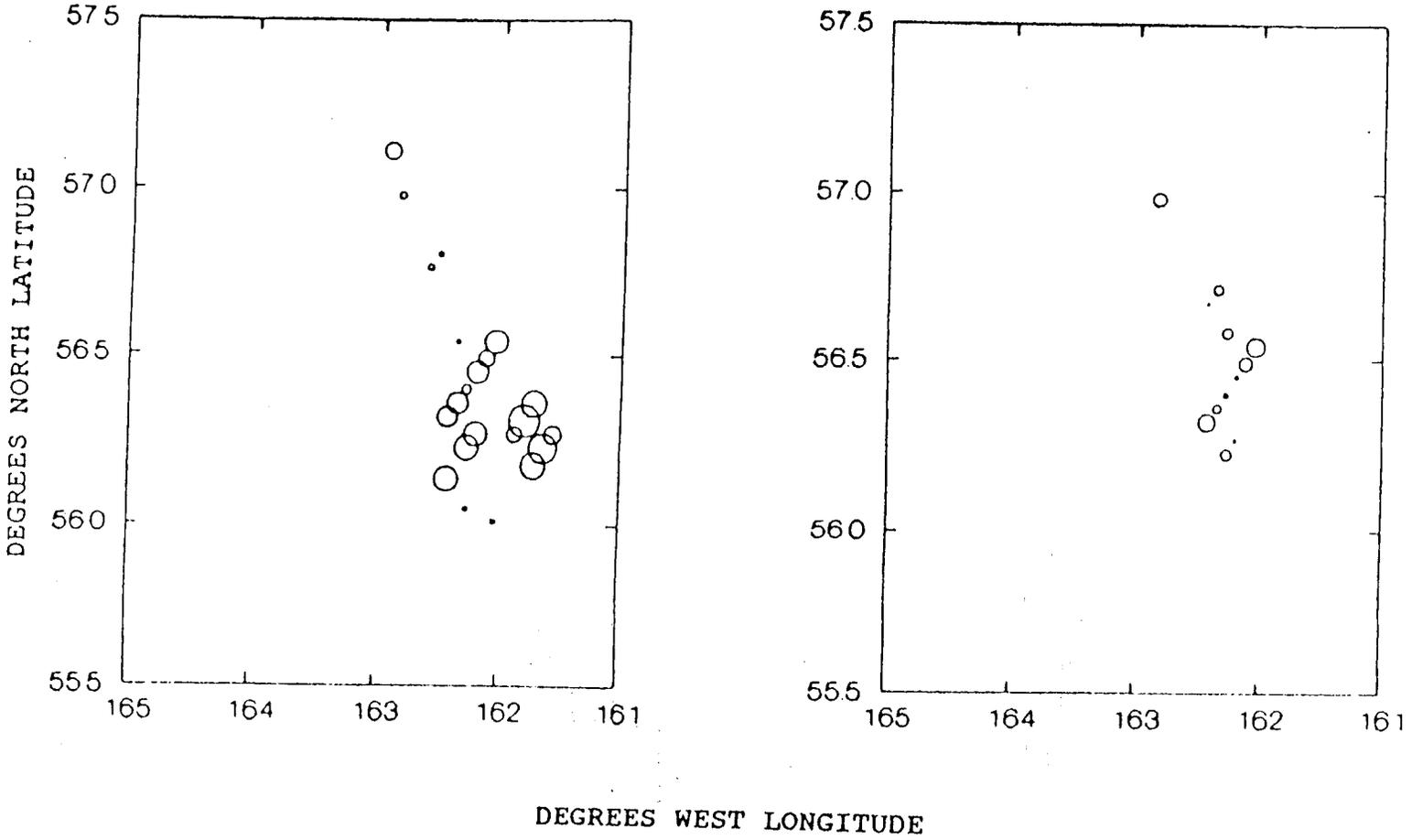


Figure 8. Distribution by station of mature and immature female red king crabs caught during the 1991 Bristol Bay tagging study. Circle size in the above graphs is proportional to the log of the catch per pot.

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Appendix A. Summary of red king crab fishing and catch data at 141 stations in the 1991 Bristol Bay tagging study.

Sta- tion	Date	North Lati- tude	West Longi- tude	Depth (m)	No. of Pots Sampled	Females	Males			
							Sublegal		Legal	
						<120mm CL	≥120mm CL	No.	Avg C/P	
1	09/05	56 43.	164 54.39	75	4	0	0	0	0	0.0
2	09/05	56 46.	164 49.53	75	4	0	0	0	1	0.3
3	09/05	56 48.	164 44.61	73	4	0	0	0	5	1.3
4	09/06	56 51.	164 40.00	73	4	0	0	0	1	0.3
5	09/06	56 53.	164 35.10	71	4	0	0	0	8	2.0
6	09/06	56 56.	164 30.34	70	4	0	0	2	4	1.0
7	09/06	56 59.	164 25.72	70	4	0	0	3	25	6.3
8	09/06	57 1.3	164 20.84	68	4	0	0	2	8	2.0
9	09/08	56 38.	164 44.88	75	4	0	0	9	32	8.0
10	09/08	56 40.	164 40.03	73	4	0	0	1	15	3.8
11	09/08	56 43.	164 35.25	71	4	0	0	6	34	8.5
12	09/08	56 46.	164 30.44	73	4	0	0	14	122	30.5
13	09/06	56 48.	164 25.61	73	4	0	16	56	193	48.3
14	09/06	56 51.	164 20.87	71	4	0	0	1	9	2.3
15	09/06	56 53.	164 16.12	71	4	0	0	3	29	7.3
16	09/06	56 57.	164 11.42	70	4	0	4	13	22	5.5
17	09/08	56 32.	164 35.24	79	4	0	0	7	37	9.3
18	09/08	56 35.	164 30.40	75	4	0	0	24	112	28.0
19	09/08	56 38.	164 25.66	75	4	0	0	2	27	6.8
20	09/08	56 40.	164 20.89	73	4	0	0	0	58	14.5
21	09/08	56 43.	164 16.10	73	4	0	1	18	192	48.0
22	09/09	56 45.	164 11.40	73	4	0	5	81	209	52.3
23	09/09	56 48.	164 6.59	71	4	0	6	138	276	69.0
24	09/09	56 51.	164 1.69	71	4	0	1	5	86	21.5
25	09/10	56 27.	164 25.72	82	2	0	0	4	12	6.0
26	09/10	56 30.	164 20.92	82	2	0	0	0	1	0.5
27	09/10	56 32.	164 16.07	79	2	0	0	0	9	4.5
28	09/10	56 35.	164 11.34	77	2	0	0	1	26	13.0
29	09/10	56 38.	164 6.47	77	2	0	3	43	60	30.0
30	09/10	56 40.	164 1.76	75	2	0	1	9	27	13.5
31	09/10	56 43.	163 57.03	73	2	0	1	54	122	61.0
32	09/10	56 46.	163 52.08	71	2	0	0	7	44	22.0
33	09/11	56 56.	163 52.21	70	2	0	0	3	32	16.0
34	09/11	56 59.	163 47.45	70	2	0	0	2	27	13.5
35	09/11	57 1.4	163 42.56	68	2	0	0	12	74	37.0
36	09/11	57 4.	163 37.85	66	2	0	0	12	76	38.0
37	09/12	57 6.7	163 32.99	66	2	0	1	14	58	29.0
38	09/12	57 9.3	163 28.33	64	2	0	0	7	26	13.0
39	09/12	57 12.	163 23.42	62	2	0	9	28	54	27.0
40	09/12	57 15.	163 18.55	59	2	2	7	33	45	22.5
41	09/12	56 51.	163 42.64	70	2	0	0	0	8	4.0
42	09/12	56 53.	163 37.78	70	2	0	0	0	8	4.0
43	09/12	56 56.	163 33.09	68	2	0	0	3	11	5.5
44	09/12	56 59.	163 28.28	66	2	0	1	9	12	6.0
45	09/12	57 1.4	163 23.41	66	2	0	2	8	53	26.5
46	09/12	57 4.1	163 18.76	64	2	0	1	10	17	8.5
47	09/12	57 6.7	163 13.89	62	2	0	3	18	56	28.0
48	09/12	57 9.4	163 9.13	62	2	1	34	81	78	39.0
49	09/13	56 45.	163 33.03	73	2	0	0	2	18	9.0
50	09/13	56 48.	163 28.27	71	2	0	0	5	15	7.5
51	09/13	56 51.	163 23.45	71	2	0	0	12	32	16.0

-Continued-

Appendix B. (page 32 of 56)

Appendix A. (page 2 of 3)

