

PROJECT OPERATIONAL PLAN
1998 BERING SEA TEST FISHERY PROJECT:
BRISTOL BAY RED KING CRAB

by

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¹ Reference to trade names does not imply endorsement by ADF&G.

ALASKA DEPARTMENT FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

PROJECT OPERATIONAL PLAN

Title: Bristol Bay Red King Crab Test Fishery Project

Yellowbook Project No.: TF-785

Project Leader: Donn Tracy PCN: 1857
Biometrician: Douglas Pengilly PCN: 1227

Date Submitted: July 29, 1998

Region: Westward
Fishery Unit: Bering Sea/Aleutian Islands (BSAI) Crab
Fishery: Bristol Bay Red King Crab
Fishery Management Plan: Fishery Management Plan for the Commercial King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands

File Name: bb98pop.doc

APPROVALS

Level	Signature	Date
Project Leader:	_____	_____
Regional Biometrician:	_____	_____
Research Supervisor:	_____	_____
Regional Supervisor:	_____	_____
Headquarters' Receipt:	_____	_____
Headquarters' Approval:	_____	_____
Headquarters' Recommendation:		
Further Review:	_____	_____
Approval:	_____	_____

FOREWORD

The Bering Sea Test Fishery Project, funded under authority granted the Alaska Department of Fish and Game (ADF&G) by the State Legislature, the State of Alaska Bering Sea Crab Test Fishery Program, is in its ninth year and has previously focused on Bristol Bay red king crab tagging studies initiated in 1989. Operational plans for 1990, 1991, 1992, 1993, 1994, 1995, 1996 and 1997 are documented in Blau et al (1996), Watson and Pengilly (1992, 1993a, 1993b, 1994, 1995 respectively), Watson et al. (1996, 1997), and Tracy and Pengilly (1996,1997).

The FY99 project has three major components: 1) a 28 day vessel charter in the Bristol Bay Registration Area 'T', to conduct project cost recovery fishing and an experiment testing catch rates of sublegal male and female red king crabs under variable pot fishing soak times; 2) a 28 day vessel charter in St. Matthew Island Section of the Northern District of the Bering Sea Registration Area 'Q' to conduct blue king crab population assessment and a tagging survey; and, 3) an intensive tagged crab recovery program during the 1998 St. Matthew Island blue king crab commercial fishery beginning September 15, 1998. The total FY99 budget for the Bering Sea Crab Test Fishery Project is \$455,100 (Appendix A).

Only the Bristol Bay directed research and cost recovery fishing are described in this operational plan. An extended overview of the 28-day St. Matthew Island blue king crab survey is provided in Blau and Watson (1998). A list of reports and presentations generated from the test fish project since its inception in 1989 is given in Appendix C.

INTRODUCTION

The Bristol Bay (Management Area T) red king crab fishery has long comprised a significant economic component of Alaska's commercial shellfish fisheries. Over the last several years, the ex-vessel value of the annual red king crab harvest in Bristol Bay has exceeded 50 million dollars (Morrison 1997). Effective inseason management of the red king crab fishery by the Alaska Department of Fish and Game (ADF&G) has recently been complicated by a depressed crab population coupled with constant or increasing fishing pressure, and a revised harvest strategy aimed at stock rebuilding (Zheng et al. 1996) that has recently been adopted by the Alaska Board of Fisheries (BOF).

The nature of the management problems associated with the Bristol Bay fishery and temporary regulations recently adopted by the BOF compelled ADF&G to conduct an experimental study in August 1997 directed at examining the effects of variable pot soak periods on the catchability of legal male, sublegal male and female red king crabs. Background information, objectives and methods of that study are reported in "Project Operational Plan Bering Sea Test Fish Program: 1997 Bristol Bay red king crab project" (Tracy and Pengilly 1997).

Results of the 1997 experiment identified significant differences between catch rates of legal-sized and sublegal sized male crabs male red king crabs in pots fished over different soak periods - specifically at 12hr., 24hr., and 72hr. intervals (Pengilly and Tracy *in press*). Differences in catch rates of female crabs were less apparent, however, and are probably due to a lack of localized abundance in the areas fished.

The August 1998 test fishery project will present ADF&G with an opportunity to conduct additional trials of the pot soak time experiment. The design and data analysis methods will generally remain the same as those employed in 1997; however, logistics and available vessel charter days may allow greater sampling of fished pots and soak time categories. Also, analysis of results from the 1998 project will emphasize examining catch rates of under-sized male and female red king crabs, and thus greater priority will be placed on fishing locations presumed to contain relatively high densities of these animals.

OBJECTIVES

As outlined, and in addition to obtaining project cost recovery revenues, a primary objective of the 1998 Bristol Bay Test Fishery will consist of testing the rates at which legal male, sub-legal male and female red king crabs are captured in standardized king crab pots under three pot soak time scenarios.

Secondly, a prototype autonomous underwater video system will be periodically deployed in order to acquire footage depicting the activity of red king crabs in and around fished pots under each of the

soak scenarios tested, and also to observe the functional characteristics of the nine-inch stretched escape mesh required in commercial shellfish regulations for red king crab pots (ADF&G 1998). Zhou (1996) previously used video observations in a quantitative examination of king crab behavioral responses to baited pots in a laboratory environment. Some video documentation has also been produced by Donaldson and Otto (1996, pers. comm.), of seeded Tanner crabs *Chionoecetes bairdi* egressing pots fished with escape rings in Chiniak Bay, Alaska. Video footage from the Bristol Bay project will be qualitatively analyzed for comparison to soak study catch results and for use in designing future pot catchability studies.

A number of ancillary data collections will also be made during cost recovery and directed research fishing, including a daily recording of fishing locations and performance statistics, samples of male and female red king crab size/wet weight measurements, king and Tanner crab specimens retained for Paralytic Shellfish Poisoning (PSP) and domoic acid testing, and multi-species shellfish specimens collected for interpretive public display.

METHODS

The test fishery project will be conducted aboard the charter vessel F/V Viking Queen from approximately August 1 to August 28, 1998 in Bristol Bay waters east of 168° longitude. An illustration of the general area in which cost recovery and directed research fishing will occur is given in Figure 1.

Cost Recovery Fishing

The initial 10 to 14 days of the cruise will be directed towards harvesting marketable male red king crab for project cost recovery. Up to 120 pots will be fished at various locations presumed to contain dense concentrations of legal male red king crabs. Approximately 25,000 male crabs equal to or greater than 6.5 inches in carapace width (CW) will be captured and sold to a processing facility to cover annual project expenses, including vessel charter costs. The total quantity of crabs harvested for project funding is determined prior to cost recovery fishing through competitive bidding for their purchase by Bering Sea-based processors. If cost recovery goals are not attained during the 10 -14 day period, the charter vessel will continue fishing for this purpose until a sufficient number of crabs are captured.

Offloading of the catch will be monitored and sampled for size distribution by department staff to ensure an accurate accounting of crabs for fish ticket documentation and correct payment to the State of Alaska for the sale.

Pot Soak Time Study

Following cost recovery fishing, the remaining charter days will be utilized to conduct the previously outlined experiment examining the effects of pot soak periods on the catchability of under-sized male and female red king crabs. Waters targeted for fishing soak study pots will include areas where a high abundance of sublegal male and female crabs are observed during the cost recovery fishing and during the 1996 and 1997 Eastern Bering Sea crab stock assessment trawl surveys (Otto et al. 1996, 1997). Pot sample catch data from at-sea observer deployments during the 1997 Bristol Bay red king crab fishery (Moore and Byrne *in press*) may also be used to locate densities of crabs targeted during the study.

Study Design

The catch abundance of sublegal male and female crabs within several pot soak time categories will also be assessed using a systematic study design. A total of 36 pots will be deployed and fished simultaneously in individual grid squares - hereafter referred to as “blocks”. Pots fished within each block will be spaced at 1/3 (.333) NM intervals bilaterally; ideally, 8-10 blocks of pots will be deployed by the conclusion of the experiment. However, the actual sample size will be largely dependent upon the number of available fishing days and the logistics of maintaining equivalent numbers of pots deployed within the soak period categories described below. An example of the systematic block deployment pattern is shown in Figure 2.

Target soak times will be assigned randomly to pots within a block. Soak times will be defined as 12 hr. (with an acceptable range of 10-14 hr.); 24 hr. (with an acceptable range of 20-28 hr.); and 72 hr. (with an acceptable range of 68-76 hr.) (see Figure 2).

Catch Sampling

Pot contents will be examined within both soak time study blocks and cost recovery strings. Sampled crabs will be speciated, enumerated, measured and shell-aged, and all males identified as legal or sub-legal. All females will be assessed as adults or juveniles with regard to reproductive status.

Comprehensive catch sampling and shipboard procedures, and data recording forms for the project are detailed in “Shipboard Instructions for the 1998 Bristol Bay Test Fishery Charter” (Appendix C).

Underwater Video

Underwater video footage will be obtained during cost recovery and directed research fishing using the prototype “Model 1000 Autonomous Video Recorder” developed by Sound Ocean Systems Inc.¹ of Redmond, Washington. A low-light intensity camera, video recorder/controller and external lamps powered by two 12-volt deep cell batteries (circuited in a 24-volt series) will be secured in

¹ Reference to trade names does not imply endorsement by ADF&G.

pots randomly selected for observation. A photographic illustration demonstrating the system and its components residing in a crab pot is provided in Figure 3.

Initial operational testing of the system will include determining the capabilities and limitations of the power supply, of the camera with and without external lighting, and of the controller programming functions. (Ocean bottom water temperature, turbidity and available ambient light will positively or negatively effect performance specifications of the system components.) Subsequent deployments will utilize an appropriate recording program sequence (based upon the results of the operational testing) for producing intervals of video footage spanning soak periods of pots selected for observation. Tentative plans for optimal time lapse video recording program sequences are provided in the project shipboard instructions (Appendix C).

DATA ANALYSIS

Pot Soak Time Study

The catch of legal-sized male and nonlegal (i.e., females and undersized males) red king crabs in each pot will be transformed prior to analysis by adding one to the catch and then taking the natural logarithm of that sum. Log-transformation of the catch per pot data should serve to normalize the data and stabilize its variance across treatments and blocks. One will be added to the catch per pot prior to log-transformation so that the few pots with zero catch of either legal or nonlegal red king crabs can be included in the analysis.

The log-transformed catch data will be modeled as,

$$\gamma_{ijk} = \mu_{..} + \delta_i + \beta_j + \delta\beta_{ij} + \varepsilon_{ijk},$$

where,

γ_{ijk} = log transformed catch of legal or nonlegal red king crabs for soak time category i ($i=1,2,3$), block j ($j=1,2,3,4$), pot k ($k=1,2,\dots,12$),

$\mu_{..}$ = the overall mean of the log-transformed catch of legal or nonlegal red king crabs,

δ_i = the effect due to soak time category i ,

β_j = the effect of block j ,

$\delta\beta_{ij}$ = the effect due to interaction between soak time categories and blocks, and

ε_{ijk} = random error.

Analysis of variance (ANOVA) will be used to test the two null hypotheses,

H₀₁: means of the log-transformed catch of legal-sized red king crabs do not differ among the soak categories , and

H₀₂: means of the log-transformed catch of nonlegal red king crabs do not differ among the soak categories.

Dependent on statistical significance (P<0.05) of the soak time effect, differences between pairs of means for the soak time categories will be assessed for statistical significance using Fisher's least significant difference (LSD) procedure (Milliken and Johnson 1984).

Additionally , we will also assess the statistical significance of the effect of soak time on the nonlegal:legal ratio of catch per pot by applying the above ANOVA model to,

$$r_{ijk}=\ln((n_{ijk} \text{ and } +1)/(l_{ijk}+1)),$$

where n_{ijk} and l_{ijk} are, respectively, the catches of nonlegal and legal red king crabs for soak time category i (i=1,2,3), block j (j = 1,2,3,4), pot k (k=1,2,...,12).

SCHEDULES AND PERSONNEL

7/97-7/98	Project planning (Tracy, Byersdorfer, Moore and Pengilly)
8/98	Bristol Bay red king crab cost recovery fishing and directed research at-sea (Tracy et al.)
9/98-6/99	Data entry, analysis, and reporting (Tracy et al)

The 1998 Bering Sea Test Fish Program supports approximately 22.0 man-months of permanent personnel time, which includes several seasonal positions (L. Watson FB I - 6.0 mm; S. Byersdorfer FB I - 9.0 mm; D. Connolly FB I - 5.0 mm; N. Heim-Blackett - Admin. II - 2.0 mm). Short-term personnel costs (i.e., sea duty/hazard pay and temporary salaries) will also be incurred to support staff onboard the survey vessels, and also those involved in post survey field activities (e.g., tagged crab recovery programs). Long-term seasonal personnel that are partially or fully supported by the project also write reports and perform logistics related to the project. All seasonal personnel also provide assistance to shellfish management and the Mandatory Shellfish Observer Program. The field season in 1998 begins on August 1 with the Bristol Bay red king crab research/cost recovery charter and the St. Matthew Island blue king crab survey/tagging study; it ends with the deployment of at-sea observer staff during the November Bristol Bay red king crab fishery.

SUPPORT OF OTHER REGIONAL PROJECTS

The Bering Sea Test Fishery Program also provides funding for other Westward Region BSAI shellfish-related projects, particularly for the purchase of equipment and supplies such as computers, office fixtures and electronic data recording devices in the Kodiak and Dutch Harbor offices. Additionally, in past years the test fishery project has supported studies involving genetic stock identification (GSI) and visual image processing to determine the incidence of hybrid Tanner crabs (*C. bairdi* X *C. opilio*); more recently, test fish funds offset the development and publication costs of a shellfish field manual sponsored by the Alaska Sea Grant Program and primarily intended for use by at-sea observers. The test fish program supports the Dutch Harbor Observer Program Database Manager (who also serves as Asst. BSAI Research Biologist) with equipment and supplies. Although the program does not fund regional biometricians, it has supported those positions in purchases of computers, statistical software, books, and in funding travel to Alaska Board of Fisheries meetings.

In 1997, test fish funds were allocated for the at-sea deployment of 10 department biologists and technicians onboard fishing vessels during the Bristol Bay red king crab season in order to gather information on fishery performance and fleet behavior under pot limit scenarios recently adopted into regulation. Additional staff deployments are planned for the 1998 Bristol Bay fishery. The data collected during these deployments will be evaluated by the Alaska Board of Fisheries in 1999 for the purpose of evaluating the effectiveness of the new regulations.

The test fishery charters have been used to accomplish a variety of shellfish management and research objectives over the past several years. Most notably, the charters have served as the platform for the Mandatory Shellfish Observer Program practicums, including the use of captured crabs for observer candidate testing and use of the vessel and crew for shipboard interviews and catch sampling. The charters have also facilitated collections of crab for the GSI studies mentioned previously. The National Marine Fisheries Service conducted a pilot crab mortality study onboard the test fish charter vessel in 1992, utilizing ADF&G personnel in the process. Also, during the previous 5 years of test fishery charters ADF&G has collected crab samples for the Alaska Department of Environmental Conservation (ADEC) in order to analyze the occurrence of paralytic shellfish poisoning (PSP) and domoic acid in red king crabs and Tanner crabs.

REPORTS

1. A summary of biological data collected during the 1998 Bristol Bay red king crab test fishery project. (Reg. Inf. Rep 4K99-01) Byersdorfer. January 1999 (final report).
2. A summary of biological data collected during the 1998 St. Matthew blue king crab survey (Reg. Inf. Rep 4K99-XX) Blau and Watson. January 1999 (final report).

3. A second experiment examining the effects of soak time on catch of legal-sized and non-legal red king crabs with commercial king crab pots in Bristol Bay, Alaska. (Reg. Inf. Rep. 4K99-XX) Pengilly, Tracy. March 1999 (final report).

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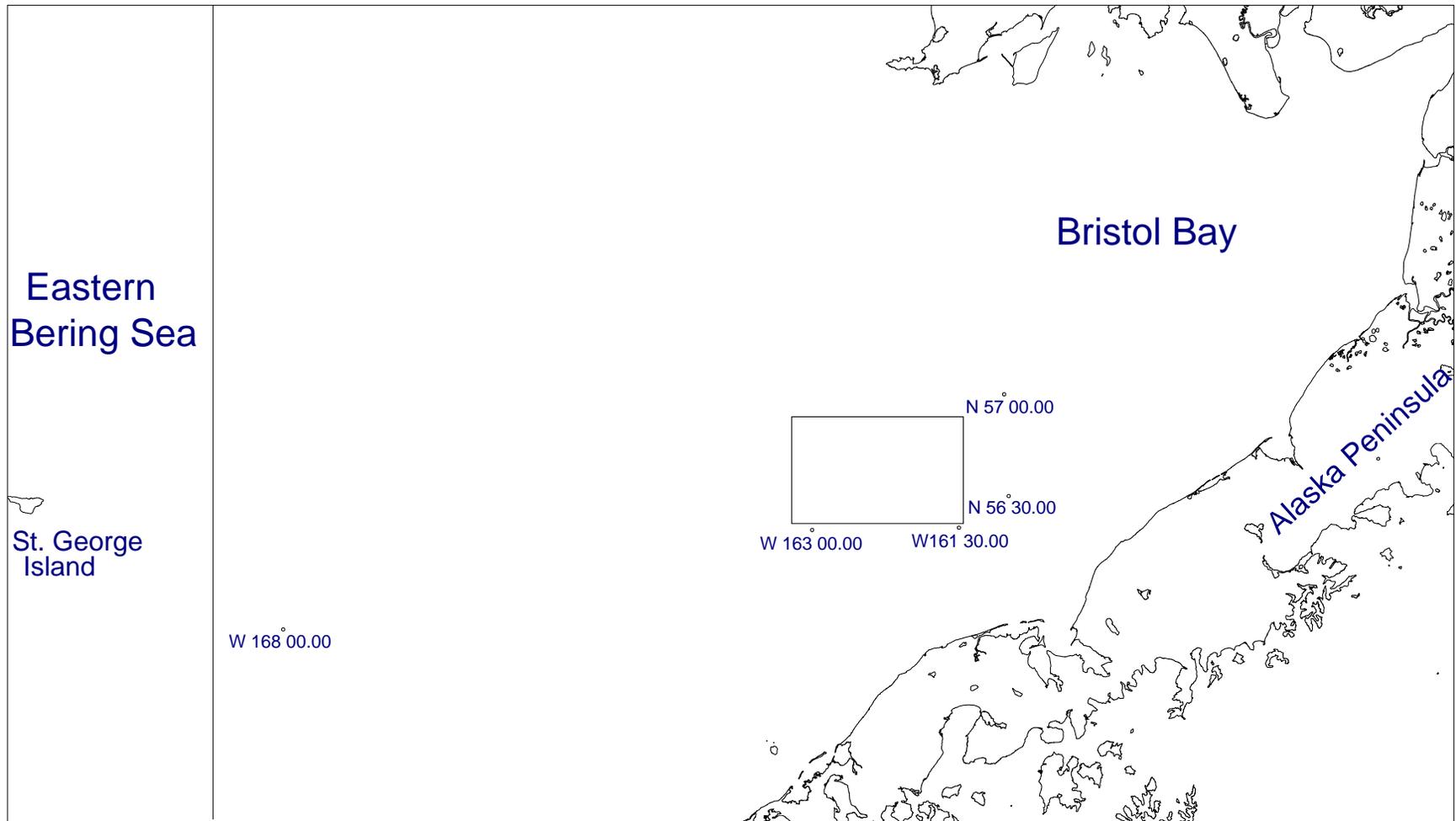


Figure 1. General location of cost recovery and directed research fishing during the 1998 Bristol Bay test fishery.

