CRUISE REPORT FOR THE KING CRAB PROJECT

1958

KING CRAB CHARTER VESSEL CRUISE PLAN 1958

The cruise during the spring and summer of 1958 is for the purpose of supporting several phases of the king crab investigation: abundance, growth, food, relationship to hydrography, ecology, migrations, condition, and effect of gear. The data needed and methods used are set forth by projects.

Schedule

April	10	to	April 22	Trip to Unalaska
April	23	to	May 29	First Station Pattern
May	30	to	July 5	Second Station Pattern
July	5	to	July 20	Return to Seattle

The above dates are tentative and subject to change as conditions may dictate.

Personnel: chartered vessel

April	10	to	May 31	Cleaver and Sakuda
June	1	to	July 30	Myahara and Hebard

Responsibilities:

1. A ship's log is to be maintained by the captain showing time, place, duration and results of all operations. The detail should be as follows: traveling times, courses and positions, time and position gear is set, depth, wind direction and velocity, sea conditions, weather, direction of tow, time lifting starts, estimated total weight in net, estimated weight of different items in catch, including everything in the net, count of crabs by numbers and species and number tagged.

2. The cruise chief (senior biologist aboard) has top authority and is responsible for carrying out the cruise plan and is responsible for the nature and timing of the operations and making certain that the Government receives the services contracted.

3. The captain of the vessel is responsible for the operation of the vessel and the safety of the ship and personnel. He is empowered to determine whether or not conditions will permit operations and his judgement in such matters is final.

4. The senior scientist aboard is responsible for reporting promptly the completion of each fifteen day charter interval so that the owner may be paid for the work completed. In the event days occur during which the vessel does not meet the terms of the charter, the beginning and the ending dates and hours of each period during which payment should not be made must be submitted, and the cause for non-payment stated.

5. At daily intervals, the senior scientist aboard shall report by telephone or wire to either Fred Cleaver or Tak Miyahara.

Fred Cleaver: EM 3-4674

Tak Miyahara : CH 3-6390

The report shall include position, progress, estimated position for following day, and authorized overtime worked for each man.

6. At the end of the term of field duty, each cruise chief shall prepare a brief written summary of his work. This should include the period covered, the work attempted, accomplishments and suggestions for improvements.

Project Plans:

1. Sampling for the purpose of estimating the numbers of crabs in the Bering Sea is to be undertaken as described in the instructions for population estimate. Estimates are to be made on both rounds of the attached station plan.

2. Hydrographic observations are to be taken as outlined in the hydrographic instructions. The portion in Unimak Pass and south of the Peninsula will not be taken on the way up. As time permits, it should be picked up as early as possible.

3. Stomach samples are to be taken on special stations for that purpose, either during or after the first round and during or after the second round. The special plan for this work is attached.

4. As convenient, a comparison of catch by tanglenets and trawls is to be made with respect to size (also sex and mortality, if possible). The 10 to 20 nets should be secured from the Tokei-maru, and set on a ground holding a fair mixture of sizes of crabs of both sexes if possible. This may be combined with the stomach study. The nets should be set, and allowed to soak a few days before lifting. Enough trawling should be done in the immediate vicinity to establish the size curve for a trawl catch of the mesh used. The degree of entanglement should be carefully noted and photographed, and the loss of crabs and injuries should be recorded with size for both type of gear. A Japanese observer should be invited to accompany the vessel.

5. All of the crabs caught except those used for stomachm samples or meat content should be tagged and released in the usual manner. This includes all sizes and both sexes. Crabs of doubtful viability should not be tagged.

6. The shell condition and size of all crabs caught should be recorded for growth studies in accordance with the instructions for that purpose.

7. Crabs shall be taken at intervals for meat content studies as outlined in the attached plan for that purpose.

8. Careful records are to be maintained of the injured crabs as outlined. As time permits, these are to be held to determine the immediate severity of injury.

9. All moulting crabs are to be held in the live tank to observe growth. This use has first priority on tank space.

10. On all trawling stations, bottom samples are to be preserved and the trawl catch by group and/or species is to be listed and samples taken in accordance with the attached plan for this purpose.

11. Tagging: If time permits, an effort should be made to release an additional 10,000 tags, preferably upon male crabs of more than 130 mm. in length. This is separate from the tags to be released on the station pattern. The tagging may be done on any ground affording an abundance of king crabs, and may be done a few days at a time as opportunity permits. It should be done only if it is moderately certain that ample vessel time will be available for the other activities listed herein.