Station	Date	North Latitude	West Longitude	Depth (m)	No. of Pots Sampled	Females	Males			
							Sublegal		Legal	
							<120mm CL	>120mm CL	No.	Avg C/P
52	09/13	56 53.	163 18.68	70	2	0	0	25	46	23.0
53	09/13	56 56.	163 13.92	68	2	0	2	38	41	20.5
54	09/13	56 59.	163 9.12	68	2	1	3	29	34	17.0
55	09/13	57 1.3	163 4.48	68	2	1	5	34	53	26.5
56	09/14	57 4.1	162 59.52	68	2	0	3	56	69	34.5
57	09/14	56 40.	163 23.48	77	2	0	0	6	25	12.5
58	09/14	56 43.	163 18.67	73	2	0	0	8	20	10.0
59	09/14	56 45.	163 13.9	71	2	0	3	21	44	22.0
60	09/14	56 48.	163 9.09	70	2	0	1	9	7	3.5
61	09/14	56 51.	163 4.33	66	2	1	4	14	43	21.5
62	09/14	56 53.	162 59.55	64	2	0	2	9	16	8.0
63	09/14	56 56.	162 54.72	62	2	0	3	18	47	23.5
64	09/14	56 59.	162 49.95	60	2	36	63	78	31	15.5
65	09/14	56 35.	163 13.93	79	2	0	2	3	22	11.0
66	09/14	56 38.	163 9.09	77	2	0	1	28	44	22.0
67	09/14	56 40.	163 4.20	77	2	0	3	10	27	13.5
68	09/14	56 43.	162 59.53	73	2	0	20	37	68	34.0
69	09/26	56 45.	162 54.61	68	2	0	2	26	46	23.0
70	09/26	56 48.	162 49.72	66	2	0	3	79	157	78.5
71	09/26	56 51.	162 44.89	64	2	2	9	29	75	37.5
72	09/26	56 53.	162 40.14	66	2	0	4	31	111	55.5
73	09/26	56 30.	163 4.33	80	2	0	0	4	20	10.0
74	09/26	56 32.	162 59.48	79	2	0	1	4	16	8.0
75	09/26	56 35.	162 54.69	79	2	0	0	4	24	12.0
76	09/26	56 38.	162 49.83	79	2	0	4	17	48	24.0
77	09/25	56 40.	162 45.03	71	2	1	11	59	133	66.5
78	09/25	56 43.	162 40.23	71	2	0	5	38	115	57.5
79	09/25	56 45.	162 35.43	70	2	7	3	59	85	42.5
80	09/25	56 48.	162 30.57	68	2	5	2	16	72	36.0
81	09/26	56 24.	162 54.61	80	2	0	2	7	31	15.5
82	09/27	56 27.	162 50.01	80	2	0	0	3	13	6.5
83	09/27	56 30.	162 45.17	79	2	0	0	6	12	6.0
84	09/27	56 32.	162 40.33	79	2	0	8	15	35	17.5
85	09/27	56 35.	162 35.53	75	2	0	2	5	22	11.0
86	09/27	56 38.	162 30.75	73	2	0	2	13	38	19.0
87	09/27	56 40.	162 25.87	70	2	4	55	22	31	15.5
88	09/27	56 43.	162 21.02	70	2	14	192	81	82	41.0
89	09/29	56 19.	162 45.23	80	2	1	2	24	51	25.5
90	09/29	56 22.	162 40.40	80	2	0	3	5	23	11.5
91	09/29	56 24.	162 35.63	75	2	0	7	30	106	53.0
92	09/29	56 27.	162 30.79	75	2	2	10	39	66	33.0
93	09/29	56 30.	162 25.97	75	2	1	3	22	34	17.0
94	09/29	56 32.	162 21.17	73	2	5	7	21	38	19.0
95	09/29	56 35.	162 16.39	73	2	16	40	32	67	33.5
96	09/29	56 38.	162 11.47	73	2	4	98	63	147	73.5
97	09/30	56 14.	162 35.59	75	2	2	4	11	32	16.0
98	09/30	56 16.	162 30.83	75	2	1	1	3	18	9.0
99	09/30	56 19.	162 26.05	75	2	140	99	32	58	29.0
100	09/30	56 22.	162 21.28	70	2	125	26	30	25	12.5
101	09/30	56 24.	162 16.52	68	2	18	33	51	67	33.5
102	09/30	56 27.	162 11.70	68	2	138	31	46	83	41.5
103	09/30	56 30.	162 6.92	75	2	76	105	30	48	24.0
104	09/30	56 32.	162 2.11	71	2	245	68	17	40	20.0

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Appendix A. (page 3 of 3)

Sta- tion	Date	North Lati- tude	West Longi- tude	Depth (m)	No. of Pots Sampled	Females	Males		Legal No.	Avg C/P
							<120mm CL	>120mm CL		
105	10/01	56 8.3	162 26.02	75	2	197	5	1	7	3.5
106	10/01	56 11.	162 21.27	77	2	0	0	0	1	0.5
107	10/01	56 14.	162 16.48	75	2	235	56	20	27	13.5
108	10/01	56 16.	162 11.75	79	2	201	18	8	13	6.5
109	10/01	56 19.	162 6.99	79	2	0	0	0	1	0.5
110	10/01	56 22.	162 2.23	82	2	0	0	1	5	2.5
111	10/01	56 24.	161 57.38	80	2	0	0	0	3	1.5
112	10/01	56 27.	161 52.60	84	2	0	0	1	12	6.0
113	10/02	56 3.	162 16.45	71	2	5	0	0	0	0.0
114	10/02	56 5.7	162 11.74	71	2	0	0	0	0	0.0
115	10/02	56 8.3	162 7.01	73	2	0	0	0	0	0.0
116	10/02	56 11.	162 2.21	71	2	0	0	0	0	0.0
117	10/02	56 14.	161 57.45	73	2	0	0	0	0	0.0
118	10/02	56 16.	161 52.66	75	2	41	3	4	2	1.0
119	10/02	56 19.	161 47.99	75	2	1026	8	8	5	2.5
120	10/02	56 22.	161 43.16	70	2	317	0	0	1	0.5
121	10/02	55 58.	162 7.03	46	2	0	0	0	0	0.0
122	10/02	56 0.3	162 2.21	51	2	5	0	0	1	0.5
123	10/02	56 3.	161 57.43	51	2	0	0	0	0	0.0
124	10/02	56 5.6	161 52.73	51	2	0	0	0	0	0.0
125	10/02	56 8.3	161 47.95	55	2	0	0	0	0	0.0
126	10/02	56 11.	161 43.12	59	2	260	1	0	0	0.0
127	10/02	56 14.	161 38.42	59	2	559	0	0	0	0.0
128	10/02	56 16.	161 33.36	59	2	64	0	0	0	0.0
129	09/11	56 40.	163 42.78	73	2	0	1	6	43	21.5
130	09/11	56 37.	163 47.62	75	2	0	0	1	43	21.5
131	09/11	56 35.	163 52.43	77	2	0	0	2	20	10.0
132	09/11	56 32.	163 57.22	79	2	0	0	1	29	14.5
133	09/14	57 6.4	162 55.13	59	2	55	4	21	51	25.5
134	10/03	56 45	163 78.80	79	2	0	0	2	6	3.0
135	10/05	56 30.	163 42.48	80	2	0	0	0	0	0.0
136	10/05	56 32.	163 37.73	79	2	0	0	1	4	2.0
137	10/05	56 35.	163 32.88	77	2	0	2	1	3	1.5
138	10/05	56 22.	163 37.65	82	2	0	0	1	13	6.5
139	10/05	56 24.	163 32.95	82	2	0	0	2	6	3.0
140	10/05	56 27.	163 28.00	80	2	0	0	0	4	2.0
141	10/05	56 30.	163 23.25	79	2	0	0	1	13	6.5
TOTAL					330	3,814	1,151	2,243	5,531	16.7

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Appendix B. Percent maturity by length class of new-shell, female red king crabs caught during the 1991 Bristol Bay tagging study.

Carapace Length (mm)	Without Embryos	With Embryos ^a	Total	Percent Mature
67	1	0	1	0.0
70	1	0	1	0.0
72	1	0	1	0.0
73	1	0	1	0.0
74	4	0	4	0.0
75	1	0	1	0.0
76	3	0	3	0.0
77	3	0	3	0.0
78	10	0	10	0.0
79	13	0	13	0.0
80	3	0	3	0.0
81	5	0	5	0.0
82	8	0	8	0.0
83	15	0	15	0.0
84	13	0	13	0.0
85	9	1	10	10.0
86	18	0	18	0.0
87	12	1	13	7.7
88	15	3	18	16.7
89	6	0	6	0.0
90	12	1	13	7.7
91	5	4	9	44.4
92	5	4	9	44.4
93	7	4	11	36.4
94	1	6	7	85.7
95	1	7	8	87.5
96	0	5	5	100.0
97	1	10	11	90.9
98	3	11	14	78.6
99	3	5	8	62.5
100	0	5	5	100.0
101	0	9	9	100.0
102	0	6	6	100.0
103	0	5	5	100.0
104	0	7	7	100.0
105	1	10	11	90.9
106	0	6	6	100.0
107	0	5	5	100.0
108	0	7	7	100.0
109	0	4	4	100.0
110	0	11	11	100.0
111	0	5	5	100.0
112	0	21	21	100.0
113	0	9	9	100.0

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Carapace Length (mm)	Without Embryos	With Embryos ^a	Total	Percent Mature
114	0	18	18	100.0
116	0	15	15	100.0
117	0	20	20	100.0
118	0	34	34	100.0
119	0	22	22	100.0
120	0	14	14	100.0
121	0	20	20	100.0
122	0	25	25	100.0
123	0	22	22	100.0
124	0	30	30	100.0
125	0	25	25	100.0
126	0	13	13	100.0
127	0	22	22	100.0
128	0	27	27	100.0
129	0	19	19	100.0
130	0	20	20	100.0
131	0	16	16	100.0
132	0	12	12	100.0
133	0	15	15	100.0
134	0	15	15	100.0
135	0	9	9	100.0
136	0	10	10	100.0
137	0	6	6	100.0
138	0	3	3	100.0
139	0	2	2	100.0
140	0	2	2	100.0
141	0	1	1	100.0
142	0	1	1	100.0
143	0	1	1	100.0
144	0	5	5	100.0
149	1	0	1	0.0
Totals	182	627	809	77.5

^aIncludes females with embryo membrane remnants (empty egg cases) or funiculi.

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Appendix C. Summary of Tanner crab fishing and catch data at 141 stations, in the 1991 Bristol Bay tagging study.