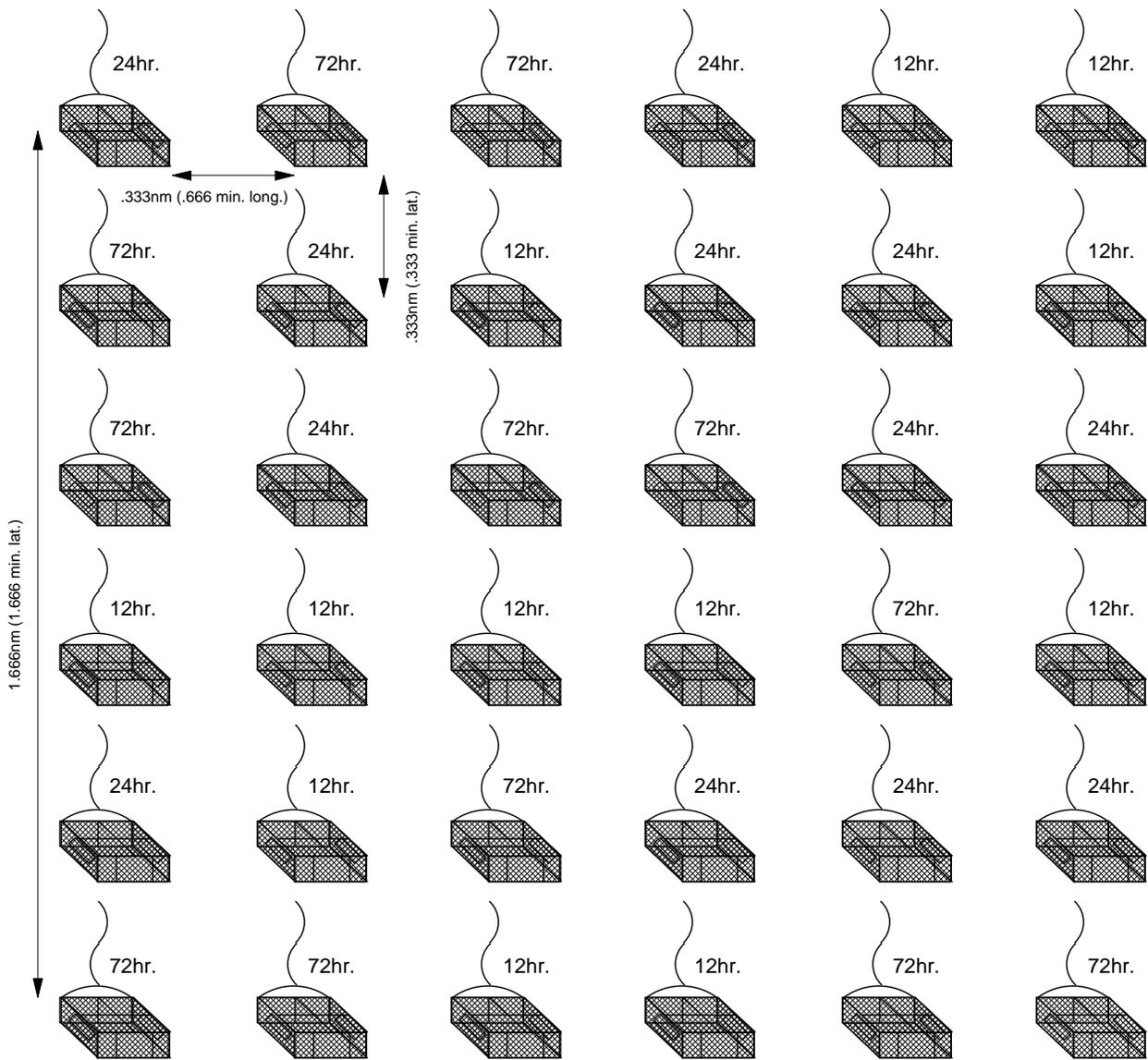


Figure 2. Illustration of project study design systematic pot deployment pattern and randomly assigned soak periods for the 1998 Bristol Bay test fishery.

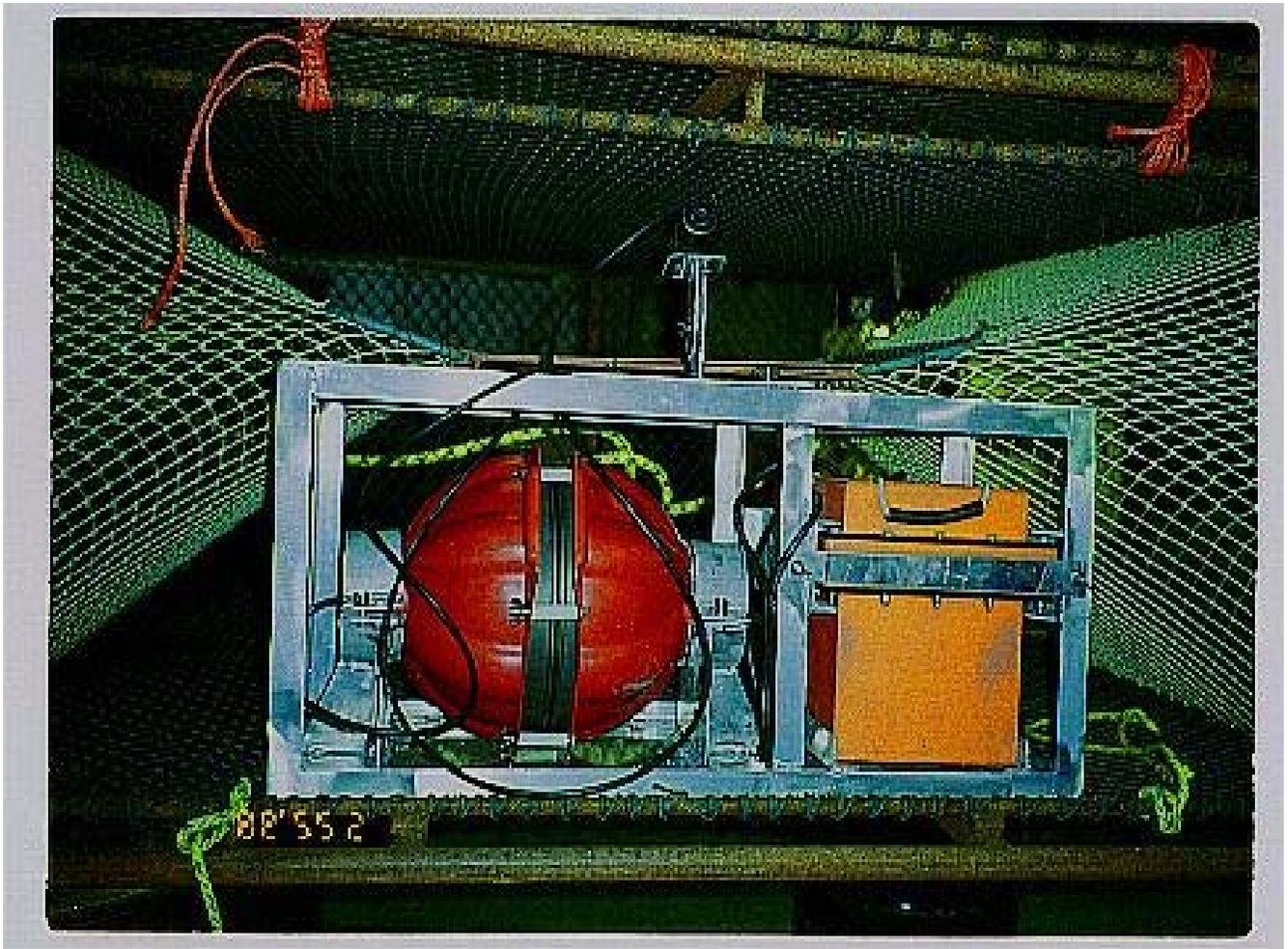


Figure 3. Photographic illustration of the Sound Ocean Systems Model-1000 Autonomous Video Recorder used during the 1998 Bristol Bay test fishery.

APPENDIX

Appendix A. FY99 Yellowbook for the Bering Sea Crab Test Fishery Project.

PROJECT TITLE: Bering Sea Crab Test Fishery
 PROJECT NUMBER: TF-785
 FISHERY UNIT: Bering Sea/Aleutians Crab
 LEDGER: 1147785
 COMPONENT: 400110100 - Fisheries Mgt.
 LOCATION: Kodiak
 PROG. ELEMENT: Test Fish Survey
 LEGISLATIVE DISTRICT: 27
 FISHERIES AFFECTED: Bering Sea/Aleutian Islands Crab
 SPECIES AFFECTED: King and Tanner Crab

PROJECT DESCRIPTION:

Funding from this project will support the state's expenses for conducting shellfish research projects in the Bering Sea and Aleutian Islands. The state's commercial shellfish fisheries in these areas have recently been valued in excess of \$300 million. Studies funded under this project provide a better understanding of species biology and the impacts of commercial fishing. Insight toward effective shellfish resource management policy is a major product of this project. Department-initiated management measures and Alaska Board of Fisheries actions are oftentimes dependent on information obtained from the Bering Sea Test Fishery. Additionally, Bering Sea/Aleutians Islands and stock ID development research funded by this project would not otherwise be conducted.

PROJECT OBJECTIVES:

Bering Sea crab populations are assessed to provide information for development of harvest levels and fishery management policy. Data will be collected on all crab captured during the surveys. Survey results, experiment findings, and short and long term tag recovery data will provide information on stock parameters such as natural mortality and fishery harvest rates that can then be used to design management strategies meeting conservation and economic objectives established by the Alaska Board of Fisheries and North Pacific Fisheries Management Council.

BUDGET MANAGER: 11-1857 Donn Tracy TITLE: Fishery Biologist III

PRIOR YEAR ALLOCATIONS

Budget Detail	FY95	FY96	FY97	FY98	FY99
100 Personal Services	200.5	200.5	114.9	118.5	165.4
200 Travel	15.3	15.3	13.5	13.5	13.9
300 Contractual	222.8	222.8	304.9	304.9	255.2
400 Commodities	9.0	9.0	7.5	7.5	18.1
500 Equipment	7.0	7.0	10.0	10.0	2.5
Project Totals	459.9	454.6	446.8	450.8	455.1

Appendix A. (page 2 of 2)

Funding sources	FY95	FY96	FY97	FY98	FY99
Federal Receipts	0.0	0.0	0.0	0.0	0.0
General Fund	0.0	0.0	0.0	0.0	0.0
Interagency Receipts	0.0	0.0	0.0	0.0	0.0
Program Receipts	454.6	446.8	450.8	454.4	455.1
General Fund Match	0.0	0.0	0.0	0.0	0.0
Fish and Game Fund	0.0	0.0	0.0	0.0	0.0
CIP Funds	0.0	0.0	0.0	0.0	0.0
Staff months	30.0	30.0	14.5	12.0	22.0

PROJECT NUMBER: TF-785

PROJECT TITLE: Bering Sea Test Fishery

COMPONENT: 400110100 Fisheries Management.

UNIT: BSAI Crab

REGION: IV

LEDGER CODE: 11147785

PCN	RS	R&S	LOC	TITLE	NAME	MM	OT	SEA	H A Z	SW	SB	TOTAL
11-1857	A P	18B	CAA	Fish Bio III	Tracy, Donn	0.0	0.0	10	0	0	0	\$ 3,316.00
11-1390	A P	18F	BKB	Fish Bio II	Pappas, George	0.0	0.0	28	0	0	0	\$ 8,246.00
11-1595	P P	16M	CAA	Fish Bio II	Blau, Forrest	0.0	0.0	28	0	0	0	\$ 9,731.00
11-1117	A S	14F	CAA	Fish Bio I	Byersdorfer, S.	9.0	37.5	28	0	0	0	\$ 53,324.00
11-1226	A P	16J	BKB	Fish Bio II	Gish, Robert	0.0	0.0	18	0	0	0	\$ 5,669.00
11-1319	A S	11D	CAA	Admin Clerk II	Blackett, Nang	2.0	0.0	0	0	0	0	\$ 6,802.00
11-1409	A S	14B	BKB	Fish Bio I	Connolly, Dan	5.0	37.5	18	0	0	0	\$ 29,507.00
11-1906	A S	9C	BKB	Fish Bio I	Ruccio, Michael	0.0	0.0	18	0	0	0	\$ 4,323.00
11-1967	P S	14F	CAA	Fish Bio I	Watson, Leslie	6.0	20.0	0	0	0	0	\$ 32,217.00
11-1825	P S	11J	CAA	Fish Tech. III	Phillips, Kim	0.0	0.0	28	0	0	0	\$ 5,774.00
11-1603	P S	11D	BKB	Fish Tech. III	Schwenzfeier, M.	0.0	0.0	28	0	0	0	\$ 6,500.00
TOTALS						22.0	95.0	252	0	0	0	\$165,409.00

Line	Description	Amount	Comments
72240	Field travel	\$7.4	Travel
72500	Per Diem/Other costs	\$6.5	Per diem Expenses
73000	Charters/Other	\$255.2	Vessel charters, tags, printing phone, freight
74520	Misc. Sci. Supply	\$18.1	Misc. Scientific Equipment
75690	Misc. Equipment	\$2.5	Computer upgrades
TOTAL LINES 200-500:		\$289.7	
GRAND TOTAL ALL LINES:		\$455.1	

Appendix B. Shipboard Instructions 1998 Bristol Bay Test Fishery Charter.

Shipboard Instructions
1998 Bristol Bay Test Fishery Charter

by
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and
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SAFETY BRIEFING

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

The captain and crew have been instructed to run through the shipboard safety drill with you **PRIOR TO DEPARTURE** (as per the charter contract; see Appendix I), 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**. When the gear is being worked, pay attention to buoy lines and trailers, slick decks and pots. ADF&G personnel will not stack pots, operate hydraulics, or throw buoy lines (department crew members that participate in any of these activities will at the very least be prohibited from deployment on any future test fish vessel charters). Be aware of the crane at all times, especially when pots are being moved or stacked. **Obey the captain in regard to your safety and the safety of others.**

GENERAL BRIEFING

The purpose of this manual is to provide instructions and information relating to the 1998 Bristol Bay red king crab test fish project. Refer to it when in doubt regarding project objectives and sampling procedures. Be prepared to accept changes from the specifics outlined in this manual if necessary; however, standardized methodologies will remain constant.

Susie Byersdorfer is this year's cruise leader. Assisting personnel are Donn Tracy, Dan Connolly, Skip Gish and Ted Spencer. During the charter each crew member may be delegated tasks that will remain their responsibility throughout the entire trip. Any problems that arise should be channeled through Susie. Clean up any work areas that you use, including the galley table. All data will be kept as dry as possible and organized. Make sure the deck paperwork tracks with the pilot house records; every pot will have a unique sequential pot number which will enable cross referencing on a pot by pot basis. Although it is the cruise leader's responsibility to ensure data integrity, she will rely on other ADF&G crew members for assistance. If you have questions about the data, sampling protocols, or anything related to the work you are conducting please ask before you act. The cruise leader will note any changes in sampling plans, and the cumulative number of crabs put aboard the vessel for cost recovery.

All data will be edited daily. This practice ensures that the often important short-term details of the day's events are not overlooked. **There will be no compromise with regard to this responsibility.** If time permits, the vessel pilot house logs will also be entered into a spreadsheet on a daily basis.

Maintain all sampling equipment and ensure that it is cleaned up and stored safely inside the vessel at the end of each day (calipers, clipboards, measuring sticks, etc.). Keep a daily log of sampling activities, hours worked, contingencies, miscellaneous observations, Floy tag recoveries, a running tally of how many crabs you have aboard, sampling irregularities, etc.

Where possible, offer your assistance to the vessel crew. When time permits, you are free to help out with some of the on-deck activities that aren't inherently dangerous, such as filling bait containers, coiling buoy set ups, etc. Please clean up after yourselves if you have coffee or snacks between meals. Offers for washing dishes, making coffee, cooking, and general cleaning are expected and should be routine. In the past, the vessel crew has typically had a busier work schedule than ADF&G personnel, and a cooperative effort toward maintaining living conditions on the boat is a great benefit to everybody's morale.

There will be no homepacking of any crabs, crab legs, crab meat, fish or any other "seafood" during the charter. The personal retention of crabs and fish by department personnel on test fish research cruises constitutes exceptionally unprofessional behavior, will not be tolerated - particularly in view of the fact that it's unquestionably illegal for vessel crew members to retain any of the catch for personal consumption. There will also be no retention of hanging bait fish by the vessel crew for bait for any purpose other than to bait pots deployed during the charter period. However, it is acceptable to consume mortally injured crabs, cod and other groundfish while at-sea. All halibut (dead or alive) are to be placed overboard immediately. There will also be no collections of crabs for biological or display purposes unless Susie authorizes it.

A daily radio schedule will be maintained with ADF&G throughout the entire cruise. On each day of cost recovery fishing the cruise leader (or designated dept. crew member) will relay a status report consisting of the cumulative number and estimated poundage of crabs onboard the vessel, and the number of pots pulled and the actual or estimated CPUE for the day. During the directed research leg of the cruise the cumulative number of soak study blocks set and pulled will be reported along with a brief description of catch rates and the status of the underwater video system deployments. However, the first priority of each days radio report will be to acknowledge the well being of the vessel and both crews. Refer to Appendix A for an outline of the radio reporting schedule.

SURVEY OBJECTIVES

1. *Cost Recovery.* Catch approximately 25,000 male red king crabs ≥ 6.5 inches carapace width (CW) for delivery to Westward Seafoods in Dutch Harbor

on approximately August 8, 1998. Cost recovery catches will be sampled as outlined in the "Methods" section.

2. *Soak Time Experiments.* The primary directed research objectives of this year's survey include 1) testing the rates at which legal sublegal male and female red king crabs are captured in a standardized king crab pot design under several different pot soak time categories, and 2) recording time lapsed video of the interaction of legal, sublegal and female crabs with the standardized pot under each soak time scenario.
3. *Crab Live Weights.* Collect wet weights of live male and female red king crabs and Tanner crabs captured in cost recovery pots and/or soak experiment pots.
4. *Crab Collection for PSP Testing.* Collect, label and freeze red king crabs, Tanner crabs, snails and surf clams per Dept. of Conservation (DEC) request.
5. *Miscellaneous.* a) *Floy-Tagged Crab Recovery.* Document all captures of tagged crabs, regardless of agency or date of tagging. Re-release crabs after documentation is completed. Additional sampling required if a PIT-tagged crab is captured. b) *Crab Collections for Display/Shellfish Observer Program.* Collect, label and freeze various shellfish specimens for interpretive display and observer education.

METHODS

Cost Recovery Fishing and Delivery

Catch objectives

Using 6.0 lb. as an average weight, this year's cost recovery fishing goal will be to retain approximately 25,000 male red king crabs \geq 6.5 inches CW (approximately 150,000 lb.). In order to achieve this goal approximately 120 pots will be set and pulled at least every two days in areas of presumed concentrations of legal-sized male red king crabs. The actual cost recovery fishing location(s) will be determined by the vessel captain and Tracy, and will be based upon the captain's fishing experience, the successful placement of cost recovery gear during previous test fish surveys, or the results of the 1997 Eastern Bering Sea Crab Stock Assessment Survey. Two liters of chopped herring (and hanging bait when available) will be used in each pot set during cost recovery fishing.

Every single crab retained for cost recovery will be measured with a 6.5" stick. Ideally, there will be a single delivery of crab for the entire 28-day charter. Directed cost recovery fishing will occur at least during the first 10 days of the charter. Donn Tracy and Susie Byersdorfer will be the only ADF&G crew members aboard the vessel during this leg. However, if the cost recovery objectives are not achieved during the initial segment of the cruise, directed fishing for retainable crabs will continue and subsequent deliveries will be made prior to the commencement of directed research fishing. Westward Seafood's of Dutch Harbor has received the contract for the purchase of cost recovery red king crabs at \$3.25 per lb.

Pilot house logs and cost recovery sample pots

The vessel pilot house logs (for each segment of the charter) must be completed by the vessel captain each day, and edited (and if possible entered using the laptop) by the ADF&G crew. Note that the "Pilot House Log - Cost Recovery Strings" (Form 1, Appendix B) is slightly different than the "Pilot House Log - Pot Soak Study Blocks" (Form 2, Appendix B). **The "6.5" rkc per pot" column is the record for documenting catches of legal crabs on both types of pilot house logs, and must be completed for every pot pulled during the charter.** It is the cruise leader's responsibility to make sure the captain accurately completes the pilot house logs.

When cost recovery pots are set, string numbers will be assigned that are unique, beginning at 001. This number will be recorded on the top left hand corner of the pilot house log. When sampling cost recovery pots, record string number in the section for "station number". Pot numbers begin at "1" with the first pot set, run sequentially, and will encompass both cost recovery and the directed research gear. The intent is provide unique pot numbers while identifying study pots separately from cost recovery pots.

Catch reporting

The daily and cumulative catch (in numbers of crabs), the daily CPUE and number of pots pulled will be recorded on the "Red King Crab Cost Recovery Daily Tally and Cumulative Catch Record" (Form 3, Appendix B); and reported during the radio schedule to the Kodiak or Dutch Harbor ADF&G office using the code sheet provided.

Non-salable crabs

Following delivery of cost recovery crabs to the processor, the vessel crew will release all non-legal and deadloss crabs at the nearest dump zone. Live non-legal crabs cannot be sold under the test fish program.

Fish ticket for cost recovery delivery

Donn Tracy will handle the paperwork for the delivery of crabs to the processor; **this transaction in no way involves the charter vessel or the vessel captain.** A designated crew member from ADF&G will verify and record the weight of every brailer of cost recovery crabs offloaded during deliveries. Also, counts of crabs will be made for at least 6 brailers per delivery (this information will be used to calculate the average weight of the catch) and at least 100 crabs will be measured for biological and legal size by a dept. crew member or one of the Dutch Harbor dockside samplers. If for some reason Tracy is unable to oversee the transaction with the processor for the sale of cost recovery crabs, complete the fish ticket, bring the CFEC card to the processor's business office and fill in the information as follows: a) record "Vessel Name" as "ADF&G-Kodiak 1998 Bering Sea Test Fishery" (**do not write the vessel name on any part of the ticket**); b) compute the average weight of the crabs and record the appropriate proportion of the catch for each statistical area by weight and number of animals; c) weigh or estimate the deadloss and record on the ticket with the appropriate code; d) verify the poundage, and the price agreed upon in the processing contract; e) re-check the fish ticket before you sign it, and **make sure it is complete and accurate**; f) **do not sign the fish ticket until you have received a check for payment-in-full (remember, we are tax-exempt)**; g) the check is to be made out to: State of Alaska, 211 Mission Road, Kodiak, Alaska 99615.

Any disagreement with the processor on the cost recovery settlement for can be resolved by contacting Tracy.

Payment for the vessel charter

Please ask the captain to send an invoice for the amount agreed to in the charter contract to Linda Wisner, 211 Mission Road, Kodiak, AK 99615.

