

PROJECT OPERATIONAL PLAN  
2003 BOTTOM TRAWL SURVEY OF CRAB AND GROUND FISH:  
KODIAK, CHIGNIK, SOUTH ALASKA PENINSULA, AND EASTERN ALEUTIAN AREAS



by

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## ABSTRACT

This report specifies the methods and procedures of conducting a trawl survey of the Kodiak, Chignik, South Alaska Peninsula and Eastern Aleutian Islands Areas of the Westward Region. A total of 394 tows, using a 400-mesh eastern otter trawl on selected inshore and offshore stations will occur from June through September of 2003. The survey results will be used to assess the abundance of Tanner crab *Chionoecetes bairdi* and red king crab *Paralithodes camtschaticus* populations, document the prevalence of bitter crab syndrome in Tanner crab from Alitak Bay, and determine species composition and length frequencies of the groundfish catch by haul and area. In addition, Pacific cod *Gadus macrocephalus* will be tagged and released throughout the survey.

**KEY WORDS:** crab, groundfish, *Paralithodes camtschaticus*, *Chionoecetes bairdi*, trawl survey, Kodiak, Alaska Peninsula, Chignik, Eastern Aleutians, bitter crab syndrome, *Gadus macrocephalus*.

## INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) has conducted trawl surveys for crab stock assessment in the Westward Region since 1963. Early surveys targeted Long Island Bank (Reynolds and Powell 1964), Marmot Flats (McMullen 1967a), Portlock Bank (McMullen 1967b), Albatross Bank (McMullen 1968), and Alitak and Kaguyak Bays (Kingsbury and James 1971) of the Kodiak Area as well as Chignik and Pavlof Bays on the Alaska Peninsula (Colgate and Hicks 1983; Colgate 1984). The last ADF&G pot survey in the Kodiak, Chignik, South Peninsula, and Eastern Aleutian Districts was conducted in 1987. Trawl-based surveys have replaced pots as the preferred method for crab stock assessment, allowing for quicker coverage of the survey area and capture and sampling of crabs of a wider size range (Jackson 1990). Trawl surveys in the eastern Aleutian Islands began in 1990 and have generally continued on a triennial basis. In recent years, the trawl survey has become increasingly important for groundfish assessment. Walleye pollock results are directly utilized in the NMFS population model for determining allowable biological catch.

ADF&G will conduct a bottom trawl survey in 2003 throughout portions of the Westward Region (Figure 1). The survey will focus on inshore waters around Kodiak Island and the Alaska Peninsula from Cape Douglas to False Pass, as well as the eastern Aleutian Islands.

## OBJECTIVES

The shellfish objectives of the 2003 survey are to estimate the abundance of Tanner crab *Chionoecetes bairdi* and red king crab *Paralithodes camtschaticus*, and to document the prevalence of bitter crab syndrome (BCS) affecting Tanner crab in Alitak Bay. Tanner crab chela height morphometric measurements in the Marmot Bay area and shell height of weathervane scallops *Patinopecten caurinus* will occur throughout the survey. Shellfish data collections include collection of king crab genetic samples, weight measurements of individual Tanner crabs, and a female Tanner crab fecundity study.

The groundfish objectives for the 2003 survey are to determine species composition of the catch by haul and area, to obtain length frequency distributions for commercially important groundfish by area, and to tag Pacific cod *Gadus macrocephalus*. In addition to the above objectives, rock sole *Lepidopsetta* spp. will be differentiated into northern and southern species and skates will be speciated and measured using two different methods. Continuing survey data collection includes adult walleye pollock *Theragra chalcogramma* otolith collections for National Marine Fisheries Service (NMFS). Collection of walleye pollock, Pacific cod, arrowtooth flounder *Atheresthes stomias*, and Pacific halibut *Hippoglossus stenolepis* stomachs in Marmot Bay is an addition to the 2003 survey.

Photos of the catch from each haul will be taken throughout the course of the survey. Deployment of a Quester Tangent Corporation (QTC<sup>TM</sup>) view seabed classification system will be used for mapping bottom habitat types (QTC 1998). Marine mammal observations by crewmembers will be

opportunistically recorded during the survey. This will include detailed physical descriptions and all interactions observed with fishing gear, the vessel, or other marine mammals.

## METHODS

### *Trawl Description and Procedures*

The 27.4 m ADF&G research vessel *Resolution* will conduct surveys in areas of known king and Tanner crab habitat throughout the Kodiak, Chignik, South Peninsula, and Eastern Aleutian Districts of the Westward Region.