Sta- tion	Date	North Lati- tude	West Long- itude	Depth (fms)	No. of Pots Sampled	Females	Sub- legal	Males	
								No.	Legal Ave C/P
1	09/05	56 43.	164 54.39	41	4	0	23	13	3.2
2	09/05	56 46.	164 49.53	41	4	4	7	12	3.0
3	09/05	56 48.	164 44.61	40	4	0	1	7	1.8
4	09/06	56 51.	164 40.00	40	4	0	0	2	0.5
5	09/06	56 53.	164 35.10	39	4	1	4	1	0.3
6	09/06	56 56.	164 30.34	38	4	0	4	9	2.2
7	09/06	56 59.	164 25.72	38	4	0	3	5	1.3
8	09/06	57 1.3	164 20.84	37	4	0	1	11	2.7
9	09/08	56 38.	164 44.88	41	4	0	5	8	1.9
10	09/08	56 40.	164 40.03	40	4	0	1	6	1.5
11	09/08	56 43.	164 35.20	39	4	0	5	14	3.4
12	09/08	56 46.	164 30.40	40	4	0	7	8	2.0
13	09/06	56 48.	164 25.61	40	4	0	4	34	8.4
14	09/06	56 51.	164 20.87	39	4	0	7	34	8.4
15	09/06	56 53.	164 16.12	39	4	1	0	38	9.5
16	09/06	56 57.	164 11.42	38	4	0	11	39	9.7
17	09/08	56 32.	164 35.24	43	4	0	10	8	2.1
18	09/08	56 35.	164 30.40	41	4	0	4	6	1.5
19	09/08	56 38.	164 25.66	41	4	0	3	18	4.5
20	09/08	56 40.	164 20.89	40	4	0	1	2	0.5
21	09/08	56 43.	164 16.10	40	4	0	0	13	3.3
22	09/09	56 45.	164 11.40	40	4	0	6	21	5.2
23	09/09	56 48.	164 6.59	39	4	0	0	15	3.8
24	09/09	56 51.	164 1.69	39	4	0	2	15	3.7
25	09/10	56 27.	164 25.72	45	2	1	14	8	4.2
26	09/10	56 30.	164 20.92	45	2	2	1	17	8.4
27	09/10	56 32.	164 16.07	43	2	0	6	23	11.6
28	09/10	56 35.	164 11.34	42	2	0	7	19	9.4
29	09/10	56 38.	164 6.47	42	2	1	2	6	3.0
30	09/10	56 40.	164 1.76	41	2	0	1	9	4.3
31	09/10	56 43.	163 57.03	40	2	0	12	5	2.5
32	09/10	56 46.	163 52.08	39	2	1	4	25	12.3
33	09/11	56 56.	163 52.21	38	2	0	4	39	19.3
34	09/11	56 59.	163 47.45	38	2	0	9	24	12.2
35	09/11	57 1.4	163 42.56	37	2	0	18	26	13.2
36	09/11	57 4.	163 37.85	36	2	0	2	5	2.5
37	09/12	57 6.7	163 32.99	36	2	0	3	10	4.8
38	09/12	57 9.3	163 28.33	35	2	0	8	13	6.6
39	09/12	57 12	163 23.42	34	2	0	6	0	0.0
40	09/12	57 15.	163 18.55	32	2	0	2	1	0.5
41	09/12	56 51.	163 42.64	38	2	0	2	16	7.8
42	09/12	56 53.	163 37.78	38	2	0	2	17	8.7
43	09/12	56 56.	163 33.09	37	2	0	7	19	9.5
44	09/12	56 59.	163 28.28	36	2	0	11	12	6.2
45	09/12	57 1.4	163 23.41	36	2	0	0	7	3.5
46	09/12	57 4.1	163 18.76	35	2	0	6	5	2.4
47	09/12	57 6.7	163 13.89	34	2	1	9	10	5.0
48	09/12	57 9.4	163 9.13	34	2	0	2	2	1.0
49	09/13	56 45.	163 33.03	40	2	0	2	17	8.4
50	09/13	56 48.	163 28.27	39	2	0	7	27	13.6
51	09/13	56 51.	163 23.45	39	2	0	6	20	9.8
52	09/13	56 53.	163 18.60	38	2	0	10	14	7.2

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Appendix C. (page 2 of 3)

Sta- tion	Date	North Lati- tude	West Long- itude	Depth (fms)	No. of Pots Sampled	Females	Sub- legal	Males	
								No.	Ave C/P
53	09/13	56 56.	163 13.92	37	2	0	1	5	2.5
54	09/13	56 59.	163 9.12	37	2	0	2	3	1.5
55	09/13	57 1.3	163 4.48	37	2	0	2	3	1.5
56	09/14	57 4.1	162 59.52	37	2	0	1	0	0.0
57	09/14	56 40.	163 23.48	42	2	0	0	37	18.5
58	09/14	56 43.	163 18.67	40	2	0	6	8	4.1
59	09/14	56 45.	163 13.90	39	2	0	16	62	31.2
60	09/14	56 48.	163 9.09	38	2	0	2	9	4.5
61	09/14	56 51.	163 4.33	36	2	2	2	9	4.5
62	09/14	56 53.	162 59.55	35	2	0	2	1	0.5
63	09/14	56 56.	162 54.72	34	2	1	1	4	2.0
64	09/14	56 59.	162 49.95	33	2	0	3	1	0.5
65	09/14	56 35.	163 13.93	43	2	94	25	38	19.0
66	09/14	56 38.	163 9.09	42	2	0	4	19	9.7
67	09/14	56 40.	163 4.2	42	2	0	1	8	4.0
68	09/14	56 43.	162 59.53	40	2	0	2	20	9.8
69	09/26	56 45.	162 54.61	37	2	0	0	9	4.5
70	09/26	56 48.	162 49.72	36	2	0	4	13	6.3
71	09/26	56 51.	162 44.89	35	2	0	5	3	1.5
72	09/26	56 53.	162 40.14	36	2	0	0	1	0.5
73	09/26	56 30.	163 4.33	44	2	5	3	26	12.8
74	09/26	56 32.	162 59.48	43	2	0	0	14	7.0
75	09/26	56 35.	162 54.69	43	2	1	10	37	18.7
76	09/26	56 38.	162 49.83	43	2	0	8	28	14.2
77	09/25	56 40.	162 45.03	39	2	0	2	12	5.9
78	09/25	56 43.	162 40.23	39	2	0	0	11	5.5
79	09/25	56 45.	162 35.43	38	2	0	1	6	3.0
80	09/25	56 48.	162 30.57	37	2	0	0	7	3.5
81	09/26	56 24.	162 54.61	44	2	9	1	13	6.4
82	09/27	56 27.	162 50.01	44	2	0	0	10	5.0
83	09/27	56 30.	162 45.17	43	2	0	2	16	8.2
84	09/27	56 32.	162 40.33	43	2	0	3	12	5.9
85	09/27	56 35.	162 35.53	41	2	0	0	3	1.5
86	09/27	56 38.	162 30.75	40	2	0	2	13	6.7
87	09/27	56 40.	162 25.87	38	2	0	3	14	7.2
88	09/27	56 43.	162 21.02	38	2	0	1	12	5.8
89	09/29	56 19.	162 45.23	44	2	0	0	4	2.0
90	09/29	56 22.	162 40.40	44	2	0	3	15	7.6
91	09/29	56 24.	162 35.63	41	2	0	1	5	2.5
92	09/29	56 27.	162 30.79	41	2	0	5	12	6.2
93	09/29	56 30.	162 25.97	41	2	0	2	1	0.5
94	09/29	56 32.	162 21.17	40	2	0	0	5	2.5
95	09/29	56 35.	162 16.39	40	2	0	3	14	6.8
96	09/29	56 38.	162 11.47	40	2	1	5	36	18.2
97	09/30	56 14.	162 35.59	41	2	0	0	2	1.0
98	09/30	56 16.	162 30.83	41	2	1	7	8	4.2
99	09/30	56 19.	162 26.05	41	2	0	0	0	0.0
100	09/30	56 22.	162 21.28	38	2	0	0	4	2.0
101	09/30	56 24.	162 16.52	37	2	0	1	8	3.8
102	09/30	56 27.	162 11.7	37	2	0	0	2	1.0
103	09/30	56 30.	162 6.92	41	2	0	2	4	2.0
104	09/30	56 32.	162 2.11	39	2	0	6	10	4.9

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Appendix C. (page 3 of 3)

Sta- tion	Date	North Lati- tude	West Long- itude	Depth (fms)	No. of Pots Sampled	Females	Sub- legal	Males	
								No.	Legal Ave C/P
105	10/01	56 8.3	162 26.02	41	2	0	9	32	15.8
106	10/01	56 11.	162 21.27	42	2	0	0	1	0.5
107	10/01	56 14.	162 16.48	41	2	0	6	1	0.5
108	10/01	56 16.	162 11.75	43	2	0	4	36	18.0
109	10/01	56 19.	162 6.99	43	2	0	0	14	7.0
110	10/01	56 22.	162 2.23	45	2	3	14	54	27.2
111	10/01	56 24.	161 57.38	44	2	0	0	3	1.5
112	10/01	56 27.	161 52.6	46	2	0	0	1	0.5
113	10/02	56 3.	162 16.45	39	2	0	16	0	0.0
114	10/02	56 5.7	162 11.74	39	2	0	0	0	0.0
115	10/02	56 8.3	162 7.01	40	2	0	1	0	0.0
116	10/02	56 11.	162 2.21	39	2	0	1	0	0.0
117	10/02	56 14.	161 57.45	40	2	0	2	0	0.0
118	10/02	56 16.	161 52.66	41	2	0	3	5	2.3
119	10/02	56 19.	161 47.99	41	2	1	5	2	1.0
120	10/02	56 22.	161 43.16	38	2	0	0	0	0.0
121	10/02	55 58.	162 7.03	25	2	0	0	0	0.0
122	10/02	56 0.3	162 2.21	28	2	0	0	0	0.0
123	10/02	56 3.	161 57.43	28	2	0	0	0	0.0
124	10/02	56 5.6	161 52.73	28	2	0	0	0	0.0
125	10/02	56 8.3	161 47.95	30	2	0	2	0	0.0
126	10/02	56 11.	161 43.12	32	2	0	0	0	0.0
127	10/02	56 14.	161 38.42	32	2	0	0	0	0.0
128	10/02	56 16.	161 33.36	32	2	1	2	0	0.0
129	09/11	56 40.	163 42.78	40	2	0	0	42	21.0
130	09/11	56 37.	163 47.62	41	2	0	0	32	16.0
131	09/11	56 35.	163 52.43	42	2	0	8	26	12.8
132	09/11	56 32.	163 57.22	43	2	0	0	30	15.0
133	09/14	57 6.4	162 55.13	32	2	0	3	1	0.5
134	10/03	56 45	163 78.80	43	2	6	5	5	2.5
135	10/05	56 30.	163 42.48	44	2	10	0	49	24.5
136	10/05	56 32.	163 37.73	43	2	7	0	32	16.0
137	10/05	56 35.	163 32.88	42	2	58	74	72	35.8
138	10/05	56 22.	163 37.65	45	2	0	2	7	3.5
139	10/05	56 24.	163 32.95	45	2	0	1	9	4.5
140	10/05	56 27.	163 28.00	44	2	4	7	7	3.6
141	10/05	56 30.	163 23.25	43	2	0	6	11	5.4
TOTALS					332	222	604	1,833	5.5