Pot Soak Time Study

In order to conduct a categorical analysis of the effects of variable pot soak periods on the catch rates of sublegal-male and female red king crabs, the study design will consist of deploying a total of 36 standard king crab pots at 1/3 (0.333) nautical mile intervals bilaterally on a grid pattern (hereafter referred to as a "block") and randomly assigning a soak time to each pot of either 12, 24 and 72 hours. Ideally, up to 10 blocks will be fished and sampled by the conclusion of the charter. The deployment of standard pots in blocks and the induced variability in pot soak periods will take place exclusively during the directed research leg of the charter. The location of the survey blocks will be based on areas of a high abundance of sublegal and female red king crabs observed during cost recovery fishing, prior test fish projects, and/or during the 1997 NMFS trawl survey. Susie and the vessel captain will be responsible for plotting pot grids during the study.

Illustrations of the 10 blocks to be fished (and the correspondingly randomly selected soak periods for pots within each block) are shown in Appendix C. The location of the first pot will determine the placement of subsequent pots within individual blocks.

It is essential that the soak study blocks are set in a series of 36 pots each. Block numbers will start at '1' and will be recorded on the "Pilot House Log - Pot Soak Study Blocks" (Form 2, Appendix B). A schedule for pot setting, pulling and sampling is provided in Appendix D. **VERY IMPORTANT:** If the prescribed schedule for setting and pulling study blocks becomes untenable (i.e., the target soak categories are jeopardized as a result of trying to fish too many blocks simultaneously), it is the crew leader's responsibility to adjust the block deployment strategy as necessary. Refer to Addendum A for an alternate deployment strategy or use the blank blocking schedule sheets provided to devise a suitable strategy. Under all circumstances avoid compromising the target soak categories in each block more than +/- 2-3 hours. The blocking scheme is the best scientific approach to maintain a systematic design for the purpose of data analysis; even though maintaining the randomly selected target soak periods for pots within each block may prove tedious at times. Both the vessel and ADF&G crews must be diligent in their pursuit of accomplishing this objective.

You must familiarize yourselves with the illustrations of pot block patterns (Appendix C) and routinely check with Susie to keep informed of the location and scheduled retrieval of the study pots so that you are always ready to start sampling. Before sampling each and every pot, check in with Susie and/or the captain to confirm block number, sequential pot number, and soak time category. Expect to work any and all hours necessary on a daily basis in order to accomplish the sampling goals of the study.

Underwater Video Observations

The autonomous underwater video system will ideally be deployed in pots fished both during project cost recovery and the soak time study. The cost recovery fishing deployments will primarily serve the purpose of initially testing the operational aspects of the camera in the field and also developing an understanding of successful deployment techniques. Deployment of the system during directed research fishing is intended to provide visual documentation of red king crab behavior in and around pots under various pot soak scenarios.

Instructions for handling and operating the video system are provided in Appendix E. If needed, more comprehensive operating procedures are outlined in the MSC-1000 Autonomous Underwater Video System User's Manual. **Note: remember that prior to each deployment the system VCR format must be set in the LP (long play) mode and the 24-volt deep cell battery must be fully re-charged.** See the "Operating Instructions for the Sony GV-S50 Video Recorder/Monitor" for VCR format setting procedures. Manufacturers' booklets are also available for the battery charger and each

of the system components and accessories, and should be referred to for product specifications and use/maintenance guidelines.

Deployment schedule

Cost Recovery Fishing - A number of deployed pots will be chosen for video observation as time permits during cost recovery fishing. The target soak time for each occasion the pot is fished must be established with the vessel captain prior to deployment of the system, so that it can be effectively programmed to record representative footage. Attempted time lapse recording programs for successive deployments should be sequenced as follows:

<u>deployment</u>	<u>pot soak</u>	<u>recording interval</u>	<u>frequency</u>
1st	if <48 hr.	60 minutes	at 12hrs., 24hrs., 36hrs.
	if >48 hr.	30 minutes	at 12hrs., 24hrs., 36hrs., 48hrs., 72 hrs.
2nd	if <48 hr.	30 minutes	once/8hrs.
	if >48 hr.	20 minutes	once/8hrs.
3rd	if <48 hr.	20 minutes	once/4hrs.
	if >48 hr.	20 minutes	once/6hrs.
4th	if <48 hr.	5 minutes	once/hr.
	if >48 hr.	10 minutes	once/3hrs.

All but the last 10 minutes of footage taken during the 1st deployment will be recorded using a single deep sea light outfitted with a 50 watt bulb. One of the remaining 5 minute intervals of footage should be recorded with both 50 watt deep sea lights activated; the other 5 minute interval should be recorded in ambient conditions (both deep sea lights turned off). Continue experimenting with differential lighting during filming to produce the best results. Subsequent deployments should contain the appropriate lighting scenario.

Since the feasibility of the above program sequences and lighting scenarios will be determined on a trail and error basis, recording intervals and frequency should be reduced proportionally as needed - in the event, for example, that it becomes apparent that the available power supply from the battery is insufficient for a given scenario.

Soak Time Study - The objectives of video system deployments during directed research fishing are to randomly produce time lapsed observations of red king crabs entering - and possibly egressing - pots during each of the three soak categories targeted for study. The appropriate recording interval sequence for this purpose will be determined during cost recovery fishing. The ideal program settings for each category will generate video footage representing the entire course of the soak period, and consequently may likely include a high recording interval frequency coupled with shortened recording intervals.

If possible, the video system should be deployed with each block of 36 pots set, and a different soak category selected for observation during each deployment. Ideally, by conclusion of the charter an equal number of video tapes depicting each soak category will be available. Try to obtain at least one footage sequence representing the 12hr., 24hr. and 72hr. target soak periods if deployment opportunities become limited.

Documentation

In order to document each deployment of the video system, all event programming sequences must be completely documented on the "Autonomous Underwater Video Recorder Event Sequence Worksheet" (Appendix B, Form 8). It will soon become apparent to the operator(s) that this measure is also necessary to successfully follow programming procedures.

Additionally, each deployment should be recorded in a separate log by including the following information:

- the pot setting and retrieval date and time (from pilot house logs), the charter leg (cost recovery or research), target pot soak time and general programming sequence;
- a brief description of the deployment results (successful/unsuccessful, problems encountered, changes made to component use/positioning, etc.).

Precautions

All pots selected for deployment of the video system are to be identified by the use or additional attachment of a trailer buoy painted with the letters "ADF&G RESEARCH", and properly outfitted with the "pot saver" device and appropriate GTR (72 hr. or greater). Pots containing the video system must be gently lowered to the ocean bottom - most likely by using the vessel's hydraulic block. **Do not allow these pots to be placed overboard by traditional use of the pot launcher.** Be sure to consult with the captain and vessel crew in order to devise a suitable means of non-free falling pot deployment.

Each time the video system is retrieved and not immediately re-deployed it must be cleaned of all marine detritus and thoroughly rinsed with fresh water to prevent corrosion. At all times during storage the system components (except the battery and frame) are to be stored in a dry, heated place. Be sure to review and follow other maintenance procedures in user manuals for individual components.

Sampling Procedures

Pot sampling will occur within both the study blocks and the cost recovery strings. Crabs will be sampled almost identically in both scenarios. However, all soak time study pots will be sampled, whereas pots sampled from cost recovery fishing will be randomly

selected. When sampling soak time study pots, you must indicate on each data form which soak category is being sampled (i.e. 12 hr.; 24 hr.; 72 hr.). Codes have been assigned for each category and are listed at the bottom of each data form. All crabs should be handled gently during sorting, measuring and release. Crabs not retained for cost recovery or other purposes are to be released into the water trough immediately following sampling. The vessel may transit while sampling is occurring; however, you must instruct the crew not to pull the next pot out of the water until you are finished sampling the previous pot.

Soak study pot catches

When a pot comes aboard, divide the catch of all crabs by species, and if possible subdivide by sex. Use a separate form for each species and sex. Create line breaks to delineate separate species recorded on the same form, NEVER PUT SEPARATE SEXES ON THE SAME FORM! Sample crabs and record required data (carapace measurements, number of crabs measured and number of crabs counted, legal/sub-legal, juvenile/adult, shell age, egg clutch conditions, disease, mortality) according to the rules for each species as given below. The catch of retained crabs (≥ 6.5 ") will be counted in every pot pulled, and recorded in the appropriate column on the Pilot House Log - Pot Soak Study Blocks (Form 2 Appendix B). Ensure that the vessel captain receives and records this information on a daily basis throughout the charter. For female RKC crabs, identification of juveniles or adults will be made based on whether or not the crab is egg-bearing, or there is evidence that it was egg-bearing (females less than 80mm CL are predominately immature, but do not use this as a standard). For female Tanner crabs, identification of juveniles or adults will be made based on whether or not the crab is egg-bearing, or there is evidence that it was egg-bearing (females less than 70mm CW are predominately immature, but do not use this as a standard); complete the "Eggs" section fully.

If a crab is dead when you sample it, please note it as code 1 (dead) in the "Other" column. Information from all sampled crabs will be recorded on the ADF&G Crab Research Data Form - Pot Soak Study Blocks (Form 4, Appendix B).

Red king crabs:

Divide the red king crab catch into males and females and further sub-divide the males into legals (≥ 6.5 inches CW) and sub-legals (< 6.5 inches CW). Record data for all crabs in each of the three sex/size classes. If all crabs in each category are sampled, data from each can be recorded on the same form. If sub-sampling in any category occurs, then all data from that category of crabs must be recorded on a separate form, and the number measured and number caught must be recorded in the spaces provided at the top of the form. **Sub-sampling will not occur** unless there is some unavoidable reason for doing

so. If subsampling does occur, The fields "number of crabs measured" and "number of crabs counted" must be filled in; otherwise, these fields will be left blank.

Tanner and snow crabs:

Divide the *C. bairdi* and *C. opilio* catch into males and females and further sub-divide the males into legals (≥ 5.5 inches CW) and sub-legals (< 5.5 inches CW). Record data for all crabs in each of the three sex-size classes. If all crabs in each category are sampled, data from each can be recorded on the same form. If sub-sampling in any category occurs, then all data from that category of crabs must be recorded on a separate form, and the number measured and number caught must be recorded in the spaces provided at the top of the form. Sub-sampling of Tanner and snow crabs will not occur unless there is some unavoidable reason for doing so.

Korean hair crabs:

Whenever Korean hair crabs are captured in either survey pots or cost recovery pots, fully sample them for sex, size, egg condition, etc. Record data for all Korean hair crabs captured on a separate form for misc. species. Document any observed mating activity in the "Comments" section.

Tanner hybrids and other incidental crab species:

Catches of any species besides red king crabs, Tanner crabs, and snow crabs will be sporadic at best. Record data for these crabs using a separate form for misc. species.

Cost recovery catches

The ADF&G crew onboard the vessel during cost recovery fishing will count catches of retained crabs (≥ 6.5 "") from every pot pulled, and ensure that the captain records this data in the appropriate column on the "Pilot House Log - Cost Recovery Strings" (Form 1, Appendix B). During all cost recovery fishing at least 5 and as many as 10 pots per day will be randomly selected for sampling (See Appendix F for random sampling procedures). Crab catches from these pots will be sampled in the same fashion as survey pot catches - however, all data will be recorded on the "Crab Data Form - Cost Recovery Strings" (Form 5, Appendix B). Remember to record string number in the section for station number in the appropriate column. Record all data for each species according to the rules for the "Soak study pot catches" (see above).

If weather conditions are unsafe or sampling efforts are severely hampering cost recovery objectives, the numbers of pots randomly selected for sampling on a daily basis during cost recovery fishing may be reduced or eliminated.

Live Crab Weights

The live weights of up to 300 each male and female red king crabs and male and female Tanner crabs will be collected in a random systematic fashion as time permits during both cost recovery and directed research fishing. Crabs set aside for this purpose should be representative of the entire size spectrum of those observed in pot catches. For convenience, a sampling checklist for different size groups and categories of crabs is provided in Addendum B. A maximum of 10 crabs in one of the four target categories should be selected from a single pot or capture location. In addition to weight, the carapace length/width, shell age, reproductive condition, sample date and catch location (stat area) for each animal sampled should also be recorded. Refer to Appendix B, Form 7 for further instructions in for recording these data.

Crab Collection for Paralytic Shellfish Poison (PSP) Testing

The Department of Environmental Conservation has requested that ADF&G collect crabs and other shellfish during the test fish charter for PSP and demoic acid testing. Red king crabs, Tanner crabs, snow crabs, snails and surf clams will be retained for this purpose. Collect 3 animals of each species encountered from each statistical area the vessel pulls gear in during cost recovery fishing. Refer to the pilot house log to determine when separate stat areas are being fished (also refer to the Bristol Bay statistical area chart). Collection labels for recording capture date and location information are in the forms supply box. Since no sampling plan came with this request, take small males of each crab species (put red king crabs in one bag w/label, Tanner crabs in another bag w/label, etc.) from a single pot in each statistical area at your convenience. The Dutch Harbor DEC office is aware that these samples will be coming in on August 8-10 and will send someone down to pick them up from the vessel. Otherwise, it is the responsibility of the crew leader to ensure that the local DEC representative is notified to retrieve the samples.

Miscellaneous

Floy-Tagged Crab Recovery

All ADF&G crew should keep an eye out for tagged crabs - especially during cost recovery fishing. These tags are hard to see. Remind the crew to keep a look-out as well. When a Floy-tagged crab is captured, try to sample it immediately. Tagged crabs are a priority whenever they are found. Document recovery of all tagged crabs on the Bristol Bay Red King Crab Tag Recovery Form (Form 6, Appendix B), including tag letter (if appropriate), tag number, measurement, legal status, shell age, capture date and location. Also note the sequential pot number and buoy number so that you can retrieve the capture location data from the pilot house logs. Return the crab to the sea as soon as possible. However, if the tag is numbered 1-3,421 and there is no "A" letter prefix, sacrifice the animal, collect, label and freeze the tail section. Collection labels for

recording capture date and location information are in the forms supply box. This information is very important; please stress its significance to the vessel crew.

Crab Collections for Display/Shellfish Observer Program

Several specimens of commercially utilized shellfishes are needed for updating and improving interpretive displays in the Kodiak ADF&G office. These specimens can be collected on a time available basis at any time during the charter. Each animal retained will be wrapped in cardboard (for protection) and placed in a plastic or burlap bag, frozen whole, and labeled as property of ADF&G (for safekeeping on the vessel). Prior to freezing, the legs of all crabs collected for display purposes should be articulated forward and tightly bound together with zip ties, string, etc. to keep them from later breaking off. The following species and numbers of each should be collected:

red king crab - two juvenile males and two juvenile females - all of which should be less than 90mm CL;

hair crab - two mature males and two mature females (no minimum or maximum sizes);

snow crab - two mature males and two mature females (no minimum or maximum sizes);

scale crab - one male and one female of any size(s) encountered;

snails - two each of every species encountered; these should include specimens of the genus *Neptunea* (Neptune snails), *Buccinum*, *Pyrulofusus* (melon snails), *Natica* (moon snails). Any snails that cannot be identified should also be retained. Refer to Kessler's "Alaska's Saltwater Fishes" to aid in speciating these animals.

Video/Photo documentation

Whenever time permits, document activities aboard the vessel. Photos of sampling and fishing activities and specialized research equipment or gear used are needed for archival and interpretive purposes. **IMPORTANT:** All underwater video footage must be documented with a written narrative relevant to what's being filmed (i.e., date and time of deployment and retrieval, recording program, objectives of deployment, pot soak time, a general description of the observed catch results, etc.). Record underwater video deployments in a separate log book; photo and on-deck video footage should be documented on Form 9 (Appendix B).

MISC. INSTRUCTIONS/REMINDERS

1. Leave timesheets with Kathleen in Dutch or Sharon in Kodiak.
2. Leave CFEC cards with Tracy.
3. Check your survival suit and EPIRB prior to departure.
4. Check your supply of forms, sampling equipment, and personal gear (seasick med.) prior to departure (Appendix G).
5. Survey itinerary and schedules are reviewed in Appendix H.
6. Questions regarding the contract between ADF&G and the vessel may be resolved by contacting Tracy and reviewing the contract in Appendix I.
7. Leave all receipts for purchases with Donn or Susie.
8. If there are no forms to record other data you collect, make them up. The Pilot House Logs must be completed at the end of each day. Complete every column in every form as required.
9. Be careful and have fun.

APPENDICES

Appendix A. Radio Schedule.

A daily radio schedule will be maintained with Kodiak ADF&G or with Dutch Harbor if the vessel cannot hail Kodiak. If all else fails, ADF&G will monitor vessel check-in through its radio schedule with Westward Seafood's. **The general vessel location will be reported daily by lat/long.** During the pot soak study, a summary of blocks fished (set and pulled) each day will be reported. When cost recovery fishing begins, report catches as specified using the phonetic codes below.

****Hail Kodiak ADF&G (WHM 29) on 5195 at 1600 hr. (4 p.m.)****

OR

****Hail Dutch Harbor ADF&G (WIM 76) on 4125 at 1600 hr. (4 p.m.)****

If reception is poor, switch channels. In addition, ADF&G Kodiak also has 3230 (WON 32) 3201, 4125 and 2512. Dutch Harbor ADF&G also has 3230 (WOM 32).

<u>Channel Code</u>	<u>Frequency</u>
A	5195
B	6227
C	2512

Catch reporting codes:

0	VICTOR	KILO	4	LIMA	PAPA
00	FOXTROT	OSCAR	5	JULIET	UNIFORM
000	ZULU	HOTEL	6	TANGO	ECHO
1	INDIA	MIKE	7	DELTA	YANKEE
2	ROMEO	X-RAY	8	GOLF	QUEBEC
3	ALPHA	BRAVO	9	WHISKEY	NOVEMBER

Appendix B. Data Forms and Examples (in bold) of Properly Completed Forms.

- Form 1. **Pilot House Log - Cost Recovery Strings**
- Form 2. **Pilot House Log - Pot Soak Study Blocks**
- Form 3. **Cost Recovery Daily Tally and Cumulative Catch Record**
- Form 4. **ADF&G Crab Research Data Form - Pot Soak Study Blocks**
- Form 5. **ADF&G Crab Research Data Form - Cost Recovery Strings**
- Form 6. **Bristol Bay Red King Crab Tag Recovery Form**
- Form 7. Crab Live Weight Form
- Form 8. Autonomous Underwater Video Recorder Event Sequence Worksheet
- Form 9. Video/Photo Documentation Log

1998 PILOT HOUSE LOG - COST RECOVERY STRINGS

BRISTOL BAY RED KING CRAB

VESSEL: Viking Queen

CAPTAIN: _____

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STRING NO. 0 0 1

SET GEAR							Depth (fathoms)	Bot. Type	Sequential Pot Number	Buoy Number	LIFT GEAR			N. LATITUDE			W. LONGITUDE			8.5" rkc per pot																			
Lo.	Day	Military Time				Mo.					Day	Military Time	Degrees	Minutes		Degrees	Minutes																						
0	8	0	2	1	0	2	1	4	0	3	0	0	0	1	A	G	0	8	0	3	0	7	0	1	5	6	3	2	.1	0	1	6	2	3	3	4	5	2	5
0	8	0	2	1	0	2	3	4	0	3	0	0	0	2	B	Y	0	8	0	3	0	7	0	9	5	6	3	2	.2	0	1	6	2	3	3	4	5	1	7
0	8	0	2	1	0	2	6	4	2	3	0	0	0	3	R	2	0	8	0	3	0	7	1	3	5	6	3	2	.3	0	1	6	2	3	3	4	5	2	4
0	8	0	2	1	0	2	8	4	2	3	0	0	0	4	C	G	0	8	0	3	0	7	1	6	5	6	3	2	.4	0	1	6	2	3	3	4	5	3	3
0	8	0	2	1	0	3	1	4	1	3	0	0	0	5	T	Y	0	8	0	3	0	7	1	9	5	6	3	2	.5	0	1	6	2	3	3	4	5	2	7
0	8	0	2	1	0	3	4	4	2	3	0	0	0	6	X1	3	0	8	0	3	0	7	2	5	5	6	3	2	.6	0	1	6	2	3	3	4	5	1	9
0	8	0	2	1	0	3	7	4	0	3	0	0	0	7	F	U	0	8	0	3	0	7	2	9	5	6	3	2	.7	0	1	6	2	3	3	4	5	4	3
0	8	0	2	1	0	4	0	4	3	3	0	0	0	8	J	R	0	8	0	3	0	7	3	3	5	6	3	2	.8	0	1	6	2	3	3	4	5	1	1
0	8	0	2	1	0	4	2	4	2	3	0	0	0	9	I	L	0	8	0	3	0	7	3	9	5	6	3	2	.9	0	1	6	2	3	3	4	6	0	0
0	8	0	2	1	0	4	5	4	1	3	0	0	1	0	SR	D	0	8	0	3	0	7	4	5	5	6	3	3	.0	0	1	6	1	3	3	4	5	3	9
0	8	0	2	1	0	4	7	4	1	3	0	0	1	1	W	A	0	8	0	3	0	7	5	1	5	6	3	3	.1	0	1	6	1	3	3	4	5	2	3
0	8	37	2	1	0	4	9	4	1	3	0	0	1	2	C	V	0	8	0	3	0	7	5	8	5	6	3	3	.2	0	1	6	1	3	3	4	5	1	8
0	8	0	2	1	0	5	1	4	0	3	0	0	1	3	B	H	0	8	0	3	0	8	0	3	5	6	3	3	.3	0	1	6	1	3	3	4	5	0	5
0	8	0	2	1	0	5	4	4	1	3	0	0	1	4	M	J	0	8	0	3	0	8	0	8	5	6	3	3	.4	0	1	6	1	3	3	4	5	2	4
0	8	0	2	1	0	5	8	4	2	3	0	0	1	5	K	L	0	8	0	3	0	8	1	3	5	6	3	3	.5	0	1	6	1	3	3	4	6	2	8
0	8	0	2	1	1	0	3	4	3	3	0	0	1	6	H	Y	0	8	0	3	0	8	1	9	5	6	3	3	.6	0	1	6	1	3	3	4	5	0	9
0	8	0	2	1	1	0	5	4	2	3	0	0	1	7	GH	C	0	8	0	3	0	8	2	6	5	6	3	3	.7	0	1	6	1	3	3	4	5	1	3
0	8	0	2	1	1	0	7	4	3	3	0	0	1	8	U	P	0	8	0	3	0	8	2	9	5	6	3	3	.8	0	1	6	1	3	3	4	5	0	8
0	8	0	2	1	1	1	0	4	0	3	0	0	1	9	D	E	0	8	0	3	0	8	3	3	5	6	3	3	.9	0	1	6	1	3	3	4	6	1	6
0	8	0	2	1	1	1	3	4	2	3	0	0	2	0	T	B	0	8	0	3	0	8	3	6	5	6	3	4	.0	0	1	6	1	3	3	4	6	0	3
0	8	0	2	1	1	1	5	4	2	3	0	0	2	1	L	K	0	8	0	3	0	8	4	0	5	6	3	4	.1	0	1	6	1	3	3	4	6	2	1
0	8	0	2	1	1	1	8	4	2	3	0	0	2	2	Z	S	0	8	0	3	0	8	4	5	5	6	3	4	.2	0	1	6	1	3	3	4	6	2	9
0	8	0	2	1	1	2	0	4	1	3	0	0	2	3	E	F	0	8	0	3	0	8	4	9	5	6	3	4	.3	0	1	6	1	3	3	4	6	2	3
0	8	0	2	1	1	2	3	4	1	3	0	0	2	4	F	A	0	8	0	3	0	8	5	5	5	6	3	4	.4	0	1	6	2	3	3	4	6	2	5
0	8	0	2	1	1	2	5	4	3	3	0	0	2	5	J	P	0	8	0	3	0	8	5	9	5	6	3	4	.5	0	1	6	2	3	3	4	6	3	4
0	8	0	2	1	1	2	7	4	2	3	0	0	2	6	Y	H	0	8	0	3	0	9	0	5	5	6	3	4	.6	0	1	6	2	3	3	4	6	3	7
0	8	0	2	1	1	3	0	4	0	3	0	0	2	7	S	P	0	8	0	3	0	9	1	1	5	6	3	4	.7	0	1	6	2	3	3	4	6	3	1

Bottom Type: 1. Rock; 2. Sand; 3. Silt; 4. Mud.