12. Halibut catches and data are to be recorded as previously. For all large fish the length, sex and otoliths are to be taken, and the date and position of catch recorded. Small halibut may be treated the same or tagged and frozen for delivery to the Halibut Commission. The tag number must be recorded with date and position if tags are used.

gd/

Instructions for

Population estimate by trawling

1. Take measures on all standard stations in plan.

2. Record: station number, date, depth, time when gear is first on bottom, time when hauling begins, length of trawl cable out, cable spread at start and end of haul, buoy spread and distance to buoy at start, middle and end of haul, number of king crabs caught and size and sex of each crab.

3. Record all but number, size and sex in "population estimate" record book. Number, size and sex will be recorded in the tagging log.

4. Cable spread should be measured and recorded as the distance between the trawl cables at the block and the distance at a point 6 feet down the cables from the stanchion block.

5. The door spread will be measured by towing a float from each door on a line about 100 fathoms long. The lines from the doors needn't be exactly 100 fathoms, but must be exactly the same length. Assuming that the lines from the doors to the floats will be parallel, the spread between the floats will equal the spread between the doors. This spread is to be calculated from the angle which they form with an observer on the vessel and the distance from the observer to a float. The angle is to be measured with a sextant and the distance with a range finder. Angular measures should be taken to the nearest second and linear measures to the nearest foot.

6. The remainder of the data recorded under (2) is believed to be self explanatory or covered under instructions elsewhere.

HYDROGRAPHIC SAMPLING

A. A hydrographic station will consist of the following samples:

1. A bathythermograph lowering (use 450' BT for depths to 137 meters and the 900' BT for depths between 137 and 275 meters.) DO NOT LOWER BT MORE THAN LOWER LIMIT GIVEN ABOVE.

2. Water bottle samples at depths depending upon depth (see table included). Surface sample to be taken with bucket and thermometer; the deepest (near bottom) bottle is to be between one and two meters above the bottom. DO NOT PLACE BOTTLE SO CLOSE TO BOTTOM THAT IT STRIKES BOTTOM UPON REVERSING.

B. The hydrographic sampling consists of essentially four series of stations which are to be repeated twice. The series are as follows:

1. Upon leaving Unalaska, take a line of three hydrographic casts between Akun Island and Cape Sarichef.

   a. After leaving Akun Island, take first cast when at approximately the center of the pass. The second sampling should be taken at approximately the 50 fm contour and the inshore sampling to be taken between 5 and 10 fm.

2. Station pattern sampling is to be taken as in the past, that being a hydrographic cast and a BT lowering.

   a. The hydrographic cast will be taken with water bottles and reversing thermometers, these placed with the spacing shown on the table included. The bottle spacing varies, depending upon water depth.

3. Between stations B-7, D-10 and F-14 and the shoreline, hydrographic stations will be made as described below.

   a. On B-7, casts are to be made on the station, 25 meters, 15 meters and at 5 meters depth.

   b. On station D-10, casts to be made at station 20, 12 and 5 meters depth.

   c. At F-14, take cast at 5, on station F-14 and 5 miles toward G-14 from F-14.

4. Between station K-12 and the beach on Hagemeister Strait (see chart) a line consisting of three hydrographic casts and BT lowerings should be made.

   a. Casts will be made southwest of Hagemeister Island, at approximately the middle of Hagemeister Strait, and the third at 5 fathoms depth near the mainland shore.

5. An attempt is to be made to determine the boundaries of the cold water if present this year.

   a. The methods to be used are as follows: BT's are to be taken on all trawl stations. If reversing thermometers show a bottom temperature between 1.5°C and 2.0°C on any station, BT's should be taken, following that station, at ten mile intervals until the reversing thermometer shows a temperature of 3°C. This procedure to be followed after all stations at which 1.5°C to 2.0°C temperatures are recorded.

6. On the second station pattern coverage the station pattern is to be run opposite the first pattern in order to cover the hydrographic stations to the beach as late as possible.

7. On the trip to Seattle from Unalaska, the hydrographic stations across Unimak Pass and the three charted hydrographic stations south of the Alaskan Peninsula are to be taken - these including hydrographic and BT casts.