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Appendix B. Forms

- Form 1. ADF&G Pilot House Log
- Form 2. ADF&G Crab Collection and R5 Proximal Segment Record
- Form 3. ADF&G Red King Crab Size Group Tally Record (Onboard Collection)
- Form 4. ADF&G Red King Crab Size Group Tally Record (Packaging for 10/92 Shipment to SMC)
- Form 5. ADF&G Observer Practicum Crab Collection Record (Onboard Collection)
- Form 6. ADF&G Crab Research Data Form (should be lots of these in Dutch Harbor Research storage)
- Form 7. ADF&G Westward Region Crab Tag Recovery Form (will change slightly for 1992 fishery)

FORM 2

ADF&G CRAB COLLECTION AND R5 PROXIMAL SEGMENT RECORD

SPECIES _____ STRING NUMBER

 REGISTRATION AREA Bristol Bay

SEX _____ BUOY NUMBER _____ MEASURER _____

VESSEL KRISTEN GAIL TRAWL HAUL NUMBER _____ RECORDER _____

DATE

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 SAMPLING FACTOR

		/		
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 PAGE _____ OF _____

SEQUENTIAL POT NUMBER	SPECIES	SEX	CARAPACE LENGTH (MM)	SIZE GROUP	LEGAL	SHELL AGE	EGGS				R5 PROXIMAL SEGMENT		COMMENTS
							COLOR	DEVELOP	CONDITION	% CLUTCH	LENGTH (MM)	WIDTH (MM)	
1		2											
2		2											
3		2											
4		2											
5		2											
6		2											
7		2											
8		2											
9		2											
10		2											
11		2											
12		2											
13		2											
14		2											
15		2											
16		2											
17		2											
18		2											
19		2											
20		2											

- | | | | | |
|--|---|--|--|---|
| <p><u>Crab Species</u></p> <p>2 - P. camtschaticus</p> <p><u>Sex</u></p> <p>1 - Male</p> <p>2 - Female</p> <p><u>Size Group</u></p> <p>1 - 120-124mm</p> <p>2 - 125-129mm</p> <p>3 - 130-134mm</p> | <p><u>Legal</u></p> <p>1 - Sublegal</p> <p>2 - Legal</p> <p>3 - Juvenile</p> <p>4 - Adult</p> <p><u>Shell Age</u></p> <p>0 - Soft</p> <p>1 - New</p> <p>2 - Old</p> <p>3 - Very Old</p> | <p><u>Live Egg Color</u></p> <p>1 - Tan</p> <p>2 - Purple</p> <p>3 - Brown</p> <p>4 - Orange</p> <p>5 - Purple-brown</p> <p>6 - Pink</p> <p>7 - Reddish</p> <p>8 -</p> <p>9 -</p> <p>0 - Other, describe in comments</p> | <p><u>Egg Devel</u></p> <p>1 - Uneyed</p> <p>2 - Eyed</p> <p><u>Clutch Condition</u></p> <p>1 - Dead eggs not apparent</p> <p>2 - Dead eggs <20%</p> <p>3 - Dead eggs >20%</p> | <p><u>Percent Clutch</u></p> <p>1 - Barren, clean pleopods</p> <p>2 - Barren, with empty eggs cases and/or stalks</p> <p>3 - Clutch 1-29% full</p> <p>4 - Clutch 30-59% full</p> <p>5 - Clutch 60-89% full</p> <p>6 - Clutch 90-100% full</p> |
|--|---|--|--|---|

FORM 3 ADF&G RED KING CRAB SIZE GROUP TALLY RECORD
(Onboard Collection)

SEX _____

RECORDER(S) _____

SIZE GROUP (MM)		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		
1	120-124												
2	125-129												
3	130-134												

SIZE GROUP (MM)		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		
1	120-124												
2	125-129												
3	130-134												

SIZE GROUP (MM)		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		
1	120-124												
2	125-129												
3	130-134												

FORM 4

ADF&G RED KING CRAB SIZE GROUP TALLY RECORD
(Packaging for 10/92 Shipment to SMC)

PACKER(S) _____

RECORDER(S) _____

SEX _____

DATE _____

SIZE GROUP (MM)		TALLY	TOTAL
1	120-124		
2	125-129		
3	130-134		

FORM 5

ADF&G OBSERVER PRACTICUM CRAB COLLECTION RECORD

(Onboard Collection)

RECORDER(S) _____

SEX	SPECIES	DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

SEX	SPECIES	DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

SEX	SPECIES	DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

FORM 6

ADF&G CRAB RESEARCH DATA FORM

SPECIES _____ STATION NUMBER

--	--	--	--	--

 REGISTRATION AREA BRISTOL BAY

SEX _____ BUOY NUMBER

--	--	--	--	--

 MEASURER _____

VESSEL KRISTEN GAIL TRAWL HAUL NUMBER

--	--	--	--	--

 RECORDER _____

DATE

--	--	--	--	--

 SAMPLING FACTOR

		/		
--	--	---	--	--

 PAGE _____ OF _____

SEQUENTIAL POT NUMBER	SPECIES	SEX	SIZE CRABS (MM) FISH (CM)	LEGAL	SHELL AGE	EGGS				OTHER	TAG NUMBER	PIT.I.D. REFERENCE NO.	COMMENTS
						COLOR	DEVELOP	CONDITION	% CLUTCH				
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													

- | | | | | | |
|--|--|---|--|--|---|
| <p>Crab Species</p> <ul style="list-style-type: none"> 1 - <i>L. aequispina</i> 2 - <i>P. camtschaticus</i> 3 - <i>P. platypus</i> 4 - <i>Erimacrus</i> 5 - <i>C. bairdi</i> x <i>opilio</i> 6 - <i>C. bairdi</i> 7 - <i>C. opilio</i> 8 - <i>C. angulatus</i> 9 - <i>Cancer magister</i> A - <i>L. couesi</i> D - <i>C. tanneri</i> | <p>Fish & Invert. Species</p> <p>See coded species list</p> <p>Sex</p> <ul style="list-style-type: none"> 1 - Male 2 - Female <p>Legal</p> <ul style="list-style-type: none"> 1 - Sublegal 2 - Legal <p>Shell Age</p> <ul style="list-style-type: none"> 0 - Soft 1 - New 2 - Old 3 - Very Old | <p>Live Egg Color</p> <ul style="list-style-type: none"> 1 - Tan 2 - Purple 3 - Brown 4 - Orange 5 - Purple-brown 6 - Pink 7 - Reddish 8 - 9 - 0 - Other, describe in comments | <p>Egg Devel</p> <ul style="list-style-type: none"> 1 - Uneyed 2 - Eyed <p>Clutch Condition</p> <ul style="list-style-type: none"> 1 - Dead eggs not apparent 2 - Dead eggs <20% 3 - Dead eggs >20% | <p>Percent Clutch</p> <ul style="list-style-type: none"> 1 - Barren, clean pleopods 2 - Barren, with empty eggs cases and/or stalks 3 - Clutch 1-29% full 4 - Clutch 30-59% full 5 - Clutch 60-89% full 6 - Clutch 90-100% full | <p>Others</p> <ul style="list-style-type: none"> 1 - Dead 2 - Alive 3 - Nemertean in clutch 4 - Turbellarians in clutch 5 - Black mat 6 - Blitter crab disease 7 - "cottage cheese" disease 8 - Shell rust 9 - <i>B. callosus</i> |
|--|--|---|--|--|---|

42 66

FORM 7

ADF&G WESTWARD REGION CRAB TAG RECOVERY FORM

SPECIES _____ SEX a/ _____ REGISTRATION AREA _____ RECORDER _____

External Tag Series & Number	Size (mm) King - CL Tanner - CW	Shell Age b/	Fate c/	CAPTURE											DEPTH (fm)	STATISTICAL AREA	ADF&G VESSEL NO.
				Mo.	Day	Yr.	LATITUDE - N				LONGITUDE - E OR W						
1																	
2																	
3																	
4																	
5																	
6																	
7																	

a/ If female crab record additional data on back. b/ Shell Age: 0 = Soft; 1 = New; 2 = Old; 3 = Very Old. c/ Fate: 1 = Dead; 2 = Rereleased.

Appendix B. (page 46 of 56)

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Received Tag or Tagged Crab From: Who? When? Where? Address:	Recovery Location Data From: Who? When? Where? Address:	Vessel Name	Codes d/	PIT TAGS									
				ID Numbers & Letters									
1													
2													
3													
4													
5													
6													
7													

d/ Pit Codes: 1 = Detected; 2 = Not detected (no Pit tag found upon dissection); 3 = Not checked (tail section unavailable); 4 = Not checked (tail section collected, must have flov tag attached).