Source: shellfish research

1998 PILOT HOUSE LOG - POT SOAK STUDY BLOCKS
BRISTOL BAY RED KING CRAB

VESSEL: Viking Queen
CAPTAIN: _____

Appendix B. (page 21 of 75)

BLOCK NO.

0	0	1
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SET GEAR								Soak Code	Depth (fathoms)	Bot. Type	Sequential Pot Number	Buoy Number	LIFT GEAR			N. LATITUDE			W. LONGITUDE			6.5" rkc per pot																		
Mo.	Day	Military Time			Mo.	Day	Military Time						Degrees	Minutes		Degrees	Minutes																							
0	8	0	2	1	0	2	1	1	4	0	3	0	0	2	8	A	G	0	8	0	3	0	7	0	1	5	6	3	2	.3	3	1	6	2	3	3	.0	0	0	5
0	8	0	2	1	0	2	3	3	4	0	3	0	0	2	9	B	Y	0	8	0	3	0	7	0	9	5	6	3	2	.3	3	1	6	2	3	3	.8	6	1	7
0	8	0	2	1	0	2	8	3	4	2	3	0	0	3	0	R	2	0	8	0	3	0	7	1	3	5	6	3	2	.3	3	1	6	2	3	4	.3	3	1	4
0	8	0	2	1	0	2	8	2	4	2	3	0	0	3	1	C	G	0	8	0	3	0	7	1	6	5	6	3	2	.3	3	1	6	2	3	6	.0	0	0	3
0	8	0	2	1	0	3	1	1	4	1	3	0	0	3	2	T	Y	0	8	0	3	0	7	1	9	5	6	3	2	.3	3	1	6	2	3	6	.6	6	2	1
0	8	0	2	1	0	3	4	1	4	2	3	0	0	3	3	X1	3	0	8	0	3	0	7	2	6	5	6	3	2	.3	3	1	6	2	3	6	.3	3	1	9
0	8	0	2	1	0	3	7	3	4	0	3	0	0	3	4	F	U	0	8	0	3	0	7	2	9	5	6	3	2	.8	6	1	6	2	3	3	.0	0	0	3
0	8	0	2	1	0	4	0	2	4	3	3	0	0	3	5	J	R	0	8	0	3	0	7	3	3	5	6	3	2	.6	6	1	6	2	3	3	.6	6	1	1
0	8	0	2	1	0	4	2	1	4	2	3	0	0	3	6	I	L	0	8	0	3	0	7	3	9	5	6	3	2	.8	6	1	6	2	3	4	.3	3	2	0
0	8	0	2	1	0	4	5	2	4	1	3	0	0	3	7	SR	D	0	8	0	3	0	7	4	6	5	6	3	3	.8	6	1	6	2	3	5	.0	0	0	8
0	8	0	2	1	0	4	7	2	4	1	3	0	0	3	8	W	A	0	8	0	3	0	7	6	1	5	6	3	3	.6	6	1	6	2	3	5	.8	6	1	3
0	8	38	2	1	0	4	9	1	4	1	3	0	0	3	9	C	V	0	8	0	3	0	7	6	8	5	6	3	3	.6	6	1	6	2	3	6	.3	3	0	6

Soak code: 1. - 12 hr.; 2. - 24 hr.; 3. - 72 hr. Bottom type: 1. Rock; 2. Sand; 3. Silt; 4. Mud.

SPECIES _____
 SEX _____
 DATE

--	--	--	--	--	--

STATION NO. _____
 BUOY NO. _____
 NO. CRAB MEASURED _____
 TOTAL NO. CAUGHT _____

VESSEL _____
 MEASURER _____
 RECORDER _____
 PAGE _____ OF _____

SOAK CATEGORY

SEQUENTIAL POT NUMBER	SPECIES	SEX	CRAB SIZE (MM)	LEGAL	SHELL AGE	EMBRYOS				OTHER	COMMENTS
						COLOR	DEVEL.	COND.	% 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											
26											
27											
28											
29											
30											

- | | | | | | | |
|--|--|--|---|---|--|---|
| <p><u>Crab Species</u></p> <ol style="list-style-type: none"> 1. <i>L. azoquospina</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> 10. <i>L. douesi</i> 11. <i>C. tanneri</i> | <p><u>Sex</u></p> <ol style="list-style-type: none"> 1. Male 2. Female <p><u>Legal</u></p> <ol style="list-style-type: none"> 1. Sublegal 2. Legal <p><u>Shell Age</u></p> <ol style="list-style-type: none"> 0. Soft 1. New 2. Old | <p><u>Live Egg Color</u></p> <ol style="list-style-type: none"> 1. Tan 2. Purple 3. Brown 4. Orange 5. Purple-brown 6. Pink 7. Reddish 0. Other-describe | <p><u>Egg Development</u></p> <ol style="list-style-type: none"> 1. Uneyed 2. Eyed <p><u>Clutch Condition</u></p> <ol style="list-style-type: none"> 1. Dead eggs not apparent 2. Dead eggs < 20% 3. Dead eggs > 20% | <p><u>Percent Clutch</u></p> <ol style="list-style-type: none"> 1. Barren, clean pleopods 2. Barren, with empty egg 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><u>Other</u></p> <ol style="list-style-type: none"> 1. dead 3. Nematodes in clutch 4. Turbellarians in clutch 5. Black mat 6. Bitter crab disease 7. "Cottage cheese disease" 8. Shell rust 9. <i>B. callosus</i> | <p><u>Soak Category</u></p> <ol style="list-style-type: none"> 1. 12 hr soak 2. 24 hr soak 3. 72 hr soak |
|--|--|--|---|---|--|---|

SPECIES _____

SEX _____

DATE

--	--	--	--	--	--

STATION NO. _____

BUOY NO. _____

NO. CRAB MEASURED _____

TOTAL NO. CAUGHT _____

VESSEL _____

MEASURER _____

RECORDER _____

PAGE _____ OF _____

SEQUENTIAL POT NUMBER	SPECIES	SEX	CRAB SIZE (MM)	LEGAL	SHELL AGE	EMBRYOS				OTHER	COMMENTS
						COLOR	DEVEL.	COND.	% 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											
26											
27											
28											
29											
30											

- Crab Species
1. *L. aquispina*
 2. *P. camtschaticus*
 3. *P. platypus*
 4. *Erimacrus*
 5. *C. bairdi* x *oconio*
 6. *C. bairdi*
 7. *C. opilio*
 8. *C. angulatus*
 9. *Cancer magister*
 10. *L. covei*
 11. *C. bairdii*

- Sex
1. Male
 2. Female
- Legal
1. Sublegal
 2. Legal
- Shell Age
0. Soft
 1. New
 2. Old

- Live Egg Color
1. Tan
 2. Purple
 3. Brown
 4. Orange
 5. Purple-brown
 6. Pink
 7. Reddish
 8. Other-
 9. describe in comments

- Egg Development
1. Uneyed
 2. Eyed
- Clutch Condition
1. Dead eggs not apparent
 2. Dead eggs < 20%
 3. Dead eggs > 20%

- Percent Clutch
1. Barren, clean pleopods
 2. Barren, with empty egg cases and/or stalks
 3. Clutch 1-29% full
 4. Clutch 30-59% full
 5. Clutch 60-89% full
 6. Clutch 90-100% full

- Other
1. dead
 2. Nemertean in clutch
 3. Turbellarians in clutch
 4. Black mat
 5. Bitter crab disease
 6. "Cottage cheese disease"
 7. Shell rust
 8. *B. callosus*

ADF&G WESTWARD REGION CRAB TAG RECOVERY FORM

SPECIES _____

FISHERY _____

SAMPLER _____

	FLOY TAG SERIES & NUMBER	SIZE (mm CL)	LEGAL /a	SEX /b	SHELL /c	FATE /d	CAPTURE DATE			CAPTURE LOCATION				DEPTH (m)	STATISTICAL AREA	ADF&G VESSEL NO.	
							Mo.	Day	Yr.	N. LATITUDE		W. LONGITUDE					
1																	
2																	
3																	
4																	
5																	

/a LEGAL: 1=Sublegal; 2=Legal. /b SEX: 1=Male; 2=Female. /c SHELL AGE: 0=Soft; 1=New; 2=Old; 3=Very Old. /d FATE: 1=Dead; 2=Released alive; 3=Dead (not retained for sale; e.g., found in deadloss pile or frozen for ADF&G or Observer sampling, etc.)

NOTE: If female crab; record additional information on the back of this form. Record comments for captured male and female crabs on the back of this form.

	Received Tag or Tagged Crab From: Name, Address & Phone	Received Recovery Location Data From: Name, Address & Phone	Vessel Name	Processor Name	Sampling Date		
					Mo.	Day	Year
1							
2							
3							
4							
5							

Edited by: _____

Date: _____

Entered by: _____

Date: _____

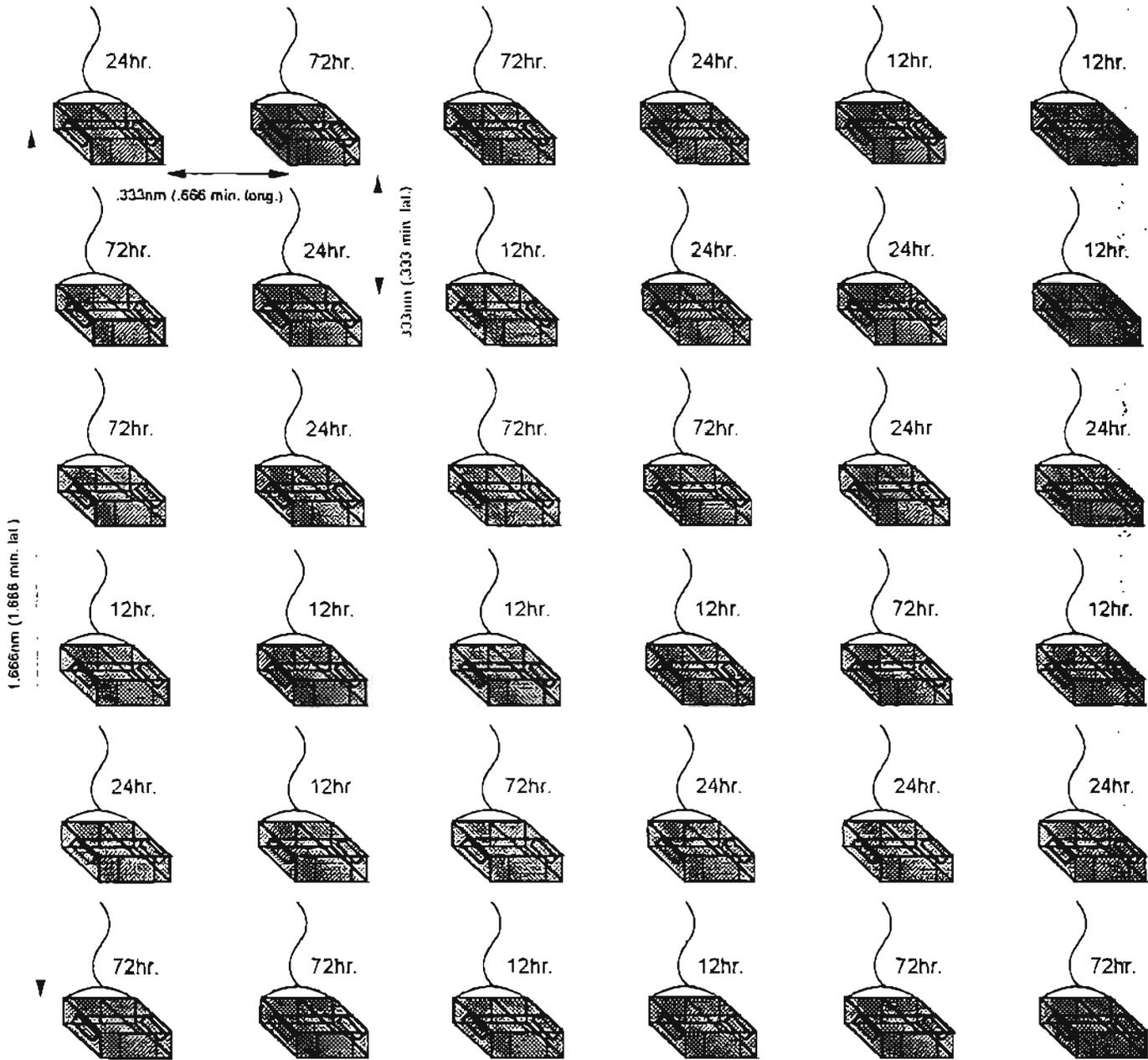
6MTFPM05.WQ1 0/05 (fw)

42
23

Appendix B. (page 29 of 75)

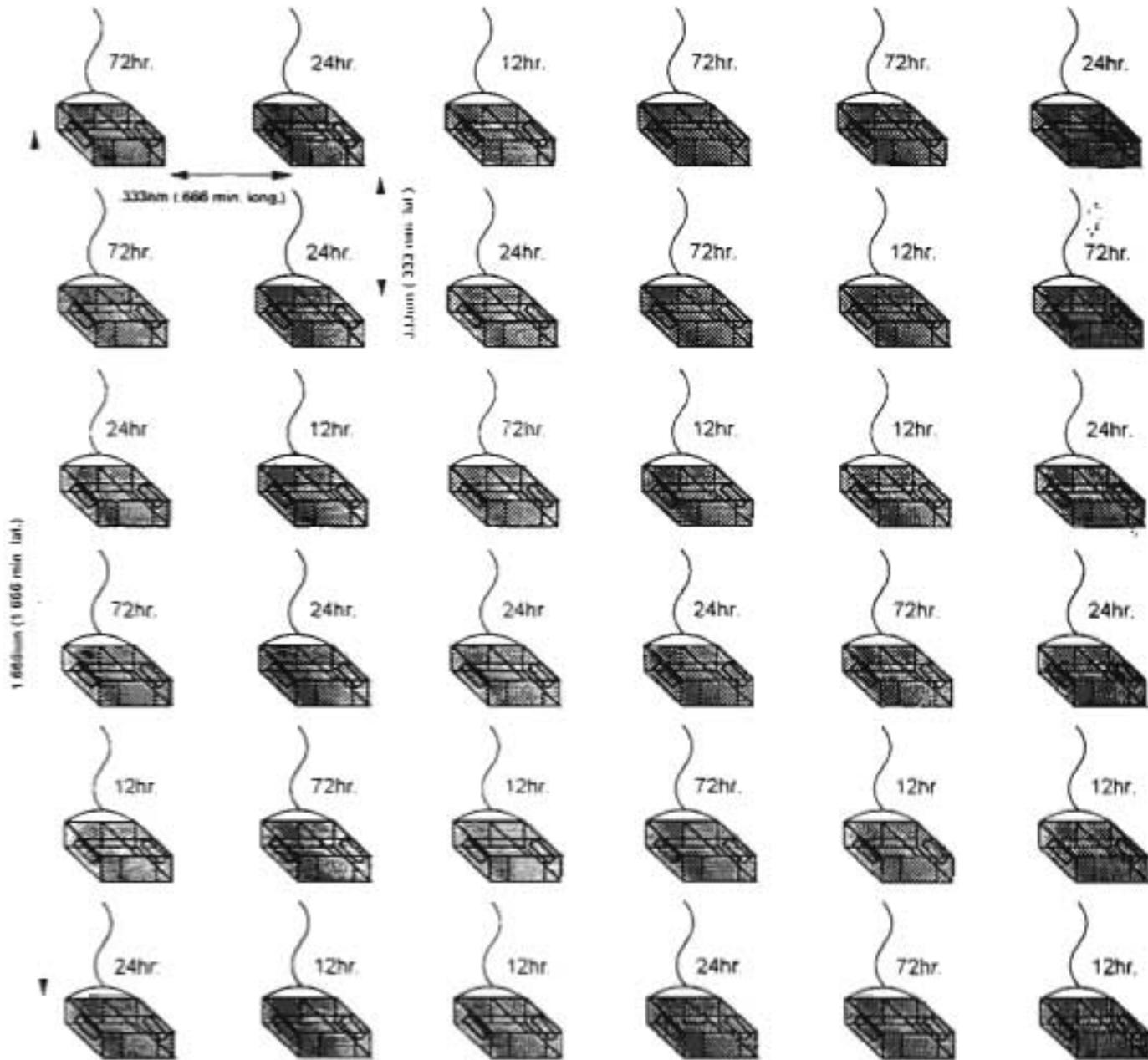
Appendix C. Soak Time Study Block Deployment Patterns. Block Numbers and Randomly Assigned Soak Periods for Pots Within Each Block.

Appendix C (cont'd).



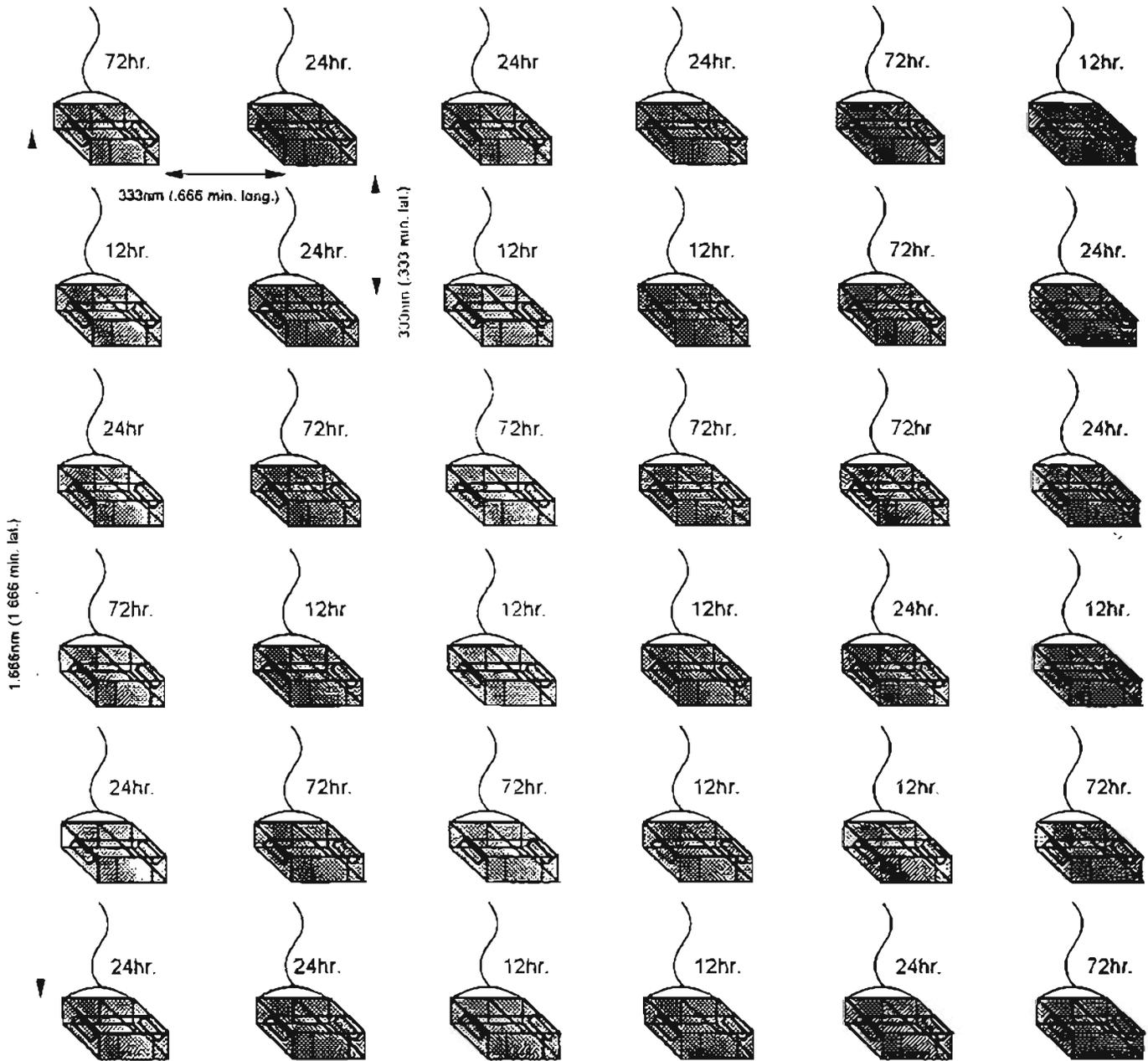
BLOCK #1

Appendix C (cont'd).