C. Location of hydrographic stations are shown on the chart of the station pattern.

NOTES AND PRECAUTIONS

A. Bathythermograph

1. Do not use 450' BT at depths greater than 75 fm (137m) or 150 fm (274m) for the 900' BT.

2. Before using a slide for the BT, write name of boat to see how easy it marks. If slide won't mark with soft lead pencil, don't use unless necessary.

3. Be sure to push the slide into its holder as far as possible.

4. When BT is again aboard, check slide for trace, if none retake.

B. Water Bottle Casts

1. After attachment of bottles to line, check to be sure the mercury at top of main thermometer has drained down.

2. Check to be sure the stop-cocks of the bottle have been closed before lowering.

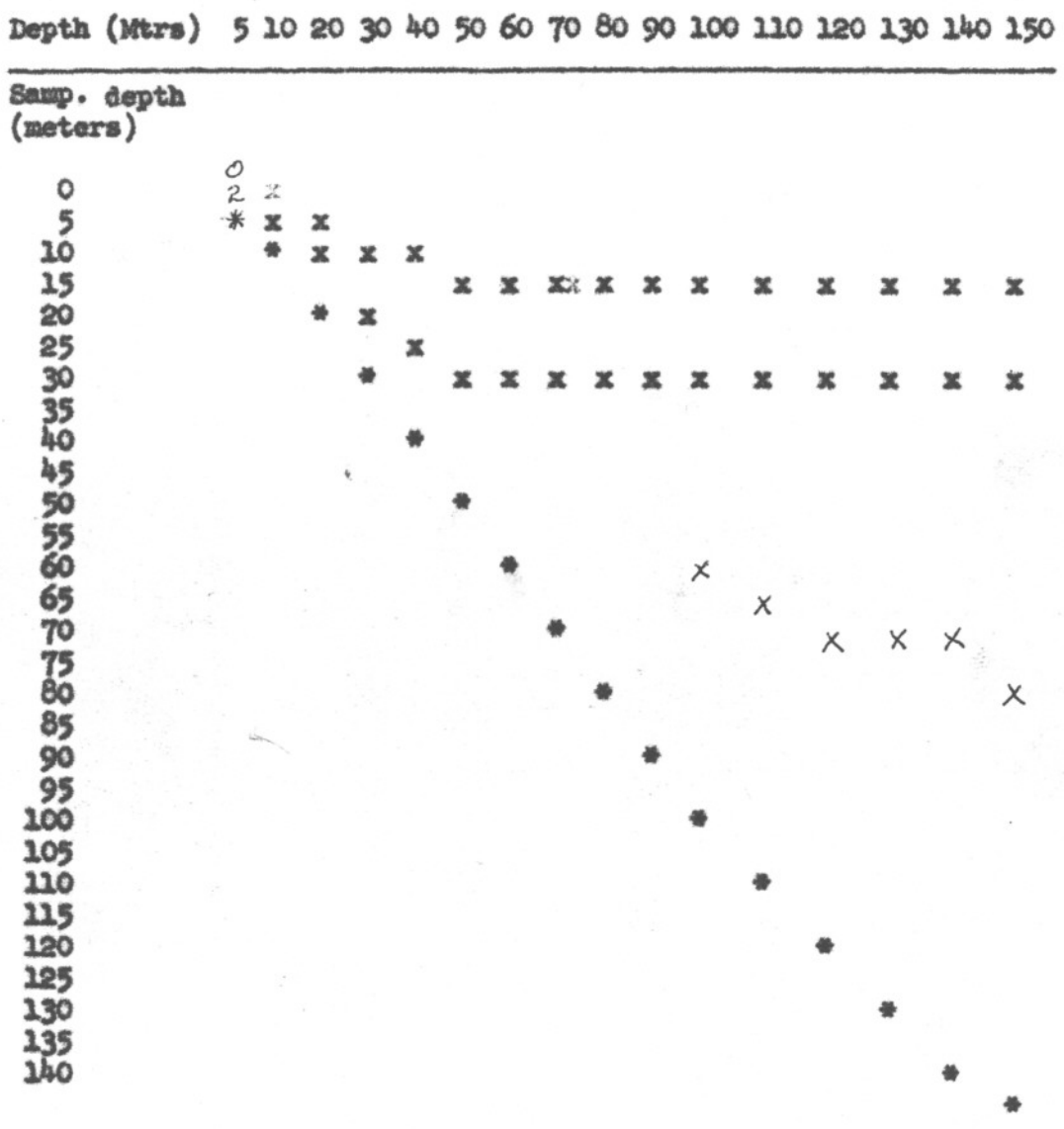
3. Attach messenger to bottle so bottles below will be tripped.