Appendix B. (page 47 of 56)

Appendix C. Table of Random Digits

TABLE A 1
TEN THOUSAND RANDOMLY ASSORTED DIGITS

	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
00	54463	22662	65905	70639	79365	67382	29085	69831	47058	08186
01	15389	85205	18850	39226	42249	90669	96325	23248	60933	26927
02	85941	40756	82414	02015	13858	78030	16269	65978	01385	15345
03	61149	69440	11286	88218	58925	03638	52862	62733	33451	77455
04	05219	81619	10651	67079	92511	59888	84502	72095	83463	75577
05	41417	98326	87719	92294	46614	50948	64886	20002	97365	30976
06	28357	94070	20652	35774	16249	75019	21145	05217	47286	76305
07	17783	00015	10806	83091	91530	36466	39981	62481	49177	75779
08	40950	84820	29881	85966	62800	70326	84740	62660	77379	90279
09	82995	64157	66164	41180	10089	41757	78258	96488	88629	37231
10	96754	17676	55659	44105	47361	34833	86679	23930	53249	27083
11	34357	88040	53364	71726	45690	66334	60332	22554	90600	71113
12	06318	37403	49927	57715	50423	67372	63116	48888	21505	80182
13	62111	52820	07243	79931	89292	84767	85693	73947	22278	11551
14	47534	09243	67879	00544	23410	12740	02540	54440	32949	13491
15	98614	75993	84460	62846	59844	14922	48730	73443	48167	34770
16	24856	03648	44898	09351	98795	18644	39765	71058	90368	44104
17	96887	12479	80621	66223	86085	78285	02432	53342	42846	94771
18	90801	21472	42815	77408	37390	76766	52615	32141	30268	18106
19	55165	77312	83666	36028	28420	70219	81369	41943	47366	41067
20	75884	12952	84318	95108	72305	64620	91318	89872	45375	85436
21	16777	37116	58550	42958	21460	43910	01175	87894	81378	10620
22	46230	43877	80207	88877	89380	32992	91380	03164	98656	59337
23	42902	66892	46134	01432	94710	23474	20423	60137	60609	13119
24	81007	00333	39693	28039	10154	95425	39220	19774	31782	49037
25	68089	01122	51111	72373	06902	74373	96199	97017	41273	21546
26	20411	67081	89950	16944	93054	87687	96693	87236	77054	33848
27	58212	13160	06468	15718	82627	76999	05999	58680	96739	63700
28	70577	42866	24969	61210	76046	67699	42054	12696	93758	03283
29	94522	74358	71659	62038	79643	79169	44741	05437	39038	13163
30	42626	86819	85651	88678	17401	03252	99547	32404	17918	62880
31	16051	33763	57194	16752	54450	19031	58580	47629	54132	60631
32	08244	27647	33851	44705	94211	46716	11738	55784	95374	72655
33	59497	04392	09419	89964	51211	04894	72882	17805	21896	83864
34	97155	13428	40293	09985	58434	01412	69124	82171	59058	82859
35	98409	66162	95763	47420	20792	61527	20441	39435	11859	41567
36	45476	84882	65109	96597	25930	66790	65706	61203	53634	22557
37	89300	69700	50741	30329	11658	23166	05400	66669	48708	03887
38	50051	95137	91631	66315	91428	12275	24816	68091	71710	33258
39	31753	85178	31310	89642	98364	02306	24617	09609	83942	22716
40	79152	53829	77250	20190	56535	18760	69942	77448	33278	48805
41	44560	38750	83635	56540	64900	42912	13953	79149	18710	68618
42	68328	83378	63369	71381	39564	05615	42451	64559	97501	65747
43	46939	38689	58625	08342	30459	85863	20781	09284	26333	91777
44	83544	86141	15707	96256	23068	13782	08467	89469	93842	55349
45	91621	00881	04900	54224	46177	55309	17852	27491	89415	23466
46	91896	67126	04151	03795	59077	11848	12630	98375	52068	60142
47	55751	62515	21108	80830	02263	29303	37204	96926	30506	09808
48	85156	87689	95493	88842	00664	55017	55539	17771	69448	87530
49	07521	56898	12236	60277	39102	62315	12239	07105	11844	01117

nd 18 *d.f.* Find the
14. part II, gives the

0.10
2.42

59. By the alterna-

0.16
square roots. To save
interpolation will rarely
mistakes in finding
should clarify the

3)	(4)
	Square Root
76	77.6
99	19.9
81	6.81
40	0.440
99	0.0299

or left of the decimal
table is to be read.
ause there is a *single*
ny non-zero digits to
omma, as in 60.28.0.
ken directly from the

Consider, first, num-
left of the decimal.
t of the decimal. If
as with 60.28.0 and
decimal, and so on.
the right of the deci-
is 0.0299 as shown.

Appendix B. (page 49 of 56)

544 Appendix Tables

TABLE A 1--(Continued)

	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99		
00	59391	58030	52098	82718	87024	82848	04190	96574	90464	29065	50	6
01	99567	76364	77204	04615	27062	96621	43918	01896	83991	51141	51	7
02	10363	97518	51400	25670	98342	61891	27101	37855	06235	33316	52	8
03	86859	19558	64432	16706	99612	59798	32803	67708	15297	28612	53	9
04	11258	24591	36863	55368	31721	94335	34936	02566	80972	08188	54	10
05	95068	88628	35911	14530	33020	80428	39936	31855	34334	64865	55	11
06	54463	47237	73800	91017	36239	71824	83671	39892	60518	37092	56	12
07	16874	62677	57412	13215	31389	62233	80827	73917	82802	84420	57	13
08	92494	63157	76593	91316	03505	72389	96363	52887	01087	66091	58	14
09	15669	56689	35682	40844	53256	81872	35213	09840	34471	74441	59	15
10	99116	75486	84989	23476	52967	67104	39495	39100	17217	74073	60	16
11	15696	10703	65178	90637	63110	17622	53988	71087	84148	11670	61	17
12	97720	15369	51269	69620	03388	13699	33423	67453	43269	56720	62	18
13	11666	13841	71681	98000	35979	39719	81899	07449	47985	46967	63	19
14	71628	73130	78783	75691	41632	09847	61547	18707	85489	69944	64	20
15	40501	51089	99943	91843	41995	88931	73631	69361	05375	15417	65	21
16	22518	55576	98215	82068	10798	86211	36584	67466	69373	40054	66	22
17	75112	30485	62173	02132	14878	92879	22281	16783	86352	00077	67	23
18	80327	02671	98191	84342	90813	49268	95441	15496	20168	09271	68	24
19	60251	45548	02146	05597	48228	81366	34598	72856	66762	17002	69	25
20	57430	82270	10421	00540	43648	75888	66049	21511	47676	33444	70	26
21	73528	39559	34434	88596	54086	71693	43132	14414	79949	85193	71	27
22	25991	65959	70769	64721	86413	33475	42740	06175	82758	66248	72	28
23	78388	16638	09134	59980	63806	48472	39318	35434	24057	74739	73	29
24	12477	09965	96657	57994	59439	76330	24596	77515	09577	91871	74	30
25	83266	32883	42451	15579	38155	29793	40914	65990	16255	17777	75	31
26	76970	80876	10237	39515	79152	74798	39357	09054	73579	92359	76	32
27	37074	65198	44785	68624	98336	84481	97610	78735	46703	98265	77	33
28	83712	06514	30101	78295	54656	85417	43189	60048	72781	72606	78	34
29	20287	56862	69727	94443	64936	08366	27227	05158	50326	59566	79	35
30	74261	32592	86538	27041	65172	85532	07571	80609	39285	65340	80	36
31	64081	49863	08478	96001	18888	14810	70545	89755	59064	07210	81	37
32	05617	75818	47750	67814	29575	10526	66192	44464	27058	40467	82	38
33	26793	74951	95466	74307	13330	42664	85515	20632	05497	33625	83	39
34	65988	72850	48737	54719	52056	01596	03845	35067	03134	70322	84	40
35	27366	42271	44300	73399	21105	03280	73457	43093	05192	48657	85	41
36	56760	10909	98147	34736	33863	95256	12731	66598	50771	83665	86	42
37	72880	43338	93643	58904	59543	23943	11231	83268	65938	81581	87	43
38	77888	38100	03062	58103	47961	83841	25878	23746	55903	44115	88	44
39	28440	07819	21580	51459	47971	29882	13990	29226	23608	15873	89	45
40	63525	94441	77033	12147	51054	49955	58312	76923	96071	05813	90	46
41	47606	93410	16359	89033	89696	47231	64498	31776	05383	39902	91	47
42	52669	45030	96279	14709	52372	87832	02735	50803	72744	88208	92	48
43	16738	60159	07425	62369	07515	82721	37875	71153	21315	00132	93	49
44	59348	11695	45751	15865	74739	05572	32688	20271	65128	14551	94	50
45	12900	71775	29845	60774	94924	21810	38636	33717	67598	82521	95	51
46	75086	23537	49939	33595	13484	97588	28617	17979	70749	35234	96	52
47	99495	51434	29181	09993	38190	42553	68922	52125	91077	40197	97	53
48	26075	31671	45386	36583	93459	48599	52022	41330	60651	91321	98	54
49	13636	93596	23377	51133	95126	61496	42474	45141	46660	42338	99	55

TABLE A 1—(Continued)