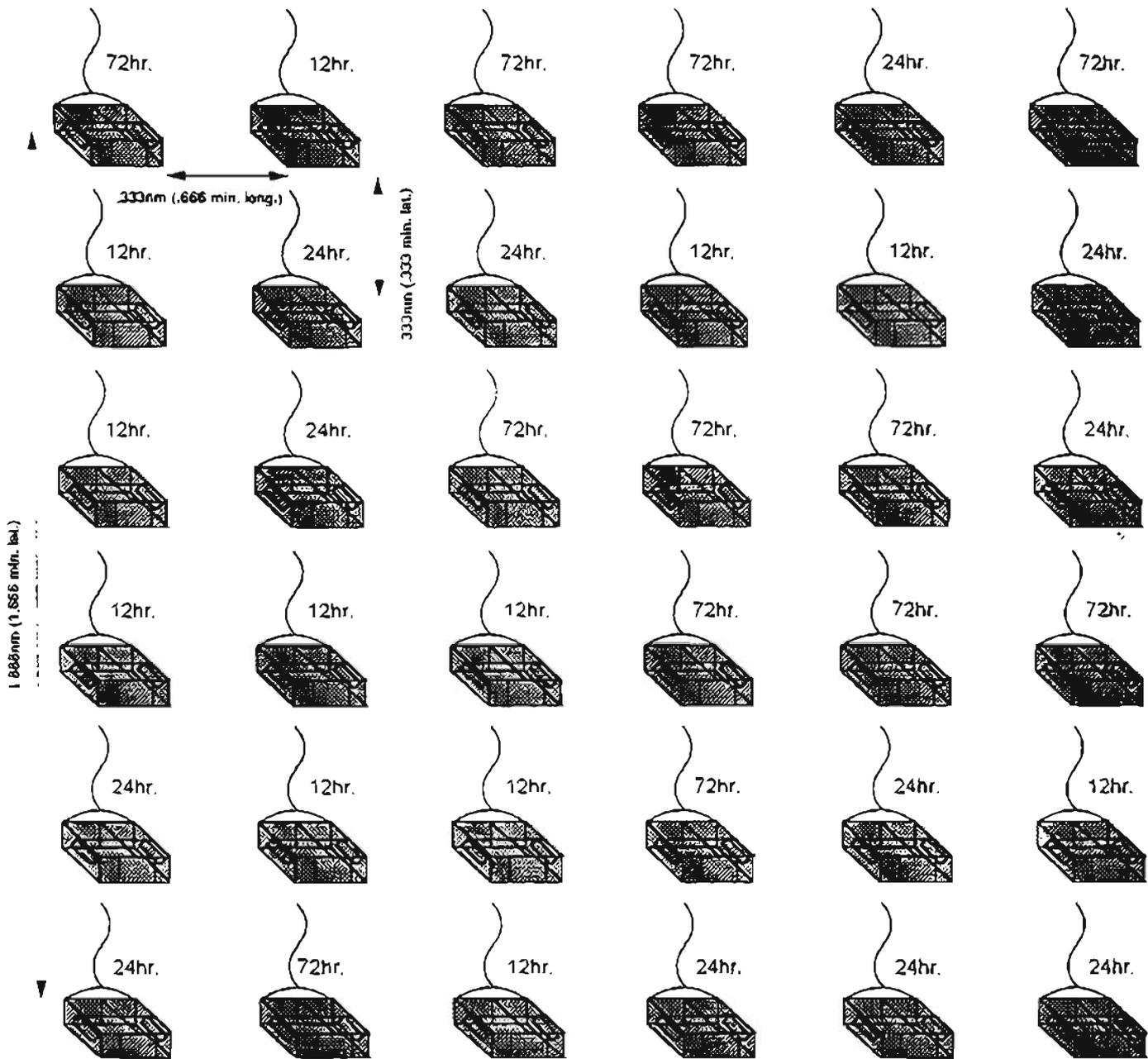
BLOCK #2

Appendix C (cont'd).



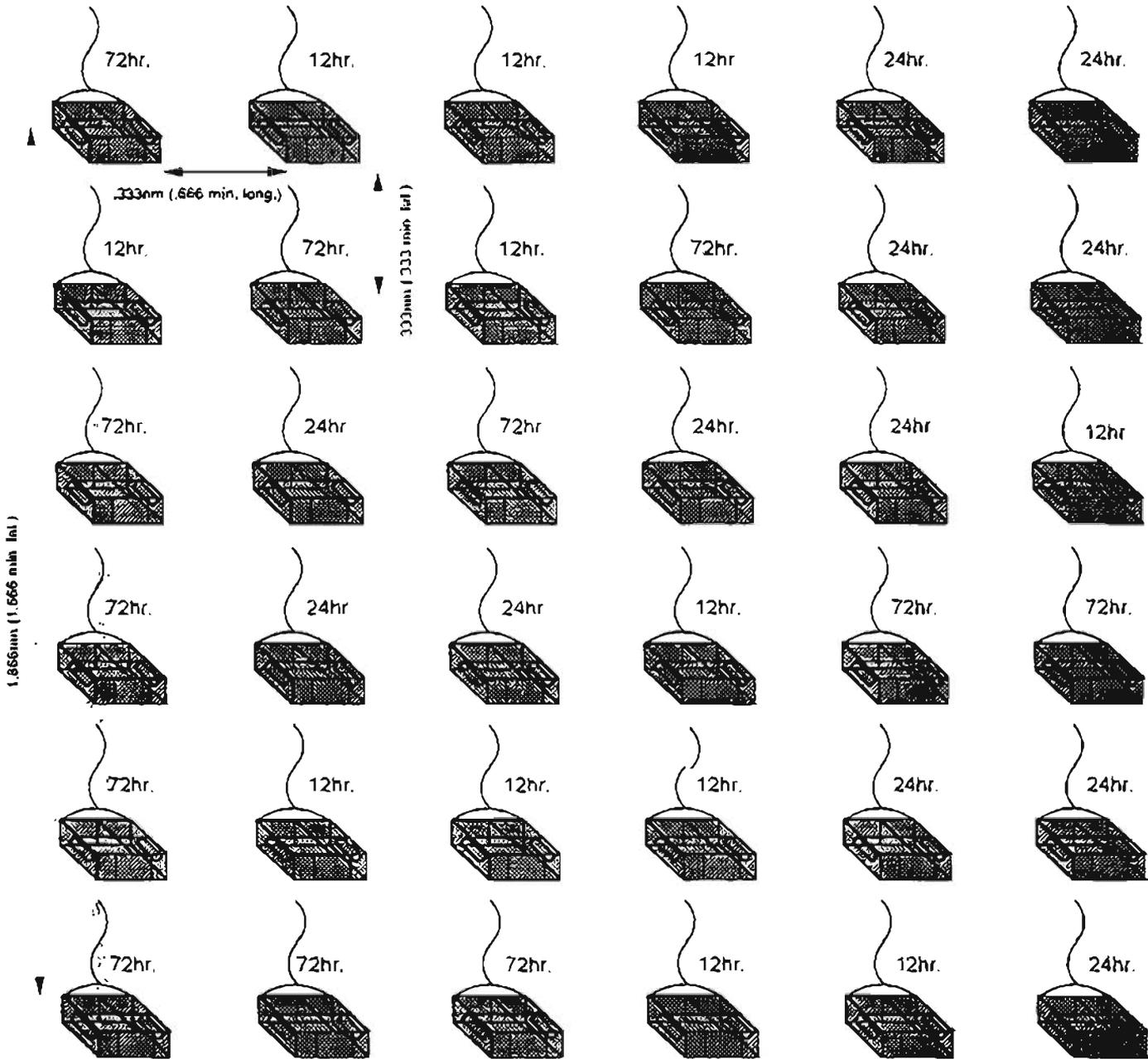
BLOCK #3

Appendix C (cont'd).



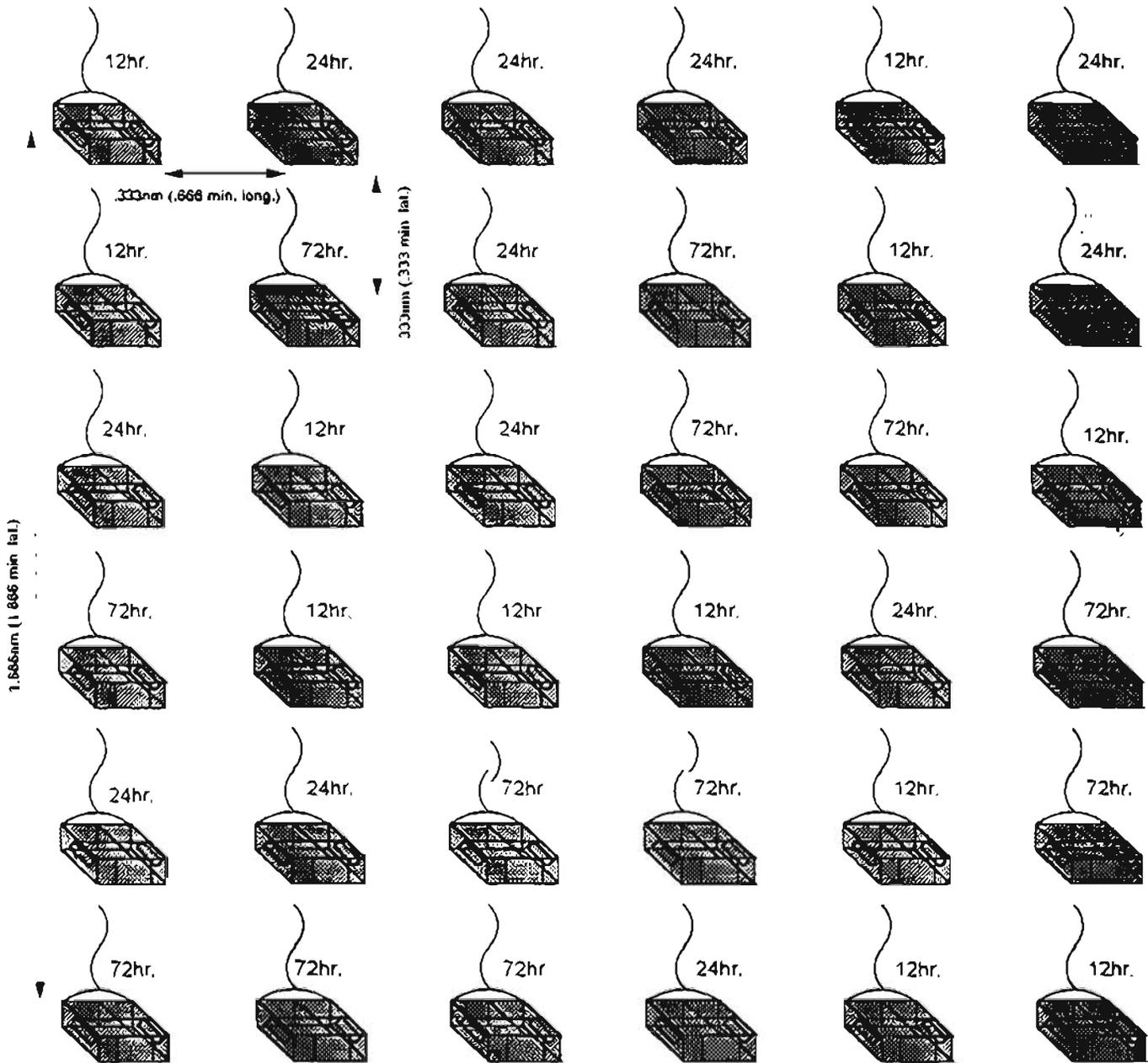
BLOCK #4

Appendix C (cont'd).



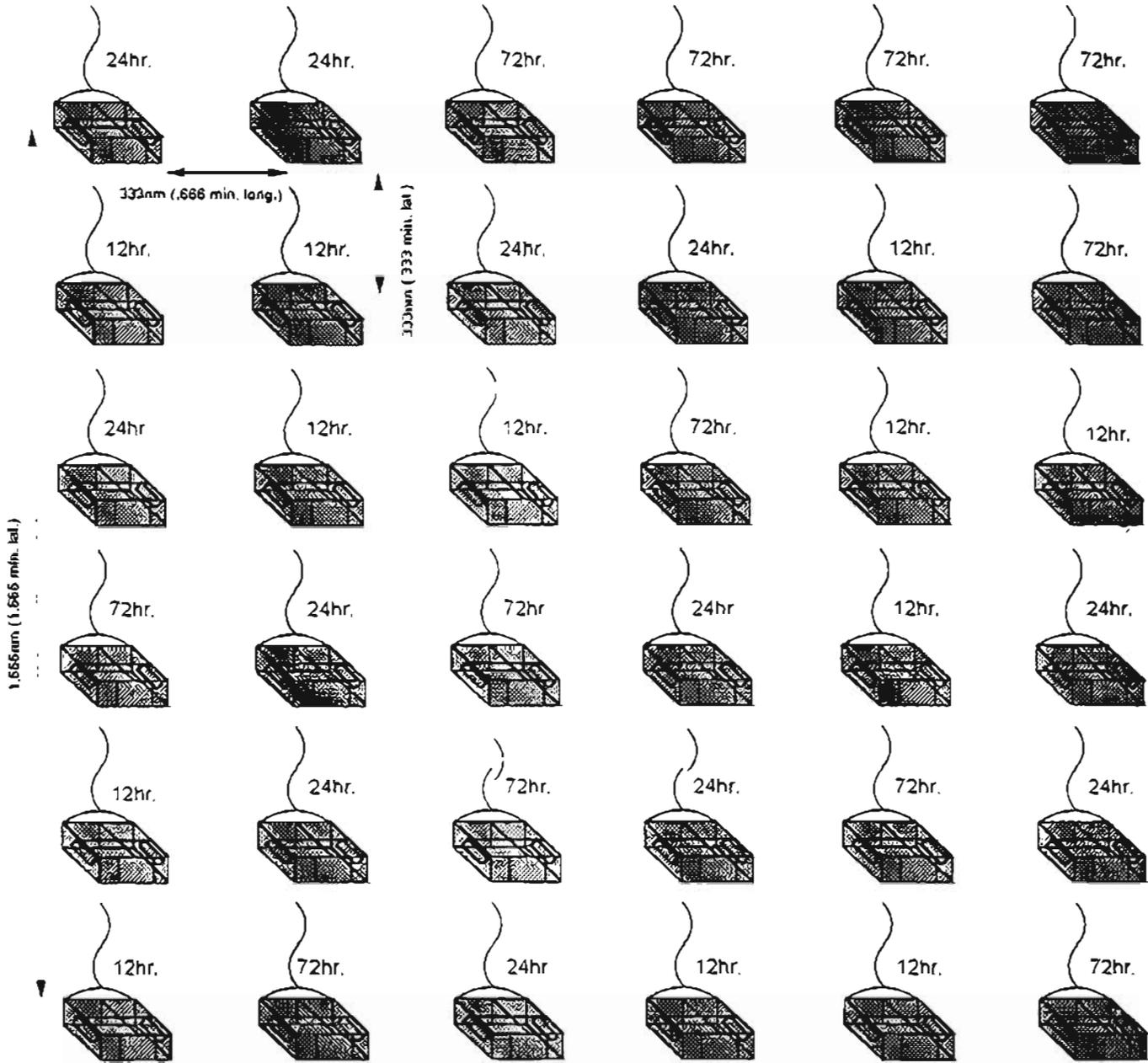
BLOCK #5

Appendix C (cont'd).



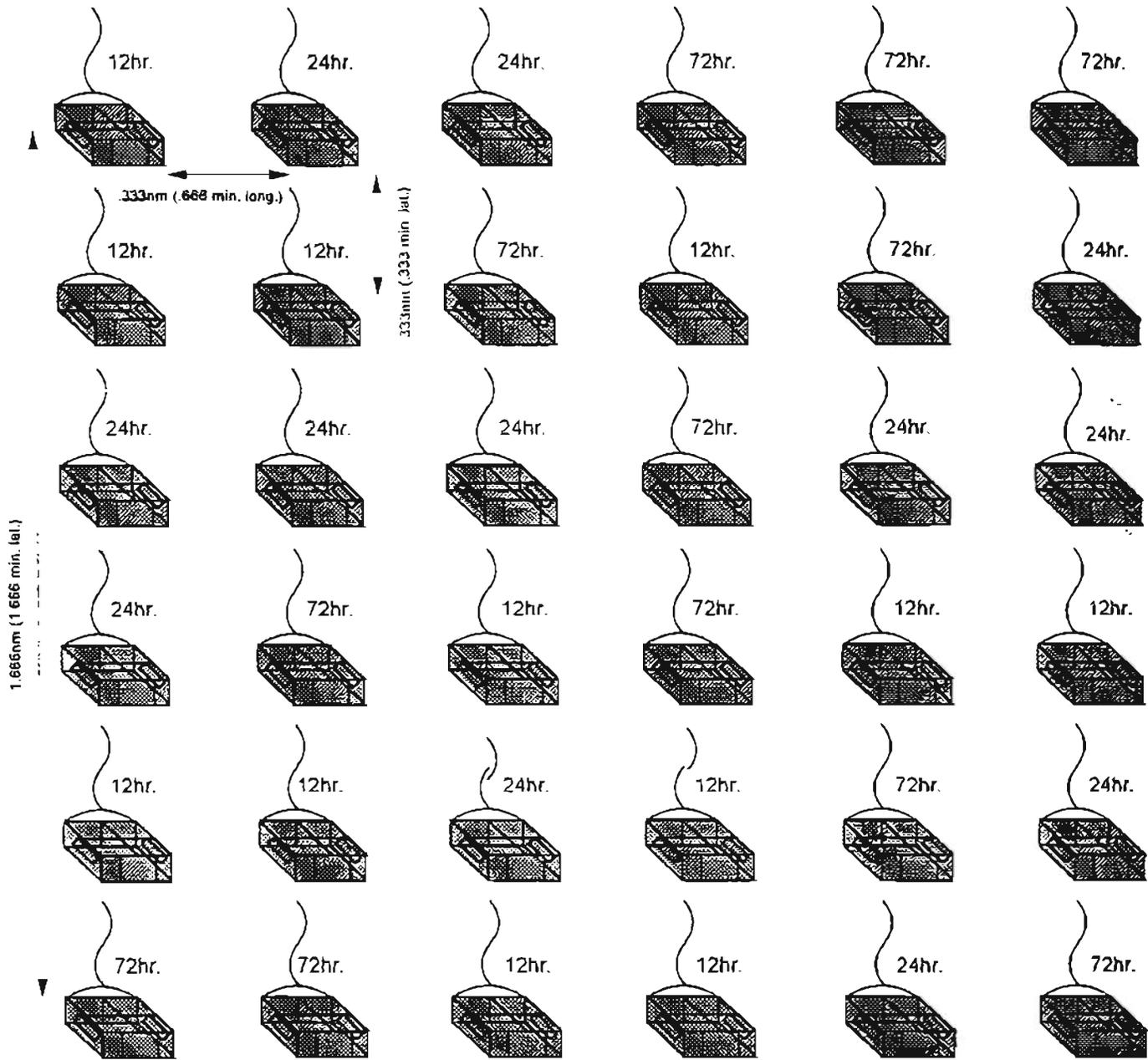
BLOCK #6

Appendix C (cont'd).