4. After bottles reach depth, allow to soak for 10 minutes before tripping.

5. After bottles are back aboard, draw salinity samples before reading temperature so that thermometers can reach equilibrium temp.

6. Upon completing the drawing of salinity and reading the thermometers, turn the bottles upright so mercury can be rejoined. THERMOMETERS WILL BE RUINED OR WILL BECOME INACCURATE BY LEAVING THEM IN A REVERSED POSITION ANY LONGER THAN NECESSARY.

SAMPLE DEPTH WITH RESPECT TO STATION DEPTH



* Variable depth: this bottle to be located between 1 and 2 meters above the bottom

ECOLOGY

BOTTOM FAUNA AND STOMACH CONTENT STUDIES 1958 CRUISE

Bottom Fauna

Instructions are for sampling each haul on both station pattern rounds.

1. Line the last one-half of the cod end of the net with $1\frac{1}{2}$" mesh.

2. When the net comes on board, estimate the total weight of the catch.

3. Empty the net on the deck and estimate the number of each species of fish represented as they are removed from the catch.

4. Remove the king crab.

5. Remove the large specimens of hairy crabs, tanner crabs, sea cucumbers and other large organisms and estimate (to the nearest 10) their number. Retain three or four specimens of each of these organism on the first and second tow. If you are sure that you have samples of all species, duplicate samples need not be taken on succeeding tows. At any time a new species is encountered throughout the cruise, retain and preserve a few samples.

6. From the remainder of the catch, take a random sample with a shovel full enough to fill a numbered burlap bag. If the catch should be so small that it, in entirety, would not be more than a bag full, take the entire catch for your sample. In this case, be sure to indicate this in the records. Freeze this sample immediately.

7. After this sample has been removed, estimate the number of representatives of each group. Do not try to make species identification unless you are positive. Estimations should be made to the nearest 10 for quantities under 100, to the nearest 50 for quantities between 100 and 1000 and to the nearest 100 for quantities over 1000. Both plant and animal groups are to be recorded. Check rocks for barnacles and bryozoans and wood for woodboring worms.

8. When colloquial names are used for identification of organisms, preserve one or two of these and lable with name given, date, and position or station number. Organisms which are unidentifiable may be designated in whatever manner is best suited to the individual, however be sure to retain and preserve in a jar (or jars) at least two samples with a lable indicating exactly what you have called it, date, location, etc.

9. Write into the record book any organisms not already listed.

10. Upon returning to Unalaska, place frozen sample bags in drums of 10% formalin (1 gal. of formaldehyde to 9 gal. of seawater buffered with 33 tablespoons (1 pkg.) borax). Pack carefully to avoid smashing the organisms. If sufficient drums are not available, samples may be kept frozen until the vessel's return to Seattle.

From the hauls retain two or three samples of each type of sponge found in the area, place in cotton bags and freeze. Do not put these samples in formalin at all, but leave frozen until the vessel's return to Seattle.

Stomach Samples

The following methods are listed in order of preference. If at some time it should happen that the requested number of samples could be obtained for the second method and only the minimum number for the preferred method (Method I), we would like to have the first method used. The number of stomachs requested is for the preferred sample size, however this number may increase or decrease according to the availability of the crabs. The minimum sample size that can be used is indicated in parenthesis at the right of the preferred size.

Method I

To be used once on each complete station round. On an abundance of crabs, take sufficient tows in as restricted an area as practical (1 or 2 sq. miles) to obtain 640 (360) crabs, with the following type of distribution:

Size Group	Shell Condition	No.	(Min.)	Sex
1. 60-100 mm	new	100	60	♂ + ♀ equally
2. 60-100 mm	old	100	60	" "
3. 120-145 mm	new	100	60	" "
4. 120-145 mm	old	100	60	" "
5. 120-145 mm	very old	60	30	♂
6. 160 & up	new	60	30	probably ♂
7. 160 & up	old	60	30	"
8. 160 & up	very old	60	30	♂

Sex is not critical here, and if equally representatives of the sexes cannot be obtained, get whatever is available.

Method II

A. Round 1. On an abundance of crabs, take sufficient tows in a restricted area (1 - 2 sq. miles) to get at least 375 (150) crabs with the following distribution.