85-89	90-94	95-99	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
96574	90464	29065	50	64249	63664	39652	40646	97306	31741	07294	84149	46797	82487
01896	83991	51141	51	26538	44249	04050	48174	65570	44072	40192	51153	11397	58212
37855	06235	33316	52	05845	00512	78630	55328	18116	69296	91705	86224	29503	57071
57708	15297	28612	53	74897	68373	67359	51014	33510	83048	17056	72506	82949	54600
12566	80972	08188	54	20872	54570	35017	88132	25730	22626	86723	91691	13191	77212
31855	34334	64865	55	31432	96156	89177	75541	81355	24480	77243	76690	42507	84362
39892	60518	37092	56	66890	61505	01240	00660	05873	13568	76082	79172	57913	93448
73917	82802	84420	57	41894	57790	79970	33106	86904	48119	52503	24130	72824	21627
52887	01087	66091	58	11303	87118	81471	52936	08555	28420	49416	44448	04269	27029
09840	34471	74441	59	54374	57325	16947	45356	78371	10563	97191	53798	12693	27928
39100	17217	74073	60	64852	34421	61046	90849	13966	39810	42699	21753	76192	10508
71087	84148	11670	61	16309	20384	09491	91588	97720	89846	30376	76970	23063	35894
67453	43269	56720	62	42587	37065	24526	72602	57589	98131	37292	05967	26002	51945
07449	47985	46967	63	40177	98590	97161	41682	84533	67588	62036	49967	01990	72308
18707	85489	69944	64	82309	76128	93965	26743	24141	04838	40254	26065	07938	76236
69361	05375	15417	65	79788	68243	59732	04257	27084	14743	17520	95401	55811	76099
67466	69373	40054	66	40538	79000	89559	25026	42274	23489	34502	75508	06059	86682
16783	86352	00077	67	64016	73598	18609	73150	62463	33102	45205	87440	96767	67042
15496	20168	09271	68	49767	12691	17903	93871	99721	79109	09425	26904	07419	76013
72856	66762	17002	69	76974	55108	29795	08404	82684	00497	51126	79935	57450	55671
21511	47676	33444	70	23854	08480	85983	96025	50117	64610	99425	62291	86943	21541
14414	79949	85193	71	68973	70551	25098	78033	98573	79848	31778	29555	61446	23037
06175	82758	66248	72	36444	93600	65350	14971	25325	00427	52073	64280	18847	24768
35434	24057	74739	73	03003	87800	07391	11594	21196	00781	32550	57158	58887	73041
77515	09577	91871	74	17540	26188	36647	78386	04558	61463	57842	90382	77019	24210
65990	16255	17777	75	38916	55809	47982	41968	69760	79422	80154	91486	19180	15100
09054	73579	92359	76	64288	19843	69122	42502	48508	28820	59933	72998	99942	10515
78735	46703	98265	77	86809	51564	38040	39418	49915	19000	58050	16899	79952	57849
60048	72781	72606	78	99800	99566	14742	05028	30033	94889	53381	23656	75787	59223
05158	50326	59566	79	92345	31890	95712	08279	91794	94068	49337	88674	35355	12267
80609	39285	65340	80	90363	65162	32245	82279	79256	80834	06088	99462	56705	06118
89755	59064	07210	81	64437	32242	48431	04835	39070	59702	31508	60935	22390	52246
44464	27058	40467	82	91714	53662	28373	34333	55791	74758	51144	18827	10704	76803
20632	05497	33625	83	20902	17646	31391	31459	33315	03444	55743	74701	58851	27427
35067	03134	70322	84	12217	86007	70371	52281	14510	76094	96579	54853	78339	20839
43093	05192	48657	85	45177	02863	42307	53571	22532	74921	17735	42201	80540	54721
66598	50771	83665	86	28325	90814	08804	52746	47913	54577	47525	77705	95330	21866
83268	65938	81581	87	29019	28776	56116	54791	64604	08815	46049	71186	34650	14994
23746	55903	44115	88	84979	81353	56219	67062	26146	82567	33122	14124	46240	92973
29226	23608	15873	89	50371	26347	48513	63915	11158	25563	91915	18431	92978	11591
76923	96071	05813	90	53422	06825	69711	67950	64716	18003	49581	45378	99878	61130
31776	05383	39902	91	67453	35651	89316	41620	32048	70225	47597	33137	31443	51445
50803	72744	88208	92	07294	85353	74819	23445	68237	07202	99515	62282	53809	26685
71153	21315	00132	93	79544	00302	45338	16015	66613	88968	14595	63836	77716	79596
20271	65128	14551	94	64144	85442	82060	46471	24162	39500	87351	36637	42833	71875
33717	67598	82521	95	90919	11883	58318	00042	52402	28210	34075	33272	00840	73268
17979	70749	35234	96	06670	57353	86275	92276	77591	46924	60839	55437	03183	13191
52125	91077	40197	97	36634	93976	52062	83678	41256	60948	18685	48992	19462	96062
41330	60651	91321	98	75101	72891	85745	67106	26010	62107	60885	37503	55461	71213
45141	46660	42338	99	05112	71222	72654	51583	05228	62056	57390	42746	39272	96659

Appendix B. (page 51 of 56)

546 Appendix Tables

TABLE A 1 - (Continued)

	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99
50	32847	31282	03345	89593	69214	70381	78285	20054	91018	16742
51	16916	00041	30236	55023	14253	76582	12092	86533	92426	37655
52	66176	34037	21005	27137	03193	48970	64625	22394	39622	79085
53	46299	13335	12180	16861	38043	59292	62675	63631	37020	78195
54	22847	47839	45385	23289	47526	54098	45683	55849	51575	64689
55	41851	54160	92320	69936	34803	92479	33399	71160	64777	83378
56	28444	59497	91586	95917	68553	28639	06455	34174	11130	91994
57	47520	62378	98855	83174	13088	16561	68559	26679	06238	51254
58	34978	63271	13142	82681	05271	08822	06490	44984	49307	61717
59	37404	80416	69035	92980	49486	74378	75610	74976	70056	15478
60	32400	65482	52099	53676	74648	94148	65095	69597	52771	71551
61	89262	86332	51718	70663	11623	29834	79820	73002	84886	03591
62	86866	09127	98021	03871	27789	58444	44832	36505	40672	30180
63	90814	14833	08759	74645	05046	94056	99094	65091	32663	73040
64	19192	82756	20553	58446	55376	88914	75096	26119	83898	43816
65	77585	52593	56612	95766	10019	29531	73064	20953	53523	58136
66	23757	16364	05096	03192	62386	45389	85332	18877	55710	96459
67	45989	96257	23850	26216	23309	21526	07425	50254	19455	29315
68	92970	94243	07316	41467	64837	52406	25225	51553	31220	14032
69	74346	59596	40088	98176	17896	86900	20249	77753	19099	48885
70	87646	41309	27636	45153	29988	94770	07255	70908	05340	99751
71	50099	71038	45146	06146	55211	99429	43169	66259	97786	95180
72	10127	46900	64984	75348	04115	33624	68774	60013	35515	62556
73	67995	81977	18984	64091	02785	27762	42529	97144	80407	64524
74	26304	80217	84934	82657	69291	35397	98714	35104	08187	48109
75	81994	41070	56642	64091	31229	02595	13513	45148	78722	30144
76	59537	34662	79631	89403	65212	09975	06118	86197	58208	16162
77	51228	10937	62396	81460	47331	91403	95007	06047	16846	64809
78	31089	37995	29577	07828	42272	54016	21950	86192	99046	84864
79	38207	97938	93459	75174	79460	55436	57206	87644	21296	43393
80	88666	31142	09474	89712	63153	62333	42212	06140	42594	43671
81	53365	56134	67582	92557	89520	33452	05134	70628	27612	33738
82	89807	74530	38004	90102	11693	90257	05500	79920	62700	43325
83	18682	81038	85662	90915	91631	22223	91588	80774	07716	12548
84	63571	32579	63942	25371	09234	94592	98475	76884	37635	33608
85	68927	56492	67799	95398	77642	54913	91583	08421	81450	76229
86	56401	63186	39389	88798	31356	89235	97036	32341	33292	73757
87	24333	95603	02359	72942	46287	95382	08452	62862	97869	71775
88	17025	84202	95199	62272	06366	16175	97577	99304	41587	03686
89	02804	08253	52133	20224	68034	50865	57868	22343	55111	03607
90	08298	03879	20995	19850	73090	13191	18963	82244	78479	99121
91	59883	01785	82403	96062	03785	03488	12970	64896	38336	30030
92	46982	06682	62864	91837	74021	89094	39952	64158	79614	78235
93	31121	47266	07661	02051	67599	24471	69843	83696	71402	76287
94	97867	56641	63416	17577	30161	87320	37752	73276	48969	41915
95	57364	86746	08415	14621	49430	22311	15836	72492	49372	44103
96	09559	26263	69511	28064	75999	44540	13337	10918	79846	54809
97	53873	55571	00608	42661	91332	63956	74087	59008	47493	99581
98	35531	19162	86406	05299	77511	24311	57257	22826	77555	05941
99	28229	88629	25695	94932	30721	16197	78742	34974	97528	45447

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Appendix D. List of Equipment

1. Survival suit with EPIRB and strobe attached
2. Rain gear, gloves and boots
3. Float suit if on deck in rough weather
4. EPIRB and Strobe
5. Forms (include tag recovery)
6. Small (6") dial calipers
7. Large calipers
8. 6 inch measuring stick (find one from last year's survey gear)
9. film and camera (use your own at your own risk)
10. video camera and tapes
11. Rite-in-Rain notebook
12. pencils
13. permanent marker
14. clipboard(s)
15. calculator
16. tallywackers
17. 3 colors survey tape

To pick up or purchase in Kodiak or Dutch prior to vessel departure:

1. 6 rolls duct tape
2. 3 rolls clear, 3" or wider tape (for affixing shipping labels)
3. bale of burlap (shipped 9/30 to Donn)
4. 2 small sharp knives (Victorinox are good)
5. 1 Biosonics PIT tag hand-held reader (find one that works and charge battery before you go. Caution: many of the units in Dutch do not have scanning wands.)
6. boxes for Seward crabs (get 40 from Royal Aleutian, we'll keep excess boxes in Dutch for future crab shipments)

Appendix E. Itinerary and Schedules

- Oct. 5 Byersdorfer in Dutch Harbor by 0800 hrs.
- Oct. 5-6 Byersdorfer readies gear, meets with Tracy and Morrison on observer practicum crab collection, settles aboard vessel.
- Oct. 7 Vessel departs Dutch Harbor.
- Oct. 8-21 Cost recovery fishing, SMC and observer crab collection (paid charter days 1-14). Note departure time in daily log.
- Oct. 21 Vessel returns to Dutch Harbor around 2000 hrs. Watson and Byersdorfer practice PIT-tagging female red king crab.
- Oct. 22 Last paid charter day (day 15).
- Package crab 0800 hrs. Ship crab Markair flight no. xxxx departing xxxx hrs. Alternative airline ok, direct flight desirable. After crab are shipped, Watson and Byersdorfer refine PIT-tagging techniques.
- Observer practicum begins aboard vessel at 1200 hrs.
- Cost recovery crabs are delivered beginning at 1300 hrs. Watson/Byersdorfer take weights on survey crab, crew takes if Watson/Byersdorfer are NA.
- Oct. 23 - Observer practicum may continue. Vessel takes practicum crabs out of Captain's Bay to dump if not processeable (females or under 6 inches).
- If vessel doesn't catch enough crab to cover the \$373,000 project cost, can return to fishing with Byersdorfer aboard.
- At charter's end, Byersdorfer cleans up from survey charter (double-check and remove all data and equipment).
- Oct. 23 Begin pre-season tag recovery PR program at docks and
- 31 distribute news releases (Watson will send/bring a supply). Work with Tracy to coordinate returns from observers.

Appendix B. (page 54 of 56)

Oct. 31 Byersdorfer assists with Bristol Bay red king crab tank inspections.

Nov. 1-? Tag recovery.

PLAN-A-MONTH.