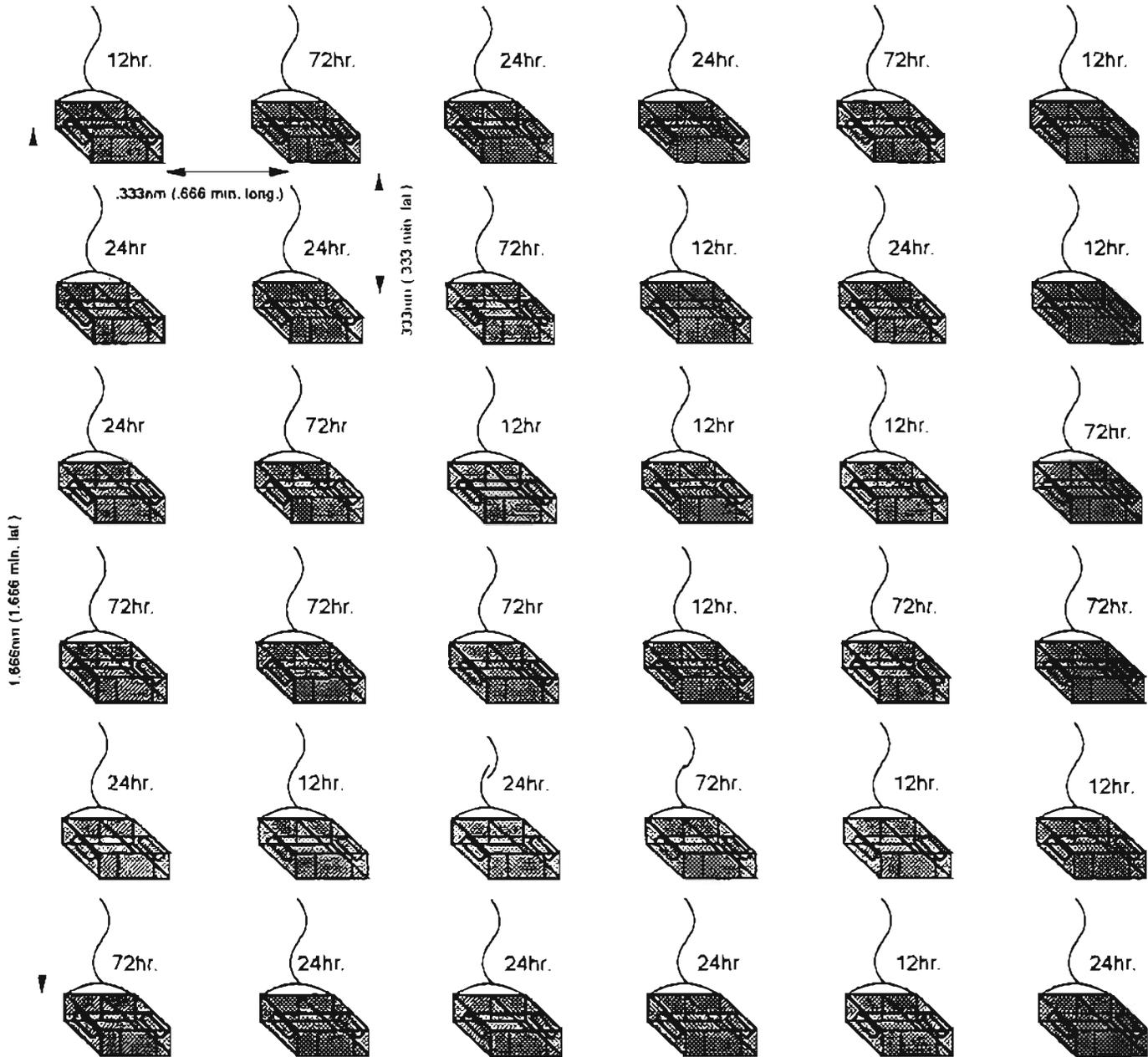
BLOCK #7

Appendix C (cont'd).

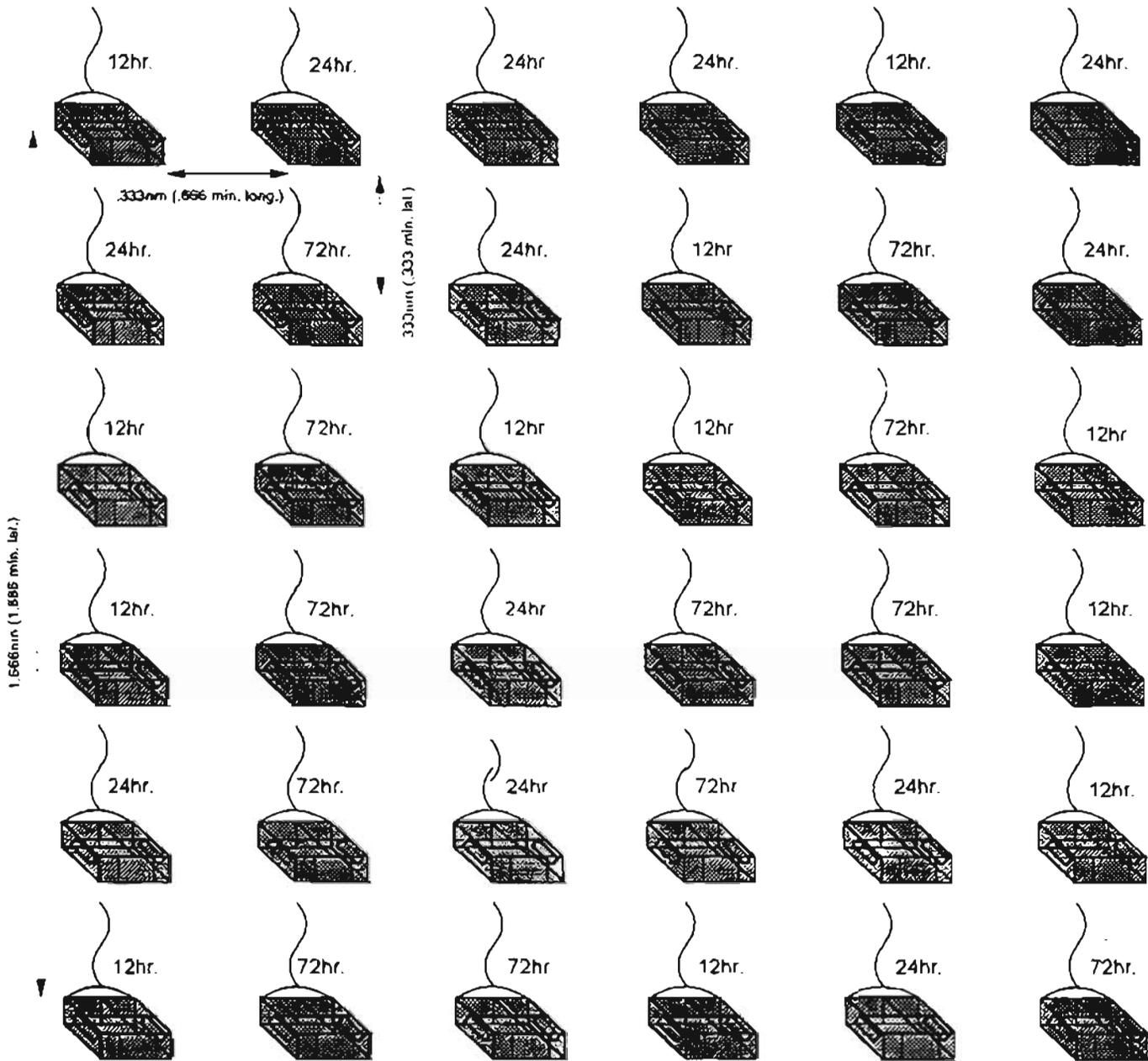


BLOCK.#8

Appendix C (cont'd).



BLOCK #9



BLOCK #10

Appendix D. Pot Soak Study Gear Setting, Pulling and Sampling Schedule

Day	Block #1	Block #2	Block #3	Block #4	Block #5	Block #6	Block #7	Block #8	Block #9	Block #10
1	A.M. set block P.M. 12hr pick									
2	A.M. 24hr pick	P.M. set block								
3		A.M. 12hr pick P.M. 24hr pick	P.M. set block							
4	A.M. 72hr. pick		A.M. 12hr pick P.M. 24hr pick	P.M. set block						
5		P.M. 72hr pick		A.M. 12hr pick P.M. 24hr pick						
6			P.M. 72 hr pick		A.M. set block P.M. 12hr pick					
7				P.M. 72hr pick	A.M. 24hr pick	P.M. set block				
8						A.M. 12hr pick P.M. 24hr pick	P.M. set block			
9					A.M. 72hr pick		A.M. 12hr pick P.M. 24hr pick			
10						P.M. 72hr pick		A.M. set block P.M. 12hr pick		

Appendix D (cont'd).

Day	Block #1	Block #2	Block #3	Block #4	Block #5	Block #6	Block #7	Block #8	Block #9	Block #10
12							P.M. 72hr pick	A.M. 24hr pick	P.M. set block	
13									A.M. 12hr pick P.M. 24hr pick	P.M. set block
14								A.M. 72hr pick		A.M. 12hr pick P.M. 24hr pick
15									P.M. 72hr pick	
16										P.M. 72hr pick

Appendix E. Instructions for Handling and Operating Autonomous Underwater Video Recorder System.

During programming of MSC-1000 controller, the spherical anodized aluminum housing containing this component and the system VCR must at all times be kept in a sheltered and dry area. **Under no circumstances will the housing be opened on the vessel's outside deck - regardless of weather and sea conditions.** Since the system 24-volt battery must be re-charged following every deployment, the controller can most easily be accessed for programming by adhering to the following sequence of actions:

- Place the pot selected for observation in the vessel's launcher.
- Secure the fully charged battery in the deployment frame.
- Secure the frame in the selected pot.
- Using the 40' auxiliary power cable and following Step # 1 below, connect the battery to the appropriate port (look for the matching pin pattern) on the housing end bulkhead.*

*Note: The power cables leading to the housing must be threaded through the open ends of orange "pumpkin" halves before they are attached to the housing ports. Otherwise, the housing cannot be properly secured in the pumpkin and deployment frame after programming is completed.

The housing can now be transported up to 40' to an indoor location where it can be opened and programmed. Prior to opening the housing following each deployment (and before disconnecting any of the power cables), it must be completely rinsed with FRESH WATER and subsequently dried off. Opening and closing the housing is accomplished by using the 110-volt two-directional air pump. To open the housing, place it in one of the white plastic buckets provided with the end bulkhead containing the hexagonal stainless steel pressure valve screw facing upward. Remove this screw and in its place attach the plastic pump hose leading to the arrow on the pump unit pointing outward (toward the free end of the hose you're attaching to the housing). **Before plugging in the pump make sure that a person is holding the upright half of the housing in place.** The over-pressurization of the housing necessary for opening it will cause the upper half to forcefully detach itself when the seal between the two halves is broken. After plugging in the pump, allow 5-10 seconds for over-pressurization to occur. To access the controller programming console and LCD, gently lift the detached half of the housing and place it in the second plastic bucket, while taking great care not to stretch, twist or tangle any of the internal wiring connecting the system components.

Programming the system controller can only be successfully completed by following the procedures outlined below:

Appendix E (cont'd).

1. If previously disconnected, before plugging in the battery camera and lights make sure the control toggle switch (the only toggle switch visible) is in the 'off' position.
2. Make sure VCR is turned off.
3. Turn control switch to the 'on' position.
4. The 1st menu screen on the controller LCD display, which is referred to as the 'standby screen', should read as follows:

```
RUN STORED PROGRAM
PROGRAM EVENTS
CALIBRATION
```

```
Sel Next Prev Back
```

- a. Push the 'Next' button until you get to 'PROGRAM EVENTS'
- b. Push the 'Sel' button

The 'PROGRAM EVENTS' menu screen should display the following:

```
EVENT: 1
DATE: 07 01 01*
TIME: 00:00:00
  H M S
SEL NEXT PREV SAVE
```

*Note: The date will be displayed in the relative time mode (January 1, 1970); the controller can be programmed in the real or relative time mode. Programming in real time mode requires that the date and time are calibrated before hand to reflect the current time and date. Consult the complete MSC-1000 User's Manual for calibration procedures.

- d. Push 'Next' until you advance to 'TIME'
- e. Push the 'Sel' button, which will advance you to the 'Set Time' screen.

The 'Set Time' screen should display the following:

```
DATE      TIME
YYMMDD   HH:MM:SS

DIG. INC. DEC. BACK
```

- f. Using the 'DIG.' key to advance between hours, minutes and seconds, and the 'INC.' and 'DEC.' keys to add or subtract units. enter the amount of time you want to elapse before the VCR and /or the camera lights come on (the internal programming clock will begin running as soon as a power source is connected to the controller).
- g. press the 'SAVE' button.
- h. press the 'NEXT' button, which will advance you to the 'Event Menu' screen.

Appendix B. (page 44 of 75)

Appendix E (cont'd).

The 'Event Menu' screen should display the following:

RECORD: AAA

CAMERA: AAA

LIGHT 1: AAA

SEL NEXT PREV BACK

- i. Using the 'NEXT' and 'PREV' keys, toggle through between functions to activate the camera and lights. Press the 'SEL' key when the function you wish to change is highlighted (this will designate each accessory to come ON or OFF at the time of the event you have just programmed). In order to change the setting for the second camera light ('LIGHT 2') you must press the 'NEXT' button to scroll down the "Event Menu" screen. Use the "Sel" key to activate or de-activate the second light.
- j. Press the 'BACK' button, which will return you to the 'PROGRAM EVENT' screen
- k. Press the 'SAVE' button, which will return you to the 'Standby' screen ('EVENT 2' will now appear at the top of this screen).

VERY IMPORTANT: You must repeat Step 4, parts a through j for each occasion you wish to program the video system to be turned on, or to be turned off. For example, if you wanted the recorder and camera (and if applicable, lights 1 and 2) to take video footage on two separate occasions during a given deployment time interval, you would need to program a total of 4 events - 1 for each time the system would come on (a total of 2 times in this example), and 1 for each time the system would shut off (twice in this example).

Programmed events cannot be stored in the controller memory (and thus will not occur at the specified date and time) if any steps in the sequence specified above are skipped. Therefore, it is imperative that for each deployment of the system, each programmed event is recorded on a step-by-step basis on the "Autonomous Underwater Video Recorder Event Sequence Worksheet" (Appendix B, Form #8).

The controller memory will accommodate a total of 183 events during a single programming cycle, which means that 91 separate time-lapsed intervals of video footage can be recorded during a single deployment of the system.

After programming has been completed, the housing must be closed and completely sealed by performing the following steps:

- Examine, clean and lubricate (using a small amount of electrical insulating compound) the housing O-rings and make sure they are seated properly around the male sealing bore.
- Apply a thin layer of lubricant on the female sealing bore.
- Being very careful not to twist or pinch any of the internal wiring, replace the top half of the housing by aligning the controller circuit board with the space in front of the VCR.

Appendix E (cont'd).

- Once the halves of the housing sphere are in alignment, re-inspect the O-ring seating placement and gently press the halves together until firm resistance is met.
- Attach the plastic hose leading to the arrow on the pump unit pointing inward (away from the end of the hose you're attaching to the housing) to the stainless steel pressure valve port.
- Plug in the pump until the vacuum created by air being removed from the housing draws the two halves completely together, and seals the bored surfaces with an audible suction sound.
- Replace the closure band around the housing (do not tighten excessively so that the shape of the band deforms).
- Replace the stainless steel pressure valve screw and gently tighten.

After securing the housing in the orange pumpkin using the PVC spacers, stainless steel bolts and wing nuts, fasten the pumpkin to the deployment frame in the appropriate position (as indicated by arrows and lettering on the frame). Mount the camera and lights (if applicable), keeping in mind that laterally, the lights should be approximately 28" from the camera, and must be set back slightly behind it in order to illuminate the entire area being filmed.

The system is now ready for deployment.

Appendix F. Random Selection of Cost Recovery Pots for Catch Sampling

You must randomly pre-select your pots each day prior to actually seeing the pots come aboard. Once you have pre-selected the pots for the day, you cannot alter your sampling scheme whether or not the pot is empty or full. The random selection of pots is to be made by using a random number generator (most calculators and computers have them) or the attached Table of Random Digits. Following is an example of how to use the random digit table.

The captain says he will pull 60 pots today. You need to sample 10 pots. In order to select the 10 pots, you decide to start with the 7th number in the first column, count by multiples of 10 and pick the first 10 numbers between 1 and 60 using the first two 2 digits of the number. Obviously, you will discard duplicate numbers and numbers greater than 60. As a result of using this method, your 10 pot numbers for the day will be pots 4, 13, 18, 23, 29, 36, 37, 44, 50, and 54. Confirm your understanding of this using the example on the next page.

A different random selection scheme must be used every day. All you need to know is the estimated number of pots to be pulled. Start with the nth number in the nth column (or row), count by multiples of X, and use the first two (or the middle two or the last two numbers) of the nth number to get your pot numbers.

Appendix Statistical Tables

TABLE XIII Random numbers

74970	06996	11136	26428	23607	97462
74077	63454	45058	20708	42772	61311
13557	72942	59693	42635	69187	17870
66824	77092	51315	11910	91362	85877
36135	62333	37762	06766	52006	48746
06176	37697	40726	66014	78540	03503
17371	29089	26149	86755	36502	45455
21223	60124	07325	61085	61663	93814
31842	75317	58670	07821	75722	75152
20516	27594	21126	21262	14847	85513
99277	64548	70107	01059	34794	89863
01991	83000	27894	43577	82087	71504
54377	90482	39785	75722	20978	72511
20121	34555	25752	35312	85403	46189
11571	25668	34005	60874	72564	27470
93725	16472	21779	22432	71132	58118
65299	19900	21083	77915	20234	57314
36671	66533	86361	01327	80226	67405
49870	72912	20126	71728	86130	22113
50647	27134	56117	08650	91732	56189
17834	90311	00470	25024	20604	55526
27421	59467	69163	36665	26139	59445
26586	93561	52994	91112	74191	53986
51769	19891	46105	60143	63230	43817
41635	22882	85301	06875	58116	90778
04382	75863	37867	86246	58449	47432
48736	95362	21908	86094	43262	82826
49226	85080	33783	98388	62526	04014
20854	80874	15061	24566	72654	83590
50093	79411	58243	12538	16000	81354
32746	91894	87531	03933	08670	35011
45655	67247	49062	80256	21828	70217
96268	69668	23518	85192	81640	19832
43792	70776	17047	10233	44527	40725
66726	38354	88229	52784	48167	43464
00305	60732	03985	83552	83744	33572
47203	23522	41528	72453	88184	97289
94417	00980	76255	09103	55746	57149
28492	27329	28987	08292	22457	27594
15068	78906	13085	52751	42272	10144
86628	62686	03694	38080	35208	10638
70099	52095	34944	74139	92323	24202
59642	03751	88891	73720	90197	48857
21373	68891	39516	31394	29618	13531
62249	55787	68112	51338	09111	84084
15068	28465	20985	64222	79260	22767
35078	08613	30709	07408	99171	30553
19643	91937	12828	53404	07541	10589
75025	72481	37200	27222	92688	11164
71553	58597	33573	12991	32797	24758

TABLE XI, Random Numbers (Continued)

48611	62866	33963	14045	79451	04934	45576
28812	03509	78673	73181	29973	18664	04555
19472	63971	37271	31445	49019	49405	46925
51266	11569	08697	91120	64156	40363	74297
55806	96275	26130	47949	14877	69594	83041
77527	81360	18180	97421	55541	90275	18213
77680	58788	33016	61173	93049	04694	43534
15404	96554	88265	34537	38526	67924	40474
14045	22917	60718	66487	46346	30949	03173
68376	43918	77653	04127	69930	43283	15766
93385	13421	67957	20384	58731	53396	59723
09858	52104	32014	53115	03727	98624	84616
93307	34116	49516	42148	57740	31198	70336
04794	01534	92058	03157	91758	80611	45357
86265	49096	97021	92582	61422	75890	86442
65943	79232	45702	67055	39024	57383	44424
90038	94209	04055	27393	61517	23002	96560
97283	95943	78363	36498	40662	94188	18202
21913	72958	75637	99936	58715	07943	23748
41161	57341	81838	19389	80336	46346	91895
23777	98392	31417	98547	92058	02277	50315
59973	08144	61070	73094	27059	69181	55623
82690	74099	77885	23813	10054	11900	44653
83854	24715	48866	65745	31131	47636	45137
61980	34997	41825	11623	07320	15003	56774
99915	45821	97702	87125	44488	77613	56823
48293	86847	43186	42951	37804	83129	28993
33225	31280	41232	34750	91097	60752	69783
06846	32828	24425	30249	78801	26977	92074
32671	45587	79620	84831	38156	74211	82752
82096	21913	75544	55228	89796	05694	91552
51666	10433	10945	55306	78562	89630	41230
54044	67942	24145	42294	27427	84875	37022
66738	60184	75679	38120	17640	36242	99357
59064	17427	89180	74018	44865	53197	74810
69599	60264	84549	78007	88450	06488	72274
64756	87759	92354	78694	63638	80939	98644
80817	74533	68407	55862	32476	19326	95558
39847	96884	84657	33697	39578	90197	80532
90401	41700	95510	61166	33757	23279	85523
78227	90110	81378	96659	37008	04050	04228
87240	52716	87697	79433	16336	52862	69149
08486	10951	26832	39763	02485	71688	90936
39338	52169	03713	93510	61244	73774	01245
21188	01850	69689	49426	49128	14660	14143
13287	82531	04388	64693	11934	35051	68576
53609	04001	19648	14053	49623	10840	51915
87900	36194	31567	53906	34304	39910	79630
81641	00496	36058	75899	46620	70024	88753
19512	50277	71508	20116	79520	06269	74173

TABLE XI Random Numbers (Continued)