Size group	Shell type	Number (min.)	Sex
1. 60-100 mm	new	75 (30)	doesn't matter
2. 60-100 mm	old	75 (30)	" "
3. 140 and over	new	75 (30)	" "
4. 140 and over	old	75 (30)	males
5. 140 and over	very old	75 (30)	"

B. Round 2. At the same position if at all possible, take sufficient tows in a restricted area to obtain 300 (105)crabs with the following distribution.

Size group	Number	(min.)
1. 60 - 100 mm	100	(30)
2. 120 - 145 mm	100	(30)
3. 160 and up	100	(30)

All crabs should be of the same shell condition, if new, not newly moulted (within 2-3 weeks). If old shelled crabs are used, limit the entire sample to the male sex.

Parts A and B of method two may be reversed with regard to when they are taken, but if, for example, part B is obtained on Round 1, do not repeat it on round 2.

If the previous methods of sampling are impossible to use, collect as many crabs as possible in as many of the various catagories as possible. At all times, Method I is preferred to Method II.

Processing Stomach Samples

1. With a sharp knife remove the legs and gill region, cutting from the ventral side. Remove the abdomen on all but 75 crabs (25 of each size group). Cut as close to the mid-line as is possible without exposing or damaging the stomach or gut.

2. Place the center portion of each crab in an individual cloth bag, enclose a numbered peterson disc, fasten securely with a hog ring and preserve in formalin.

3. On the smaller crabs where cutting into the body is not practical without exposing the stomach, remove just the legs.

4. Use a separate data book for stomach samples. The record should include:

1. Number of enclosed peterson disc
2. Length
3. Shell condition
4. Sex
5. Injury not caused by trawl
6. Position - or station number
7. Haul number
8. Depth
9. Date

Moulting Crabs

If an abundance of soft-shelled, newly moulted crabs, or crabs very soon approaching the moult is encountered, preserve a sample of approximately 200 (minimum 50) crabs - most probably females for stomach analysis. Number, record and preserve in the same manner as described for the other stomach samples. If number of days after moulting (by softness of the shell), or number of days prior to moulting (possibly also by softening of different parts of the shell) can be ascertained, record this information also.

Bottom Samples

Instructions for sampling on each haul of both station rounds.

1. Attach a pipe 2" in diameter and 12" in length to one of the doors.

2. When haul comes up, remove pipe and empty the contents into 1 pt. freezer cartons.

3. Lable with date, station number or position, and haul number.

4. Freeze the samples.

Bottom Dredging: To be done in connection with stomach sampling.

1. With the dredge, sample the bottom area covered by each haul in which crabs for stomach samples were caught. Take at least 3 dredge samples per 1 sq. mile haul area, from which stomachs were taken.

2. Empty dredge onto screen provided and sift out mud. Examine rocks for encrusting bryozoans, barnacles, etc.

3. Place organisms in wide mouth qt. jars containing formalin or in burlap bags - preserving as with bottom fauna trawl samples, and lable with date, dredge number and position.

Accessory data

1. Collect 3 average to large size males and females to be used for general anatomical study to accompany stomach samples. Preserve in same way as preserving bottom fauna. When placing in drums, care should be taken to prevent breaking them up.

2. Underwater camera - Instruction will accompany camera.

MIGRATION - TAGGING 1958

Objective:

To determine the migration of the king crabs which are being exploited in the eastern Bering Sea for purposes of management of the stock. In this respect, the following essential facts must be known:

1. The distribution of the crabs in the Bering Sea.
2. The migration of the crabs in respect to range, direction, rate and route of movement.

Methods:

The method proposed to determine the movement of the crabs is by the use of tags. The tagging methods used in 1957 seem adequate and should be continued in 1958. The spaghetti type tags used in 1957 were found to be excellent as far as handling and tagging, and should be used in 1958.

Procedure:

1. To continue the determination of within year direction and rate of movement by releasing tagged crabs while the fishery is in operation. This to be accomplished by relasing tags on the station pattern, which will essentially cover the path of the fishing operation.

2. In addition to the male crabs to be tagged, female crabs are to be tagged and released on the sta tion pattern.

Equipment:

1. Calipers (2 on vessel).
2. Gloves (1 dozen pairs).
3. Tags (approx. 15,000 spaghetti type w/red disc).
4. Tagging needles (1 dozen).
5. Water-proof log books (1 dozen).
6. Bering Sea and Bristol Bay charts of the station pattern.