1992		OCTOBER					1992	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
				275 1 091	276 2 090	277 3 089		
278 4 088	279 5 087	280 6 086 Yom Kippur begins at sundown	281 7 085 Yom Kippur	282 8 084	283 9 083	284 10 082		
285 11 081	286 12 080 Columbus Day Thanksgiving Day (Canada)	287 13 079	288 14 078	289 15 077	290 16 076	291 17 075		
292 18 074	293 19 073	294 20 072	295 21 071	296 22 070	297 23 069	298 24 068 United Nations Day		
299 25 067	300 26 066	301 27 065	302 28 064	303 29 063	304 30 062	305 31 061 Halloween		

January 1992
S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

February 1992
S M T W T F S
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29

March 1992
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

April 1992
S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30

May 1992
S M T W T F S
1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31

June 1992
S M T W T F S
1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30

July 1992
S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

August 1992
S M T W T F S
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31

September 1992
S M T W T F S
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30

October 1992
S M T W T F S
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31

November 1992
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30

December 1992
S M T W T F S
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

Appendix B. (page 56 of 56)

Appendix F. (envelope)

Mailing labels for:

1. Seward Marine Center crabs
2. Department of Environmental Conservation (DEC) crabs

Collection tags for:

1. PIT-tagged red king crab tail sections
2. DEC crabs

1992 Commercial Shellfish Regulations book

Appendix C. Forms used in the Bristol Bay red king crab Seward Marine Center 18-month holding tank study. Tag recovery forms are shown in Watson and Pengilly (1992).

Seward Marine Center (SMC) Study:

1. ADF&G/SMC Red King Crab PIT Tag Injection and Identification Record. All study crabs will be retrieved; half will be PIT-tagged.
2. ADF&G/SMC Red King Crab Bimonthly Observation Record. All study crabs will be retrieved twice per month, examined for PIT tag presence and wound status, etc.
3. ADF&G/SMC Red King Crab Daily Observation Record. Note death, injury, disease, changes in cable tag nos., found PIT tags in tanks, etc. for all study crabs on an ad hoc basis.

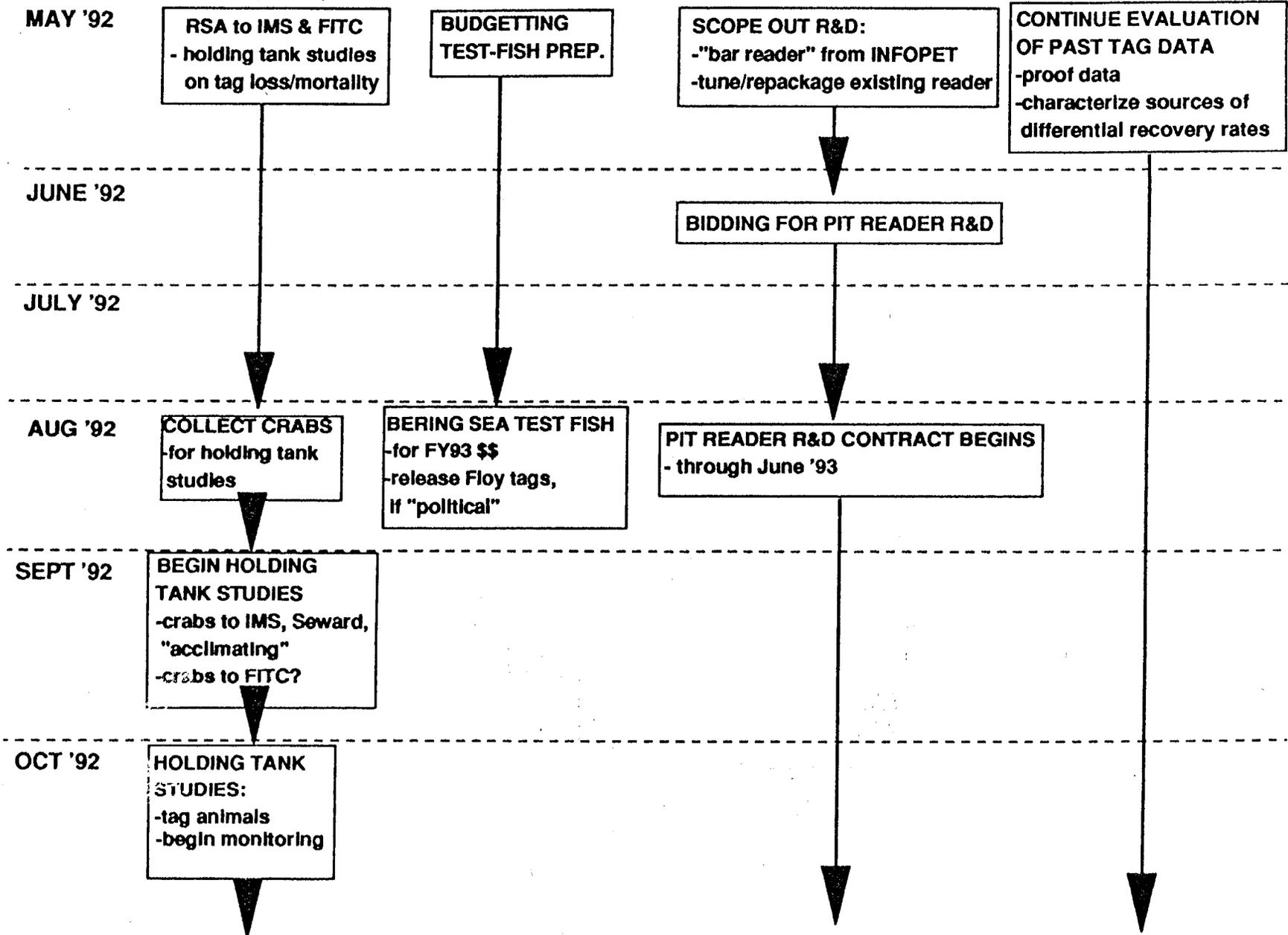
Kodiak Veterinary Clinic (KVC) X-ray Study:

4. ADF&G/KVC Red King Crab X-ray Record. Tail sections from dead PIT-tagged SMC crabs all x-rayed for PIT position, infection, etc. (To be designed.)

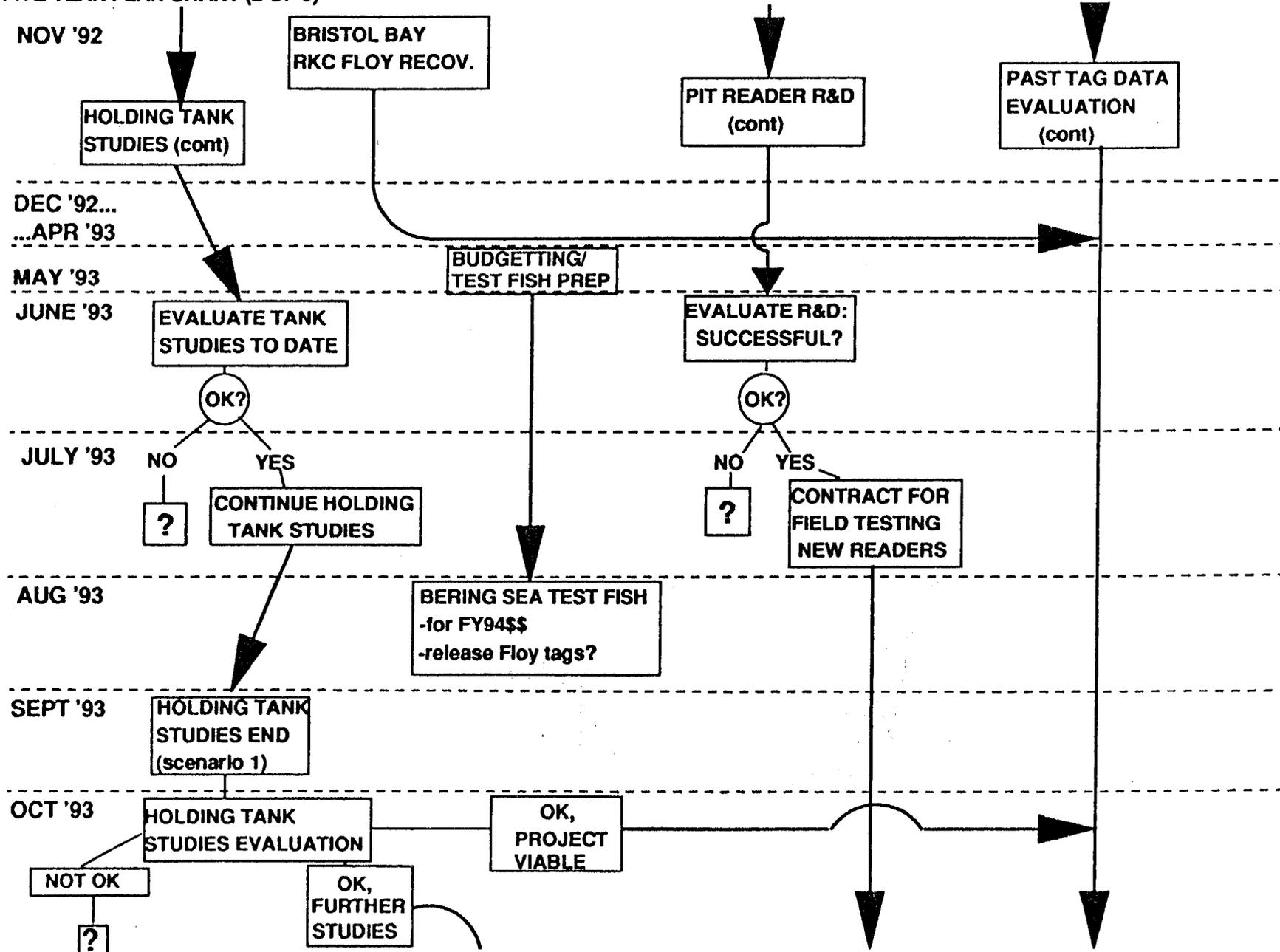
ADF&G Pathology Lab:

5. ADF&G Post-Mortem Examination Record. Tail sections from dead PIT-tagged SMC crabs. (To be designed.)

FIVE YEAR PLAN CHART (1 OF 6)