24418	23508	91507	76455	54941	72711	39406
57404	73678	08272	62941	02349	71389	45605
77644	98489	86268	73652	98210	44546	27174
68366	65814	01443	07807	11826	91326	29664
64472	72294	95432	53555	96810	17100	35066
88205	37913	98633	81009	81060	33449	68055
98455	78685	71250	10329	56135	80647	51404
48977	36794	56054	59243	57361	65304	93258
93077	72941	92779	23581	24548	56415	61927
84533	26564	91583	83411	66504	02036	02922
11338	12903	14514	27585	45068	05520	56321
23853	68500	92274	87026	99717	01542	72990
94096	74920	25822	98026	05394	61840	83089
83160	82362	09350	98536	38155	42661	02363
97425	47335	69709	01386	74319	04318	99387
83951	11954	24317	20345	18134	90062	10761
93085	35203	05740	03206	92012	42710	34650
33762	93193	58045	89880	78101	44392	53767
49665	55397	85137	30496	23469	42846	94810
37541	82627	80051	72521	35342	56119	97190
22145	85304	35348	82854	55846	18076	12415
27153	08662	61078	52433	22184	33998	87436
00301	49425	66682	25442	83668	66236	79655
43815	43272	73778	63469	50083	70696	13538
14689	86482	74157	46012	97765	27352	49617
16680	55936	82453	19532	49988	13176	94219
86938	60429	01137	86168	78257	86249	46134
33944	29219	73161	46061	30946	22210	79302
16045	67736	18608	18198	19468	76358	69203
37044	52523	25627	63107	30806	30857	84383
61471	45322	35340	35132	42163	69332	98851
47422	21296	16785	66393	59249	51463	95963
24133	39719	14484	58613	88717	29289	77360
67253	67064	10748	16006	16767	57345	42285
62382	76941	01635	35829	77516	98468	51686
98011	16503	09201	03523	87192	66483	55849
37366	24386	20654	85117	74078	64120	04643
73587	83993	54176	05221	94119	20108	78101
33583	58291	50547	96085	62180	27453	18567
02878	33223	59199	49536	56199	05993	71201
91498	41673	17195	33175	04994	09879	70337
91127	19815	30219	55591	21725	43827	78862
12997	55013	18662	81724	24305	37661	18956
96098	13651	15393	69995	14762	69734	89150
97627	17837	10472	18983	28387	99781	52977
40064	47981	31484	76603	54088	91095	00010
16239	58743	71374	55863	22572	91609	51514
58354	24913	20435	30965	17453	65623	93058
52567	55085	50220	84641	18273	49604	47418
06236	29052	31392	07551	83532	68130	56970

TABLE XI Random Numbers (Continued)

94620	27963	96478	21559	19246	88097	44926
60947	60775	73181	43284	56895	04232	59604
27499	51523	63110	57106	20865	91683	80688
01603	23156	89223	43429	95353	44662	59433
00815	01552	06392	31437	70385	45863	75971
83844	90942	74857	52419	68723	47830	63010
06626	10042	93629	37609	57215	08409	81906
56760	63348	24949	11859	29793	37457	59377
64416	29934	00755	09418	14230	62887	92683
63569	17906	38076	32135	19096	96970	75917
22693	35089	72994	04252	23791	60249	83010
43413	59744	01275	71326	91382	45114	20245
09224	78530	50566	49965	04851	18280	14039
67625	54683	03142	74733	63558	09665	22610
86874	12549	98699	54952	91579	26023	81076
54548	49905	62515	63903	13193	33905	66936
73216	66167	49728	03581	40699	10396	81827
15220	66319	13543	14071	59148	95154	72852
16151	08029	36954	03891	38313	34016	18671
43635	84249	88984	80993	55431	90793	62603
30193	42776	85811	57635	51362	79907	77364
37430	45246	11400	20986	43996	73122	88474
88312	93047	12088	86937	70794	01041	74867
98995	58159	04700	90443	13168	31553	67891
51734	20849	70198	67906	00880	82899	66065
88698	41755	56216	66852	17748	04963	54859
51865	09836	73966	65711	41699	11732	17173
40300	08852	27528	84648	79589	95295	72895
02760	28625	70476	76410	32988	10194	94917
78450	26245	91763	73117	33047	03577	62599
50252	56911	62693	73817	98693	18728	94741
07929	66728	47761	81472	44806	15592	71357
09030	39605	87507	85446	51257	89555	75520
56670	88445	85799	76200	21795	38894	58070
48140	13583	94911	13318	64741	64336	95103
36764	86132	12463	28385	94242	32063	45233
14351	71381	28133	68269	65145	28152	39087
81276	00835	63835	87174	42446	08882	27067
55524	86088	00069	59254	24654	77371	26409
78852	65889	32719	13758	23937	90740	16866
11861	69032	51915	23510	32050	52052	26004
67699	01009	07050	73324	06732	27510	33781
50064	39500	17450	18030	63124	48061	59412
93126	17700	94400	76075	08317	27324	77723
01657	92602	41043	05686	15650	29970	95877
13800	76690	75133	60456	23491	03845	11507
98135	42870	48578	29036	69876	86563	61729
08313	99293	00990	13595	77457	79969	11339
90974	33965	62732	85161	54330	22406	86253
33273	61993	88407	69399	17301	70975	99129

Appendix G. List of Equipment:

1. Survival suits with EPIRB and strobe attached (1 for each ADF&G crew member).
2. Marine survival first aid kit
3. Rain gear, gloves and boots.
4. Shipboard Instruction Manuals (5 total - one for the vessel captain and each ADF&G crew member).
5. Notebooks of 1997 NMFS survey data and 1997 Test Fishery Data Summary R.I.R (one for captain; one for Tracy).
6. Forms:
 - a. Pilot House Log - Pot Soak Study Blocks (30).
 - b. Pilot House Log - Cost Recovery Strings (60).
 - c. Cost Recovery Daily Tally and Cumulative Catch Record (5).
 - d. Crab Data Form - Pot Soak Study Blocks (5 ream = 2500).
 - e. Crab Data Form - Cost Recovery Strings (5 ream = 2500).
 - f. Crab Live Weight Form (75)
 - g. Autonomous Underwater Video Recorder Event Sequence Worksheet (50).
 - h. Tag Recovery Form (5).
 - i. PIT Tag Tail Section Specimen Labels (5).
 - j. ADF&G Test Fishery Photographic/Video Log (5).
7. Large calipers (3 from Kodiak, 1 from Dutch).
8. 5.5 and 6.5 inch measuring sticks (3 of each).
9. Camera, film, and extra battery
10. Notebook computer
11. Rite-in-Rain notebooks (5).
12. Pencils (2 doz. sharpened) & half dozen mechanical pencils.
13. Paper clips (assorted).
14. Rubber bands.
15. Manila envelopes for data (2 legal-size, 12 regular).
16. Permanent markers (1 large black; 1 ea. small black, red).
17. Clipboard(s): 6-8 regular size (4 weather-proof).
18. Calculator w/ extra batteries.
19. Tallywackers (3).
20. One can WD40.
21. Statistical charts (2); one for captain, one for ADF&G crew.
22. Timesheets (10).
23. Burlap sacs (20)
24. Mineral oil
25. DEC PSP Labels (25)
26. Underwater video camera with aluminum frame and all misc. parts and instructions
27. Video tapes (12+)
28. One copy of "Alaska's Saltwater Fishes", by Doyne W. Kessler
29. Digital platform scale for collecting live crab weights

Appendix H. Tentative Charter Itinerary and Calendar:

Date

8/1 depart Dutch Harbor/travel to grounds
8/2 travel to grounds/set gear
8/3 set gear/pull gear
8/4 pull gear/set gear
8/5 pull gear/set gear
8/6 pull gear/set gear
8/7 pull gear/set gear
8/8 pull gear/set gear
8/9 pull gear/travel to Dutch Harbor
8/10 travel to Dutch Harbor
8/11 deliver cost recovery crab/pick up ADF&G crew and equipment
8/12 travel to grounds
8/13 set block #1/pull 12 hr. soak
8/14 pull 24hr. soak/set block #2
8/15 pull 12 hr. soak/pull 24 hr. soak/set block #3
8/16 pull 12hr. soak/pull 72hr. soak/pull 24 hr. soak/set block #4
8/17 pull 12hr. soak/pull 24hr. soak/pull 72 hr. soak
8/18 set block #5/pull 72 hr. soak/pull 12hr. soak
8/19 pull 24 hr. soak/pull 72hr. soak/set block #6
8/20 pull 12 hr. soak/pull 24 hr. soak/set block #7
8/21 pull 12hr. soak/pull 72hr. soak/pull 24 hr. soak
8/22 set block #8/pull 12hr. soak/pull 72 hr. soak
8/23 pull 24hr. soak/pull 72 hr. soak/set block #9
8/24 pull 12hr. soak/pull 24hr. soak/set block #10
8/25 pull 12hr. soak/pull 72hr. soak/pull 24hr. soak
8/26 pull 72hr. soak/collect ancillary data/stack pots
8/27 pull 72 hr. soak/travel to Dutch Harbor
8/28 travel to Dutch Harbor/conclude charter

Appendix I. Contract between the State of Alaska and the F/V Viking Queen.
STATE OF ALASKA ITB# 11-001-99
RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

CONTRACTING OFFICER:

Paul Johnson

Phone: (907) 465-4131

Fax: (907) 465-6181

DOES YOUR BUSINESS QUALIFY FOR THE ALASKA BIDDER'S PREFERENCE?

[] YES [] NO

SEE ITB FOR EXPLANATION OF CRITERIA TO QUALIFY.

COMPANY SUBMITTING BID

Iceberg Seafoods Inc

AUTHORIZED SIGNATURE

Rob Rogers

PRINTED NAME:

Rob Rogers

STREET ADDRESS

4019 21ST AVE NE

CITY, STATE, & ZIP:

Seattle, WA ~~98108~~ 98199

PHONE NUMBER:

206-281-5365

FAX NUMBER:

206-281-0322

TAX ID#:

92-0032180

ALASKA BUSINESS LICENSE #:

BL-017038

Expires 12/98

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

PURPOSE: Contract of a vessel, with captain and three (3) crew for use of Alaska Department of Fish and Game (ADF&G) as living quarters and an operations base for research activities relating to red king crab research in waters of Bristol Bay (Area T), Alaska. ADF&G will place four (4) of their personnel aboard the vessel. Biologists will collect data on red king crabs and associated marine life. This charter is scheduled to last for twenty-eight (28) days.

DEFAULT: A contractors failure to comply with any of the terms and conditions of this contract may result in a default action by the State.

COMPLIANCE: The bidder must comply with all applicable national, federal, State, local and borough regulations, codes, and laws; be liable for all required insurance, licenses, permits and bonds; pay all applicable federal, State, local and borough taxes.

NOTICE OF INTENT: After the responses to this Invitation to Bid (ITB) have been opened and evaluated a tabulation of the bids will be prepared. This tabulation, called a Notice of Intent, serves two purposes: 1) it lists the name of each company or person that offered a bid and the price they bid; 2) it also serves as notice of the State's intent to award a contract(s) to the bidder(s) indicated. A copy of the Notice of Intent will be mailed to each company or person who responded to the ITB. Bidders, identified as the apparent low responsive bidders, are instructed not to proceed until a Purchase Order, Contract Award, Lease, or, some other form of written notice is given by the Contracting Officer. A company or person who proceeds prior to receiving a Purchase Order, Contract Award, Lease, or some other form of written notice from the Contracting Officer does so without a contract and at their own risk.

PAYMENT FOR STATE PURCHASES: Payment for agreements under \$500,000, for the undisputed purchase of goods or services provided to a State agency, will be made within 30 days of the receipt of a proper billing or the delivery of the goods or services to the location(s) specified in the agreement, whichever is later. A late payment is subject to 1.5% interest per month on the unpaid balance. Interest will not be paid if there is a dispute or if there is an agreement which establishes a lower interest rate or precludes the charging of interest.

FEDERAL EXCISE TAX: The State of Alaska is exempt from the Federal Excise Tax except the following:

- Coal - Internal Revenue Code of 1986 (IRC), Section 4121 - on the purchase of coal;
- "Gas Guzzler" - IRC, Section 4064 - on the purchase of low m.p.g. automobiles, except that police and other emergency type vehicles are not subject to the tax;
- Air Cargo - IRC, Section 4271 - on the purchase of property transportation services by air;

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

- Air Passenger - IRC, Section 4261 - on the purchase of passenger transportation services by air charter.

CONTRACT ENFORCEMENT: Enforcement of this contract is the responsibility of the Division of General Services (DGS) Contracting Officer. When a State agency has a complaint concerning a contractor's performance the agency must contact DGS in writing. Facsimile notification at (907) 465 - 2189 is also acceptable. DGS will contact the contractor and resolve the matter.

FIRM AND UNQUALIFIED (UNCONDITIONAL) OFFER: Bidder's must provide enough information, with their bid, to constitute a definite, firm, and unqualified or unconditional offer. In order to be responsive a bid must constitute a definite, firm, and unqualified or unconditional offer to meet all of the meaningful or material terms of the ITB. Some meaningful or material terms are those items which could affect price, quantity, quality, or delivery. Also included as meaningful or material terms are those which are clearly identified in the ITB, and which, for reasons of policy, must be complied with at risk of bid rejection for non-responsiveness.

BIDDERS NOTE: This contract involves financial risks. Please read this ITB very carefully and make certain that you understand the risks and responsibilities. If you have any questions contact the Contracting Officer at: Voice (907) 465 - 5677, TDD (907) 465 - 2205 or FAX (907) 465 - 2189.

HOLD HARMLESS: The contractor will indemnify, save harmless and defend the State, it's officers, agents and employees from all liability, including costs and expenses, for all actions or claims resulting from injuries or damages sustained by any person or property arising directly or indirectly as a result of any error, omission or negligent act of the contractor, subcontractor or anyone directly or indirectly employed by them in the performance of this contract.

All actions or claims including costs and expenses resulting from injuries or damages sustained by any person or property arising directly or indirectly from the contractor's performance of this contract which are caused by the joint negligence of the State and the contractor will be apportioned on a comparative fault basis. Any such joint negligence on the part of the State must be the direct result of active involvement by the State.

INSURANCE: The contractor will maintain insurance satisfactory the Division of Risk Management, Department of Administration. Certificates of Insurance will be furnished to the Contracting Officer which will provide for a 30 day prior notice of cancellation, non-renewal or material change in such insurance.

Proof of insurance is required for the following:

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

- A. Protection and Indemnity, including crew exposure, in the amount of 1,000,000.00.

Failure to supply satisfactory proof of insurance within the time required will cause the State to declare the bidder non-responsive and reject the bid.

LENGTH OF CONTRACT: Approximately twenty-eight (28) continuous days, to occur on or about August 1 - 28, 1998. The length of the charter and starting date may vary by mutual agreement between the vessel owner and the State of Alaska, but payment will not exceed the twenty-eight (28) day period.

CANCELLATION: The State reserves the right to cancel the contract at the State's sole discretion.

The State will have the sole discretion to cancel any contract that results from this ITB after the charter has commenced, if it is determined by the State that there are insufficient funds to cover the State's expense and the cost of the charter.

ESTIMATED USE: The charter dates and length of charters referenced in this ITB are the State's estimated requirements. The State does not guarantee a minimum or maximum number of charter days. However, for the purpose of bid evaluation the State will assume the use of twenty-eight (28) contract days.

LOCATION OF VESSEL OPERATION: The vessel is required to operate in waters comprising Bristol Bay (Registration Area T), Alaska. The charter will begin and end in Dutch Harbor, Alaska.

TEST FISH PROGRAM: The Test Fish Program was established by the legislature (AS 16.05.050(15)) to allow the Department of Fish and Game to conduct research programs funded by the sale of fish and shellfish caught during research. The Department of Fish and Game's expense for this research is \$370,000. The charter will be financed as follows:

DAY 1 TO DAY 10: Cost recovery fishing in the Bristol Bay waters (Area T) of the Bering Sea, and delivery of cost recovery crabs in Dutch Harbor, Alaska. Revenues for the project will be generated by retaining 100% of the male red king crabs equal to or greater than 6.5 inches in carapace width.

DAY 10 TO DAY 28: At-sea research. The Captain and appropriate crew must be onboard for this purpose.

RISK TO VESSEL OWNER: Because funding for this charter is totally dependent on the crab catch, the charter involves a monetary risk. You may receive less than the

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

amount you bid and there is also a risk of not receiving anything. When you sign your name to this ITB, you are agreeing to take that risk.

PAYMENT FOR THE CHARTER: The vessel owner/Captain will be paid the amount bid up to the maximum twenty-eight (28) days, or the amount of revenue generated by the crab sold, less \$370,000 for the Department of Fish and Game's fixed expenses, whichever is the least. Days or partial days spent shoreside by the vessel captain and crew conducting activities involving loading and unloading ADF&G gear and equipment will also be paid at the daily charter rate, up to and included within the maximum twenty-eight (28) days. Payment for partial calendar day charter vessel operation from the contractual commencement and conclusion date of the twenty-eight (28) continuous day charter period will be prorated on an hourly basis from the daily charter vessel rate.

- 1) If attained, the state will retain the first \$200,000 from the receipts of harvested crabs, which will be sold under authority of the Department of Fish and Game's Test Fish Program.
- 2) If attained, the vessel owner will receive up to \$50,000 in the form of a check, from the State of Alaska from the next \$50,000 in receipts of harvested crabs.
- 3) If attained, the State of Alaska will receive the next \$170,000 in receipts of harvested crabs.
- 4) If attained, the vessel owner will receive either the remaining amount of receipts from the crab harvest up to the bid price of the charter, or the balance of the crab harvest, whichever is the least.

The vessel will fish in the manner directed by the ADF&G crew leader until sufficient crabs are obtained to cover costs to the State of Alaska (\$370,000) plus the cost of the vessel charter, or until twenty-eight (28) days have lapsed.

STATE PERSONNEL ABOARD THE VESSEL: During the contract period the State will place four (4) ADF&G crew members aboard the vessel.

VESSEL INSPECTION: The vessel will be subject to inspection by the Department of Fish and Game. The bidder(s) must, upon 10 days notice, make the vessel available for inspection at Dutch Harbor, Alaska.

By the date set for the vessel inspection, all of the equipment called for in this ITB must be installed and functional. The successful bidder must pay the cost of all the equipment and any vessel alterations needed to meet the requirements of this ITB.

If, at the time of inspection, a vessel fails to meet the ITB requirements, the State may consider the offer non-responsive and reject the bid or terminate the contract.

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T) .

A USCG Certificate of Inspection will be required to validate the type/size and other specifications of the vessel offered.

SEAWORTHINESS: Inspection of the vessel is not intended to convey acceptance by the State nor should it be considered conclusive evidence that the State believes the vessel is seaworthy. If during ADF&G's inspection or at any time during the subsequent term of the contract, conditions are noted that might affect the safety or seaworthiness of the vessel, the State will arrange for further inspection by a person with the appropriate credentials to determine if the condition of the vessel is acceptable.

VESSEL REQUIREMENTS:

- A. Length of not less than one hundred (100) feet. Length will be determined by measuring the centerline.
- B. Sleeping space for four (4) state personnel, in addition to the Captain and crew. Each sleeping space used by state personnel must be at least twenty-six (26) inches in width at the shoulders and seventy-seven (77) inches long.
- C. Minimum nine (9) cubic feet of dry storage drawer space for State equipment.
- D. Minimum twelve (12) square feet of flat, clear, interior work space for paper and computer work by ADF&G crew. Galley table is acceptable. One 110 volt AC outlet must be available near this area.
- E. Minimum six (6) square feet of flat, clear, interior work space, either shelf or table, in a relatively undisturbed location, other than the galley table, where a portable computer can be set up and paper work performed throughout the charter. One 110 volt AC outlet must be available near this area.
- F. Minimum five hundred (500) square feet of flat, clear, exterior deck work space for state personnel and equipment. Vessels with shelter decks are highly preferred. The work area must be well lit to permit work at night, including data recording and tagging. If fixed lighting is unavailable, responsive vessels must have mobile lighting, power cords, and all associated accessories to make a temporary installation of required lighting.
- G. Stove, oven, sink, galley table, and all materials and equipment necessary for daily meal preparation, cooking, and clean-up.
- H. Refrigerated and freezer storage space sufficient to maintain perishable and frozen food for all personnel for the twenty-eight (28) days of the charter.

STATE OF ALASKA ITB# _____
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

- I. Freezer storage space sufficient to maintain frozen bait herring and any biological specimens collected by ADF&G personnel for the duration of the longest continuous period of at-sea vessel operation.
- J. Fresh water storage or sea water conversion capabilities sufficient to permit twenty-eight (28) continuous days of operation. Water supply must be sufficient to permit daily: drinking water washing of dishes, personal hygiene, food preparation, and dish washing. Fresh water must also be available for short showers at least every two (2) days and for clothes washing every four (4) days.
- K. Radar system in good operating condition, with a minimum range of 60 miles. Backup system is highly desirable
- L. Automatic pilot in good operating condition. Automatic readout Loran C. or GPS. Backup system is highly desirable. Fathometer with minimum 200 fathom range. Backup system is highly desirable. Minimum of two anchors with ground tackle: all of the size and type required for the size and type of vessel chartered.
- M. Single side-band and VHF radio transmitter(s) and receiver(s) in good operating condition equipped with standard marine frequencies for the area in which operations will be conducted, including VHF channels 6 and 16. Single side-band radio transceiver: at minimum, with single side-band frequencies of 4125, 5195 and 3230 (for transmitting and receiving) to allow direct communication with marine operator (KMI). Backup communications systems are highly desirable. Vessels equipped with INMARSAT Standard C satellite communication capability are highly preferred.
- N. USCG approved first-aid kit.
- O. USCG approved fire-fighting equipment of the size and type required for the size and type vessel chartered.
- P. USCG approved life rafts. The rated capacity of the rafts must be adequate (as required by CFR 46, part 28) to accommodate all of the people aboard the vessel: this includes the Captain, the vessel crew, and all of the ADF&G crew. Packing/Inspection certificates for all life rafts must be current.
- Q. USCG approved survival suits of appropriate sizes are required for all the people aboard the vessel. The State will provide survival suits for the ADF&G crew members.
- R. The vessel's main engine(s) must be diesel powered at a minimum of 900 horsepower. Bids offering gasoline powered engines will be rejected as non-responsive.