Office Supplies:

1. Ten and 20-column stat. pads.
2. Writing pads, pencils.
3. Purchase order book.
4. Airmail envelopes.
5. Duplicating equipment (Constat. machine).

MEAT CONTENT EXPERIMENT PLANS - 1958

Objectives:

A. To determine the variation in meat content of:

1. Crabs of 160-165 mm. carapace length.

   a. of different shell types; soft, new, old, and very old.
   b. of prime crabs due to time; prime crabs being those w/new, old and very old shell types.

Method:

A. Sample the meat content throughout the charter period by cooking, removing and weighing the crab meat.
B. The charter duration to be divided into four approximately bi-weekly periods. This would be when the vessel returns to port after each round.
C. Samples to be collected on the last day before returning to port. A total of 30 crabs to be collected and kept in the live box.
D. Selection of samples:
   1. Crabs of 160-165 mm. carapace length only.
   2. At least ten crabs of each prime shell type (i.e., 10 new shell, 10 old shell, and 10 very old shell type).
   3. At least 3 or more soft shelled type crabs.
E. Samples to be measured for:
   1. Carapace length size for selection.
   2. Weight: live, cooked merus meat and total meat.
   3. Shell type to be determined in the same manner as the tagging operation.

Technique and Data Collection:

A. Record Preliminary data.
   1. Period, shell type, crab number, date.
B. Live weight measurement.
   1. Tie live crab's legs firmly to body and soak in bucket of water.
   2. Pull crab out on its side to drain excess water.
   3. Immediately weigh crab on its back to reduce excessive water loss and standardize weighing.
   4. Record live weight in data book.

C. COOKING CRABS- COOK CRABS IN BOILING WATER FOR 30 MINUTES.

D. Cooling crabs.
   1. Remove crabs from the pot and break in half after removing carapace.
   2. Then cool crab legs in running water for 10 minutes.

E. Picking and weighing meat.

1. Remove merus section of the right third leg, pick meat by cutting the shell along the length of the merus, rinse the meat, weigh on the dietary scale and record the merus meat weight in grams.
2. Pick rest of leg and shoulder meat with shears.
3. Place the picked meat in the strainer until all the meat is picked.
4. Wash off excess non-meat particles by shacking the strainer in the pot of sea water.
5. Weigh all meat on Chatillon Autopsy scale and record weight in pounds and to the tenth of an ounce. Meat to be transferred from strainer to pie plate and weighed in the pie plate.

Equipment:

A. Data collection
   1. Meat content data book.
   2. Calipers
B. Crab preparation
   1. String to tie leg sections together.
   2. A pot to cook leg sections.
   3. Coleman three burner stove.
   4. Shears for picking meat.
   5. Strainer for washing picked meat.
   6. Aluminum foil pie plate for weighing meat.
C. Weighing crab meat.
   1. Chatillon dietary scale for merus meat weight in grams.
   2. Chatillon Autopsy scale, for live and total meat weights in tenths of an ounce.

INJURY TO FEMALE AND NON-COMMERCIAL MALE KING CRABS

I. Objective:

To determine the mortality and type of injury caused by an otter trawl.

II. Tabulation of injury data:

In the "tagging record" book place a number under the appropriate injury listed below:

A. Broken - Leg injured, but not broken off at breaking point.

B. Missing - Leg broken off at breaking point.

C. Carapace - cracked.

D. Crushed - Severe injury; include cracks under abdomen.

E. Dead - Dead or dying.

On crabs whose length is modified by injury, the true length should be estimated.

III. Immediate mortality of drag injured crabs:

Crabs of a selected size and specific injury are to be held in a live tank until there is evidence of death, or three days have elapsed.

The injured crabs and their controls are to be identified by tying a spaghetti tag around one appendage.

When the injured crab is removed its control should also be removed. [redacted]. Maximum of 35 crabs in the live tank at any one time.

Before placing the injured crabs in the live box, an exact description of the injury should be recorded, sugh as: extent of crack; point where broken; obderved vitality; etc. ... Note this under remarks in the "injury book".

A. Sample size: Major size group. To be taken once every station pattern. Live tank temperature should be taken daily, and recorded in front of"injury book."