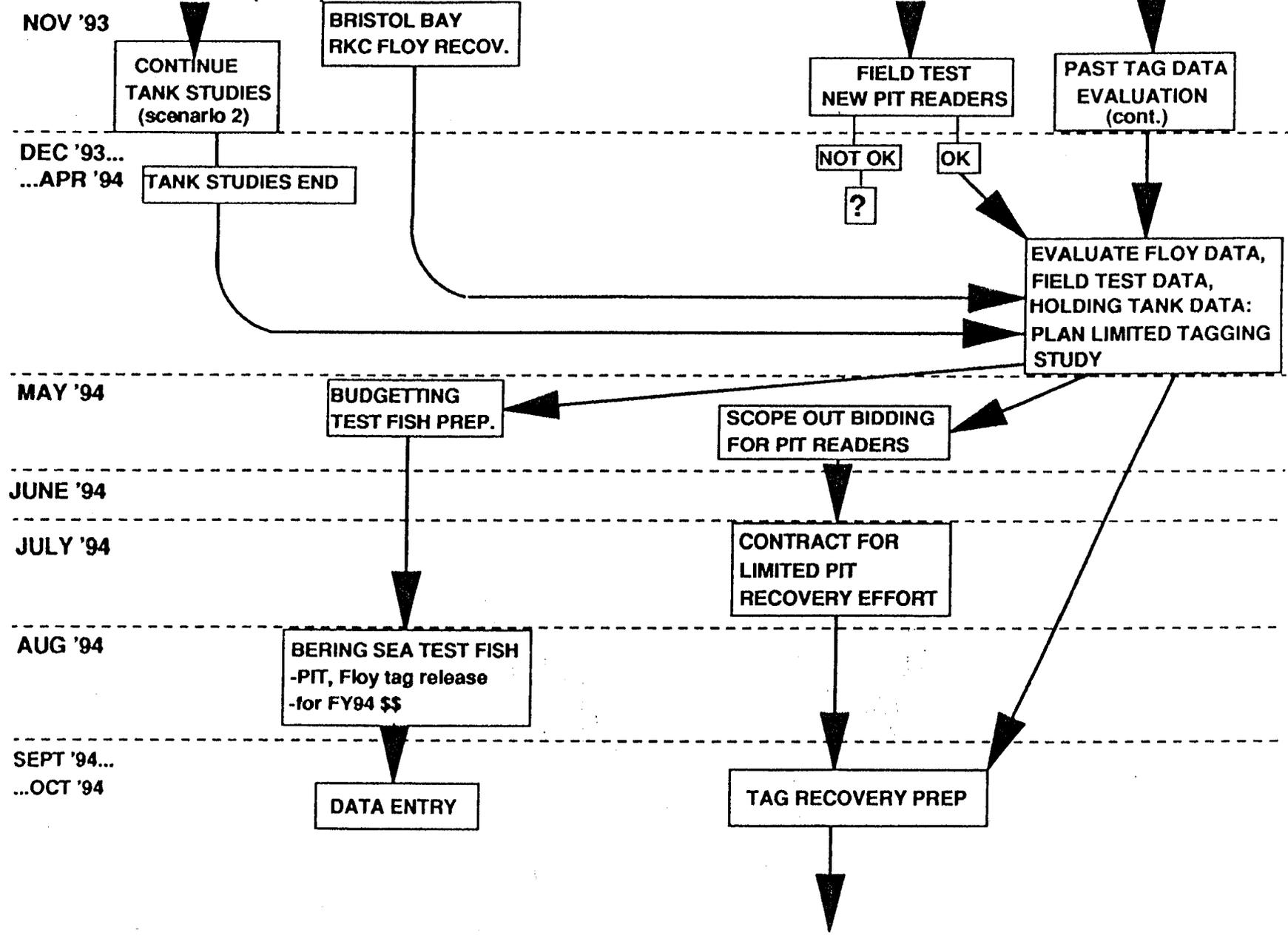


FIVE YEAR PLAN CHART (2 OF 6)



83

FIVE YEAR PLAN CHART (3 OF 6)



84

FIVE YEAR PLAN CHART (4 OF 6)

NOV '94

BRISTOL BAY
TAG RECOVERY
-limited PIT rec. sites
-large scale Floy rec.sites

DEC '94...
...APR '95

EVALUATE AND REPORT ON TAG RECOVERY RESULTS

"MAJOR GLITCHES"

NO "MAJOR GLITCHES"

?

PLANNING FOR FULL SCALE PIT RECOVERY EFFORT

MAY '95

BUDGETTING/
TEST FISH PREP

SCOPE OUT BIDDING
FOR PIT READERS

85

JUNE '95

JULY '95

CONTRACT FOR FULL SCALE
PIT READER DEPLOYMENT
-production and installation

AUG '95

BRISTOL BAY TEST FISH
-PIT, Floy release
-for FY95 \$\$

SEPT '95...
...OCT '95

DATA ENTRY

TAG RECOVERY PREP

FIVE YEAR PLAN CHART (5 OF 6)

NOV '95

BRISTOL BAY
TAG RECOVERY
-full scale PIT rec. sites
-large scale Floy rec.sites

DEC '95...
...APR '96

EVALUATE AND REPORT ON TAG RECOVERY RESULTS

"MAJOR GLITCHES"

NO "MAJOR GLITCHES"

?

PLANNING FOR PIT/FLOY MARK-RECOVERY EFFORT

MAY '96

BUDGETTING/
TEST FISH PREP

SCOPE OUT BIDDING
FOR NECESSARY R&D

96

JUNE '96

JULY '96

CONTRACT FOR
NECESSARY R&D

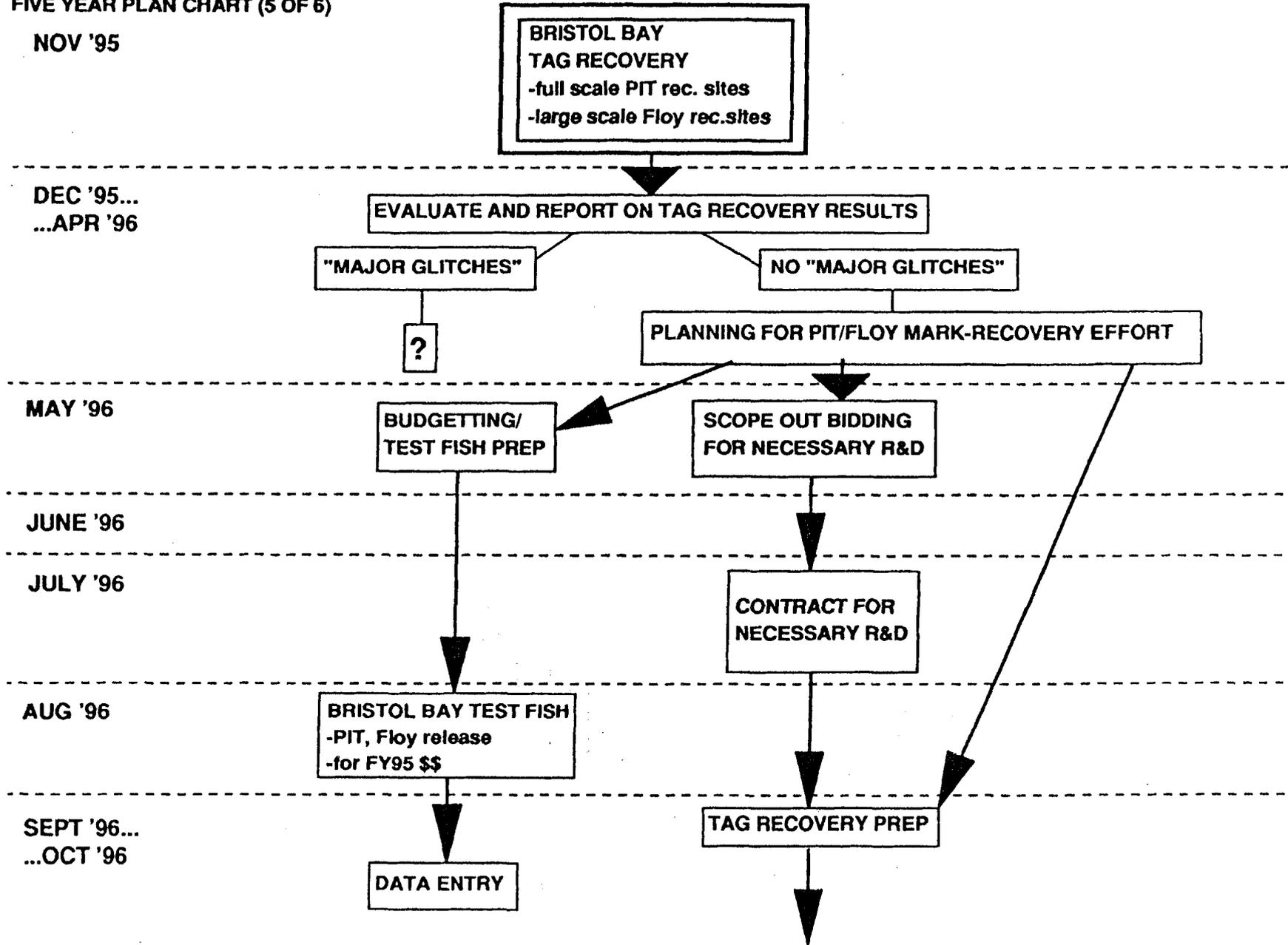
AUG '96

BRISTOL BAY TEST FISH
-PIT, Floy release
-for FY95 \$\$

SEPT '96...
...OCT '96

DATA ENTRY

TAG RECOVERY PREP



FIVE YEAR PLAN CHART (6 OF 6)

NOV '96

BRISTOL BAY
TAG RECOVERY
-full scale PIT rec. sites
-large scale Floy rec.sites

DEC '96...
...APR '97

EVALUATE AND REPORT ON TAG RECOVERY RESULTS

"MAJOR GLITCHES"

NO "MAJOR GLITCHES"

?

PLANNING FOR PIT/FLOY MARK-RECOVERY EFFORT

MAY '97

BUDGETTING/
TEST FISH PREP

SCOPE OUT BIDDING
FOR NECESSARY R&D

JUNE '97

JULY '97

CONTRACT FOR
NECESSARY R&D

AUG '97

BRISTOL BAY TEST FISH
-PIT, Floy release
-for FY95 \$\$

SEPT '97...
...OCT '97

DATA ENTRY

TAG RECOVERY PREP

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