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 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

- S. Minimum cruising speed of 10 knots (without pots on deck and without crabs in the holding tanks, and in calm seas).
- T. Two (2) power block (one spare) to pull crab gear, minimum capacity 1,000 pounds.
- U. Hydraulic (or motor operated) bait chopper.
- V. Two (2) catch sorting tables, minimum 4 feet by 8 feet; one table will be used to sort catches, the second table will be used for catch sampling by the ADF&G crew.
- X. One hundred-twenty (120) 7 feet by 7 feet dimension king crab pots (or 120 6.5 feet by 6.5 feet dimension king crab pots), and sufficient lines and buoys to single line fish all pots concurrently to a maximum depth of 60 fathoms.
- Y. Number of bait jars sufficient to fish 120 pots concurrently with at least one-half (1/2) gallons (i.e. quart containers) of bait per pot.

VESSEL CREW REQUIREMENTS.

- A. Crew to consist of a Captain with at least five (5) years of crab pot fishing experience in the Gulf of Alaska, Bering Sea or Aleutian Islands waters and at least three (3) experienced fishermen. One of the fishermen must be an engineer with five (5) years experience aboard fishing vessels and fully knowledgeable of the vessel and equipment. Vessel crew will be expected to perform cooking and cleaning duties in addition to operating the vessel and assisting biologists by handling catches as prescribed by the ADF&G crew leader.
- B. The vessel crew will set and retrieve all gear.
- C. The State will have the right to require replacement of any vessel crew member. If the vessel operates shorthanded due to replacement or illness of a vessel crew member for a period in excess of twenty-four (24) hours, the State will deduct from the charter rate for that period of time in an amount equal to the missing crewman's wages and related direct cost of employment (i.e., social security tax, unemployment insurance, etc.). The total cost of replacing a vessel crew member aboard the vessel will be at the owner's expense. The owner will be responsible for payment of wages, direct cost of employment and will be responsible for all vessel crew members. The State will be responsible for payment of daily charter rates only, and will not reimburse the owner for vessel crew wages.

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 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

- D. Captain will be required to accurately complete ADF&G skipper forms (on paper or electronically) for each day of fishing, including recording string and pot locations, date, depth, pot setting and retrieval times, etc. Captain and crew will be required to locate designated fishing stations regardless of time of day or night.
- E. There shall be no alcohol or controlled substances aboard the charter vessel during the charter period.

UNUSUAL HOURS: It may be necessary to run the vessel twenty-four (24) to thirty-six (36) hours continuously to travel from one location to another (i.e. from Dutch Harbor to fishing grounds in Bristol Bay). It will also be necessary to set and/or lift gear after minimum soak time requirements have been met regardless of daytime or nighttime hours, or hours worked.

DELAYS OR INTERRUPTIONS OF OPERATIONS: For each hour of contract time lost, for any reason other than weather or an act directly attributable to ADF&G personnel aboard the vessel, the State will on each occasion, be entitled to deduct from the total contract payment, an amount equal to the hourly contract rate for each of the hours the vessel or essential equipment on the vessel is out of service.

TERMINATION OF THE CONTRACT. The State may, without fault or liability, terminate the contract for any of the following reasons:

- 1) failure of the Captain, vessel, or vessel crew to report at the time and location specified in this ITB to begin the contract;
- 2) lack of sufficient funds for the charter contract;
- 3) insubordination and/or lack of cooperation by the Captain or vessel crew;
- 4) the condition of the vessel or essential equipment on the vessel remains such that it cannot be used for work by the ADF&G crew for a period of more than seventy-two (72) hours.

In the event of early termination of the contract, State-owned gear may be placed in storage or returned to a location that is mutually agreed upon by the State and vessel owner. Charges for state-owned gear storage will be paid by the State. The State will not assume any liability for transporting the Captain and vessel crew to their home port. Contract payments will cease on the hour and date the vessel is unable to continue normal operations.

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 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

PERFORMANCE REQUIREMENTS OF THE VESSEL CAPTAIN & COMMAND OF THE VESSEL:

- A. The vessel Captain's orders will be final in matters regarding the general operation of the vessel (either underway or at anchor); the operation of the vessel's equipment and fishing gear; any emergency situations that endanger the vessel or pose a direct or indirect threat to the safety and well being of the Captain, vessel crew and ADF&G crew; the general activities and safety of the vessel crew and ADF&G crew; and the navigation of the vessel.
- B. The vessel Captain will comply with all directives given by the ADF&G crew leader regarding the State's research activities and cost recovery fishing objectives, provided that those orders do not endanger the vessel or pose a direct or indirect threat to the safety and well being of the Captain, vessel crew, and ADF&G crew.
- C. The vessel Captain will obey all USCG, State and other applicable regulations, rules, and statutes pertaining to the safe and legal operation of the vessel.

PERFORMANCE REQUIREMENTS OF THE VESSEL CREW MEMBERS: In the role of an operations base and living quarters for State personnel, the vessel, its Captain and crew will be required to provide the following services and accommodations:

- A. General navigation and operation of the vessel either underway or at anchor.
- B. Space for compiling and analyzing the data collected.
- C. Communications base for dispersing information.
- D. Basic living accommodations for four (4) ADF&G personnel.
- E. Meal preparation, cooking and clean-up.
- F. General cleaning of the interior and exterior of the vessel.
- G. General assistance to the ADF&G personnel in the performance of their work. Vessel crew will be expected to handle catches as prescribed by the ADF&G crew leader and will be expected to fish the gear.
- H. The Captain must provide a safety orientation briefing to all vessel and ADF&G crew members prior to embarking from Dutch Harbor. Both the vessel crew and ADF&G personnel must have general instructions on the following:

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 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

1. the location and operation of lifesaving and emergency equipment (life rings, life rafts, immersion/survival suits, activating the general alarm);
2. operation of assigned equipment;
3. instructions for making a distress call;
4. what to do in the event of a person overboard;
5. what to do in the event of a fire;
6. what to do in the event of flooding;
7. what to do in the event of an abandon ship order.

CONSUMABLES TO BE PROVIDED BY THE CONTRACTOR AND INCLUDED IN THE PER DAY CONTRACT PRICE:

- A. The contractor will provide all fuel, lubricants, oils, greases and filters required during the entire charter period. At the beginning of the contract all fuel and lubricant tanks must be full and all filters must be fresh. In addition, the vessel must have aboard extra lubricants, oils, greases and filters in amounts sufficient for the entire charter period.
- B. The contractor will provide all bait for the entire charter period: up to a maximum of twenty-six (26) fishing days with up to 120 pots fished per day for the first ten (10) fishing days, and up to 36 pots fished per day up the remaining 16 fishing days of the charter period with one-half (1/2) gallon of (chopped) frozen herring per pot.
- C. The contractor will provide three ample, balanced, and nutritious meals each day for all ADF&G crew, the vessel Captain and the vessel crew.

MISCELLANEOUS PROVISIONS: The State may, at it's own expense and only for the term of the contract, install and retain in the vessel equipment necessary to accomplish the objectives of the charter. The State will remove this equipment at the termination of the contract period without permanent alteration or damage to the vessel.

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RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

VESSEL INFORMATION FORM: Bidders must complete the vessel information form below. A bidder's failure to complete the vessel information form may cause the State to reject the bid as non-responsive.

OWNERS NAME(S): Ice Ice Seafoods Inc (Contact + Rob Rogers)

ADDRESS: P.O. Box 79003 Seattle, WA 98119

PHONE: (206) 231-5365

VESSEL NAME AND ADF&G NUMBER: F/V VIKING Queen 06434

VESSEL USCG DOCUMENTED NO.: 508212

VESSEL TYPE (crabber, trawler, etc.): Crabber

CURRENT LOCATION OF VESSEL: Bering Sea Opilio CDO Fishery

CALL NUMBERS AND FREQUENCY: WX 3727 41250/4420.0

YEAR BUILT: 1967

REGISTRY NUMBER: 508212

CRUISING SPEED (KNOTS): 9-10 kts

OVERALL LENGTH (FEET): 110 LCA 103.5' Lpp Length
(Straight line measurement from end to end over the deck, excluding sheer, measured parallel to the centerline)

VESSEL WEIGHT (TONS): 198 net

DIESEL POWERED MAIN ENGINE: YES NO

MAIN ENGINE HORSEPOWER: 2 x 450 - 900 hp

HAS THE VESSEL BEEN INSPECTED BY THE USCG IN THE LAST 12 MONTHS?
 YES NO

If yes, please furnish a copy of the USCG "Commercial Vessel Safety Examination" letter with your bid.

SURVIVAL EQUIPMENT: The State requires that the life rafts carried aboard the vessel be USCG approved. The rated capacity of the life rafts must be adequate to

STATE OF ALASKA ITB# 11-001-00
 RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

accommodate all of the people aboard the vessel; this includes the ADF&G crew, the vessel Captain and vessel crew members.

Indicate the brand, capacity and USCG approval number for the life raft(s) you will carry aboard the vessel:

RAFT BRAND	CAPACITY	USCG APPROVAL NUMBER
EXAMPLE: Beaufort	8	
A. Switlik	8	160.51 5510
B. Switlik	10	160.51 24510
C.		
D.		

Bidders must provide at least enough survival suits for all those onboard. Indicate the brand and model of survival suits you carry aboard the vessel.

SURVIVAL SUIT BRAND AND MODEL	NUMBER OF SUITS
A. Universa	5
B. Universa	5
C.	
D.	
E.	
F.	

Failure to specify survival suits and USCG approved life rafts to accommodate all those on board will cause the State to declare the bidder non-responsive and to reject the bid.

Is all of the equipment called for in this ITB installed and functional on the date of the bid opening?

YES NO

If "NO", indicate exceptions which will be corrected prior to the date set for the inspection by the State:

STATE OF ALASKA ITB# 11-001-99
RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

BIDDERS NOTE: All of the equipment listed above and called for in this ITB must be installed and functional at the time of the vessel inspection.

USCG LICENSE: In the space provided, bidder's must enter the name of the person who will serve as Captain of the vessel. The Captain must be properly licensed by the USCG for the size/type vessel being offered. A photo copy of that person's USCG license should be submitted with the bid and must be submitted within 10 days of the State's request. A bidder's failure to provide a copy of the license, as stated above, may cause the State to consider the offer non-responsive and reject the bid.

If during the term of the contract, a different person is retained as Captain, a photo copy of that person's license must be submitted to the Contracting Officer prior to the time the person begins working as vessel Captain. The Contracting Officer must accept and authorize the change of Captains. The contractor's failure to follow this procedure may cause the State to terminate the contract.

On the line below, print the name of the person who will serve as Captain.

Richard Morton

VESSEL CAPTAIN

Identify the rating(s) held by the person named above.

- | | | |
|---|---------------------------------|--|
| <input type="checkbox"/> Operator of Uninspected Six Passenger Vessel | | |
| <input type="checkbox"/> Master, 25 Ton vessels | <input type="checkbox"/> Inland | <input type="checkbox"/> Near coastal |
| <input type="checkbox"/> Master, 50 Ton vessels | <input type="checkbox"/> Inland | <input type="checkbox"/> Near coastal |
| <input type="checkbox"/> Master, 100 Ton vessels | <input type="checkbox"/> Inland | <input type="checkbox"/> Near coastal |
| <input type="checkbox"/> Master, 150 Ton vessels | <input type="checkbox"/> Inland | <input type="checkbox"/> Near coastal |
| <input checked="" type="checkbox"/> Master, 200 Ton vessels | <input type="checkbox"/> Inland | <input checked="" type="checkbox"/> Near coastal |
| <input type="checkbox"/> Master, 500 Ton vessels | <input type="checkbox"/> Inland | <input type="checkbox"/> Near coastal |
| <input checked="" type="checkbox"/> Master, 1600 Ton vessels | <input type="checkbox"/> Inland | <input checked="" type="checkbox"/> Near coastal |

CREW REQUIREMENTS: At a minimum, the vessel crew will consist of a Captain and three (3) crew members. The contractor will be responsible for payment of wages, direct cost of employment and fringe benefits, if any, to the vessel crew members. The State will be responsible for payment of the daily charter rate only and will not reimburse the contractor for crew wages in addition to the charter rate.

CAPTAIN AND CREW EXPERIENCE INFORMATION: Bidders must complete the Captain and crew information form below. Bidders failure to complete the Captain and crew information may cause the State to reject the bid as non-responsive.

STATE OF ALASKA ITB# 11-001-99
RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

CAPTAIN EXPERIENCE REQUIREMENTS: The vessel Captain must have a minimum of five (5) years experience single pot crab fishing in the Gulf of Alaska, Aleutian Islands or Bering Sea waters. The Captain must also have a minimum of one (1) year experience, as a Captain, in the type and size vessel specified for this contract.

- Captain's experience operating in Alaska waters. 18 years.
- Captain's experience, as a Captain, in various size, type/class vessels.
 - a) Size type/class of vessel: 110' / crabber
Number of years experience in this size type/class of vessel: 8 years.
 - b) Size type/class of vessel: 90' / crabber
Number of years experience in this size type/class of vessel: 3 years.
 - c) Size type/class of vessel: _____
Number of years experience in this size type/class of vessel: _____ years.
 - d) Size type/class of vessel: _____
Number of years experience in this size type/class of vessel: _____ years.

CREW EXPERIENCE REQUIREMENTS:

1. ENGINEER

One of the vessel crew members must be an engineer. The engineer must have a minimum of five (5) years certified experience as an engineer. The engineer must also have a minimum of one (1) year experience, as an engineer, in the type and size vessel specified for this contract.

Engineer's experience, as an engineer, in various size, type/class vessels.

- a) Size type/class of vessel: 110' / crabber
Number of years experience in this size type/class of vessel: 3 years.
- b) Size type/class of vessel: 90' / crabber
Number of years experience in this size type/class of vessel: 4 years.
- c) Size type/class of vessel: _____
Number of years experience in this size type/class of vessel: _____ years.
- d) Size type/class of vessel: _____
Number of years experience in this size type/class of vessel: _____ years.

STATE OF ALASKA ITB# 11-001-99
RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

2. REMAINING CREW MEMBERS

The remaining crew members must have a minimum of three (3) years experience commercial crab fishing at-sea.

- a) First crew member's experience fishing at sea: 3 years.
- b) Second crew member's experience fishing at sea: 4 years.
- c) Third crew member's experience fishing at sea: 3 years.
- d) If applicable, fourth crew member's experience fishing at sea: _____ years.

FROM: FISH & GAME

FAX NO.: 9074656181

Appendix I (cont.)

STATE OF ALASKA ITB# 11-001-99
RED KING CRAB POT VESSEL CHARTER IN BRISTOL BAY (REGISTRATION AREA T)

METHOD OF AWARD: Award will be made to the lowest responsive and responsible bidder.

BID SCHEDULE

CONTRACT RATE PER DAY \$ 3,880 X 28 DAYS = \$ ^{# 108,640} ~~108,640~~ TOTAL BID PRICE
RR



ADDENDUM

Addendum A. Alternate Pot Soak Study Gear Setting, Pulling and Sampling Schedule.

Day	Block #1	Block #2	Block #3	Block #4	Block #5	Block #6	Block #7	Block #8	Block #9	Block #10
1	A.M. set block P.M. 12hr pick									
2	A.M. 24hr pick	P.M. set block								
3		A.M. 12hr pick P.M. 24hr pick	P.M. set block							
4	A.M. 72hr. pick		A.M. 12hr pick P.M. 24hr pick	P.M. set block						
5		P.M. 72hr pick		A.M. 12hr pick P.M. 24hr pick						
6			P.M. 72 hr pick		A.M. set block P.M. 12hr pick					
7				P.M. 72hr pick	A.M. 24hr pick					
8						A.M. set block P.M. 12hr pick				
9					A.M. 72hr pick	A.M. 24hr pick		P.M. set block		
10								A.M. 12hr pick P.M. 24hr pick		

Addendum A (cont'd).

Day	Block #1	Block #2	Block #3	Block #4	Block #5	Block #6	Block #7	Block #8	Block #9	Block #10
12						A.M. 72hr. pick		A.M. set block P.M. 12hr. pick		
13							P.M. 72hr pick	A.M. 24hr pick	P.M. set block	
14									A.M. 12hr pick P.M. 24hr pick	
15								A.M. 72hr pick		
16 ⁹⁸									P.M. 72hr pick	



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
1011 E. Tudor Road
Anchorage, Alaska 99503

April 16, 1998

Memo:

To: Distribution

From: John Piatt, Tom van Pelt, and Paul Flint
Alaska Biological Sciences Center, BRD/USGS
Vivian Mendenhall, Migratory Bird Management, USFWS

Re: Research on Unusual Seabird Die-offs in 1998

SUMMARY

This spring and summer we may see some major effects of the 1997/1998 El Niño on seabirds in the Gulf of Alaska (GOA). The USGS and USFWS have several studies in place to measure effects of El Niño on the reproductive success and foraging ecology of seabirds at many colonies in the GOA. If effects of this El Niño are as strong as some in the past, we also anticipate seeing significant die-offs of seabirds, particularly Common Murres, in the coming months.

We need help documenting seabird die-offs, and would appreciate your assistance. The following provides some background for your information, some specifics on how you can help, a flyer to post for public view to enlist help, a protocol for conducting beach surveys, and some references if you are interested in more details. Please contact any of us if you want more information.

BACKGROUND

Occasionally, large numbers of seabirds die for no apparent reason and wash ashore. In most cases, mortality may be attributed to episodes of mass-starvation. Die-offs or "wrecks" have been documented for centuries in both the Atlantic and Pacific, and appear to be natural events. Seabirds have extremely high metabolic rates and need to acquire more than half their body mass in food per day just to survive. When deprived of food, energy reserves may sustain them for only a few days before they begin to metabolize muscle tissue and waste away. Thus, the basic cause of most wrecks is the inability (or reduced ability) of seabirds to obtain food for some sustained period (days/weeks), leading to mass mortality.

Why food suddenly becomes inaccessible remains a mystery. We do know that the seabird species most commonly affected in wrecks are those that forage in dense aggregations and rely on dense schools of prey. We also know that the distribution and concentration of schooling fish or

fish in lower Cook Inlet and Prince William Sound. Long-term studies by BRD and USFWS of seabirds at other sites in SE Alaska, the northern Gulf, and eastern Aleutians are also continuing in 1998.

The current focus of APEX studies are the links between survival, reproductive success, and food supply. Among other things, we are trying to evaluate the recovery of seabirds from mortality incurred during the Exxon Valdez oil spill. The issue is complicated, not least by the fact that die-offs in 1989, 1993, 1997, and now starting in 1998, suggest that conditions in the Gulf of Alaska are not conducive to rapid recovery. While we are in good position in 1998 to obtain data on seabird biology at several colonies in the Gulf, and food supplies near selected colonies in Cook Inlet and Prince William Sound, it is more difficult to obtain quantitative information on mortality events at sea, particularly outside our main study areas.

INFORMATION and HELP NEEDED in 1998

We would therefore appreciate assistance from other biologists and interested persons in helping to document mortality (die-offs) of seabirds in the Gulf of Alaska and other regions of Alaska in 1998. If you can do any of the following, it would be greatly appreciated. If you can post the following page where others can see it, and perhaps act as a local advisor to help collect this data and forward it to us, that would also be greatly appreciated (add your name and contact information to following flyer). If you can conduct beach surveys, see the following protocol for methods. If you would like more detailed information, you could consult the following references (contact us if you cannot obtain copies locally).

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- 1997 Die-off: Mendenhall, V.M. 1997. Preliminary report on the 1997 seabird die-off. Unpubl. Rep. U.S. Fish and Wildl. Serv., Anchorage, Alaska. 5 pp.
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Appendix C. List of reports and presentations generated from the Bristol Bay red king crab Test Fishery program.

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Blau, S.F., D. Pengilly. 1994. Findings from the 1991 golden king crab survey in the Dutch Harbor and Adak management area including analysis from recovered tags. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K94-35, Kodiak.

Blau, S. F. 1996. The 1995 St. Matthew Island blue king crab survey. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K96-27, Kodiak.

Blau, S. F., L. J. Watson and J. Blackburn. 1997 The 1996 Norton Sound red king crab Trawl Survey. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K97-54, Kodiak.

Blau, S. F., L. J. Watson and D. Tracy. 1996 Project operational plan for the 1996 Norton Sound red king crab trawl survey. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K96-42, Kodiak.

Blau, S. F., L. J. Watson and I. Vining. 1998 The 1997 Aleutian Islands golden king crab survey. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K98-30, Kodiak.

Byersdorfer, S., and L. J. Watson. 1992. A summary of biological data collected during the 1991 Bristol Bay red king crab tagging study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report 92-14, Juneau.

Byersdorfer, S., and L. J. Watson. 1993. A summary of biological data collected during the 1992 Bristol Bay red king crab test fishery charter. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K93-24, Kodiak.

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- Byersdorfer, S., D. Pengilly, and D. Tracy. 1997. A survey of escape mechanisms and ring placements on commercial pots fished during the 1997 Bering Sea snow crab, *Chionoecetes opilio*, season. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K97-45, Kodiak.
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