No. Controls	No. Injured	Sex	Size	Injury Category
24	24	male	108-118 mm	leg missing
"	"	"	" "	leg broken
"	"	"	" "	carapace
"	"	female	" "	leg missing
"	"	"	" "	leg broken
"	"	"	" "	carapace
144	144			

B. Sample Size. Minor size group. To be taken once during the season.

No. Controls	No. Injured	Sex	Size	Injury Category
24	24	Male	128-138 mm	Legs broken
24	24	female	"	" "

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IV. Injury in relation to moulting cycle:

A. Shell condition.

1. Soft

2. New

3. Old

4. Very hold

B. Egg types

1. Purple

2. Tan

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3. Eyed

4. Empty egg cases.

5. No eggs.

C. Sample size:

All crabs should be measured. However, if conditions prevent measurement of all crabs, a sample of 30 crabs of each sex should be measured and the remainder counted.

V. Injury in relation to individual characteristics of the drag.

A. Weight.

1. Volume of catch: Place colored strings at 5 mesh intervals, and count the number of strings up to the top of the catch.

2. Weight of individual components:

a. Vertebrates & invertebrates: estimate the number of each genus present in the catch. From three or more drags obtain a mean weight for each genus. If singular large fish such as halibut and skates are taken, record the estimate of their weight, rather than the number caught.

The weight of king crabs will be calculated at the end of the season.

B. Record number of splits made.

C. Drag duration: If another drag is necessary over the same area, it is desirable to make it half or twice the duration of the first. This should be repeated as many times as possible during the season.

INJURY TO FEMALE AND NON-COMMERCIAL MALE (LESS THAN 143 mm) CRABS ON COMMERCIAL VESSELS

I. Data to be taken at beginning of drag:

A. Position

B. Date

C. Time net on bottom

II. Data to be taken at end of drag:

A. Time net off bottom.

III. Data to be taken when net is brought aboard:

A. Number of splits made

B. Total weight of catch. Obtain captain's estimate.

C. Sample size per drag.

1. Select out a sample of 30 male and 30 females from catch. Preferably a fraction from each split. (males less than 143 mm.)

2. Estimate the mumber of female and non-commercial males taken in the drag.

IV. Data to be taken after completion of drag:

A. From the sample of 30 females and 30mmales record the following:

1. Carapace length

2. Shell type.

a. Soft = S

b. New = N

c. Old = O

d. Very old = VO

3. Injury:

a. Carapace cracked = C

b. Leg broken. Leg injured, but not broken off at breaking point. If more than one leg is broken, record as 2, 3 . . . . = B

c. Leg missing. Leg broken off at breaking point. If more than one leg is missing, record as 2, 3 . . . . = M

d. Crushed. Include cracks under abdomen = S

e. Dead = D

Do not record previous injuries, or right and left sides.

4. Eggs:

a. Purple

b. Tan

c. Eyed eggs

d. Empty egg cases

e. No eggs present

GROWTH AND MOULTING OF IMMATURE KING CRABS

I. Objective: To obtain small king crabs and record their size.

II. Sampling method:

A. Capture:

1. Shallow waters under 20 feet.

a. At low tide under exposed rocks and seaweed

b. Sight crabs from surface using a boat and glass bottom box. When sighted, obtain by:

1. Dip net if crabs are stacked or sparsely separated.

2. Beach seine if crabs are plentiful but dispersed.

3. Skin diving if terrain is rocky or has a heavy covering of growth.

2. Deep water over 20 feet.

a. Shrimp pots.

b. Tangle nets.

3. Night observations, with skiff and lights.

B. Sample data to be taken with catch:

1. Carapace length.

2. Sex.

3. Shell condition, hard or soft.

4. Depth found.

5. Date and position.

6. Bottom type and fauna.

7. Bottom temperature.

8. Bottom salinity.

C. Initial Sample:

Retain in formalin a minimum of 300 crabs from each model group found.

D. Resampling:

If a large school of crabs is captured and continually observed:

1. Resample school once a week.

2. On initial sample paint a small portion of carapace before discarding. This will prevent remeasurement of previously sampled crabs.

III. Moulting Observations:

A. Sample size: At least 20 crabs from each group sampled should be retained for moulting observations.

B. Retaining: Place captured crabs in screen boxes and observe for signs of moulting once a day.

C. Observation of moulting: At the appearance of a group about to moult, place them in a live tank on shore.

D. Data to be taken at moulting:

1. Size before and after moulting.

2. Weight before and after moulting.

3. Number of days to harden.

BLOOD SAMPLES

I. Objective:

To determine if differences in blood characteristics occur in king crabs north and south of the Alaskan Peninsula.

II. Area:

Samples to be taken at:

III. A. North of Peninsula: Preferably off Amak Island and Port Moller, rather than all at one position.

B. South of Peninsula: Sand Point, Kodiac or Deep Sea

III. Sample Size:

A. Male and female, from both north and south of Peninsula

1. 10 males of about 160 mm. new shell
2. 10 males of 160 mm. old or very old shell
3. 10 females of 120 mm. new shell

IV. Procedure:

A. Equipment:

1. Syringe and needle.
2. 60 bottles.

B. Method and amount:

1. Take blood from cardiac cavity by inserting the needle under the carapace from the rear through the muscular isthmus.
2. Amount: 1 cc. minimum

C. Preservation:

1. Quick freeze.

D. Fill in label on jar, recording:

1. Size
2. Shell type
3. Sex
4. Position
5. Date

1958 CHARTER BOAT STATION POSITIONS

Station	Latitude	Longitude
A-4	55°00' N	165°44' W
A-5	55°00' N	165° 10' W
A-6	55°00' N	164°36' W
B-4	55°20' N	165°46' W
B-5	55°20' N	165°12' W
B-6	55°20' N	164°36' W
B-7	55°20' N	164°00' W
B-8	55°20' N	163°25' W
C-4	55°40' N	165°49' W
C-5	55°40' N	165°12' W
C-6	55°40' N	164°36' W
C-7	55°40' N	164°00' W
C-8	55°40' N	163°23' W
C-9	55°40' N	162°49' W
D-4	56°00' N	165°49' W
D-5	56°00' N	165°13' W
D-6	56°00'N	164°36' W
D-7	56°00'N	164°00' W
D-8	56°00'N	163°24' W
D-9	56°00'N	162°48' W
D-10	56°00'N	162°12' W
D-11	56°00'N	161°38' W
E-4	56°20' N	165°51' W
E-5	56°20' N	165°13' W
E-6	56°20'N	164°36' W
E-7	56°20'N	164°00' W
E-8	56°20'N	163°24' W
E-9	56°20'N	162°47' W
E-10	56°20'N	162°11' W
E-11	56°20'N	161°37' W
E-12	56°20'N	161°00' W
E-13	56°20'N	160°23' W
F-5	56°40'N	165°14' W
F-6	56°40'N	164°37' W
F-7	56°40'N	164°00' W
F-8	56°40'N	163°24' W
F-9	56°40'N	162°47' W
F-10	56°40'N	162°11' W
F-11	56°40'N	161°35'W
F-12	56°40'N	160°59'W
F-13	56°40'N	160°22'W
F-14	56°40'N	159°46'W

Station	Latitude	Longitude
G-5	57°00'N	165°14' W
G-6	57°00'N	164°37' W
G-7	57°00'N	164°00' W
G-8	57°00'N	163°24' W
G-9	57°00'N	162°46' W
G-10	57°00'N	162°10' W
G-11	57°00'N	161°34' W
G-12	57°00'N	160°58' W
G-13	57°00'N	160°20' W
G-14	57°00'N	159°44' W
G-15	57°00'N	159°07' W
H-7	57°20'N	164°00' W
H-8	57°20'N	163°23' W
H-9	57°20'N	162°46' W
H-10	57°20'N	162°09' W
H-11	57°20'N	161°32' W
H-12	57°20'N	160°56' W
H-13	57°20'N	160°19' W
H-14	57°20'N	159°42' W
H-15	57°20'N	159°05' W
I-8	57°40'N	163°23' W
I-9	57°40'N	162°45' W
I-10	57°40'N	162°08' W
I-11	57°40'N	161°31' W
I-12	57°40'N	160°54' W
I-13	57°40'N	160°17' W
I-14	57°40'N	159°40' W
I-15	57°40'N	159°02' W
J-10	58°00'N	162°07' W
J-11	58°00'N	161°29' W
J-12	58°00'N	160°52' W
J-13	58°00'N	160°14' W
J-14	58°00'N	159°48' W
J-15	58°00'N	158°59' W
K-10	58°20'N	162°06' W
K-11	58°20'N	161°28' W
K-12	58°20'N	160°50' W
Z-5	54°40'N	165°10' W