A 400-mesh eastern otter trawl net is designed to sweep a 12.2 m path (Figure 2). The net is constructed with 10.2 cm stretch mesh at the mouth, 8.9 cm stretch mesh in the body, and the codend is lined with 3.2 cm stretch mesh liner. It has a 21.3 m long headrope with 18 floats that are 20.3 cm in diameter. The footrope is 29.0 m in length and lacks roller gear or a tickler chain. The footrope is weighted with a 1 cm diameter chain attached every 25.4 cm to ensure that the footrope tends bottom (Figure 3). The two dandylines are 45.7 m long; each consists of an 18.3 m section of 1.5 cm cable and a pair of 27.4 m sections of 1.3 cm cable, one attached to the top and the other to the bottom of each net wing. The Astoria "V" type doors, weigh 340 kg each and measure 1.5 m x 2.1 m.

Survey areas are divided into offshore stations of approximately 92 km<sup>2</sup>, while inshore stations are approximately 27 km<sup>2</sup>. Considerable size variation occurs in some offshore and most inshore areas due to coastline geography. Inshore areas are calculated from the 20-fathom depth contour. At each station, the trawl is towed on the bottom at a speed of approximately 3.7 km per hour for 1.85 km. Length of the tow is determined by Differential Global Positioning System (DGPS) readings and the vessel captain estimates corrections for tows that are not in a straight line. Irregular bottom types occasionally cause haul length to differ from 1.85 km. Location, tow distance, depth, trawl time, and related information are recorded on the skipper trawl record form (Appendix A.1). Trawl placement within a station is determined by depth contours and the locations of a trawlable substrate. All tows are made during daylight hours. Gear performance or changes in the stations towed are recorded in the skipper's comment section of the skipper trawl record form.

### *Catch Sampling*

Total weight of the catch from each haul is determined by weighing the codend of the trawl with an electronic crane scale accurate to  $\pm 2.0$  kg. After dumping the catch from the trawl net into the sorting bins, the weight of the empty codend is recorded. The weight of the catch is calculated by subtracting the weight of the empty codend from the total weight of the catch, and is then recorded on the on-deck sampling form (Appendix A.2). If the haul is too large to be weighed or inclement weather does not permit accurate weighing, the weight of the catch can be estimated in consultation with the skipper.

The entire haul is sampled for selected species only (Table 1). Each species assemblage that is whole-haul sampled is counted, weighed to  $\pm 0.1$ g, and, where applicable, measured to  $\pm 1.0$  mm. The weights and lengths of whole-haul species are recorded on the on-deck sampling form. Finfish, sharks, and crabs are weighed, measured and numbers of individuals are recorded. Octopus, giant wrymouth, and box crab are counted and weighed only. Halibut and skate lengths are recorded and weights are determined from length-weight conversion formulas. Total count of weathervane scallops is also recorded on the on-deck sampling form. Weathervane scallops caught on the trawl wires are not included in the sample.

Additional species are subsampled. A 1.5 m<sup>2</sup> splitting net is used to obtain a subsample of the catch. The net is tied into the sorting bin before the catch is dumped from the codend. After the codend is emptied into the sorting bin, the splitting net is cinched up. The subsample is craned over to the sorting table for sorting and weighing by species.

### *Problem Sampling Scenarios*

- The splitting net does not always pick up a **representative sample**. Therefore, some of the catch may need to be shoveled into the subsample. The cruise leader will supervise this procedure to assure a representative sample is taken.
- The catch may be **too large** to weigh on the crane scale. An estimate may be required for the catch. Consult with the skipper.
- When the **total catch is small** (less than approximately 600 kg), it is faster to sort the entire catch rather than subsample.
- **Large pieces of debris** (i.e., trees, tube worms, etc.) and sharks may be caught in the trawl. These items should be whole-haul sampled and weighed separately from the rest of the catch using a splitting strap.
- **Mud tows** can be a problem for subsampling. The weight of the mud needs to be estimated if it makes up a significant portion of the subsample. Weigh the entire subsample with the mud in the splitting net. Rinse the mud and weigh the rest of the subsample to establish the proportion of mud in the total catch.

Any deviations from the standard sampling procedures should be explained on the on-deck sampling form.

## *Handling Crab*

King, Tanner, and Dungeness crab are to be separated by sex, weighed, counted, measured, shell-aged, and data recorded in the Microsoft Access crab database using the on-deck computer or manually on the crab data form before the crabs are returned to the sea (Appendix A.3). Each data form should contain information from only one sex, and every column completed when applicable.

In hauls where Tanner crab are too numerous to be individually sampled in a reasonable amount of time, a subsample will be taken. A representative sample of 200 crab of each sex will be measured. Randomly sort crab into baskets. Since large crab tend to get picked up first, sample from the first baskets sorted as well as from baskets sorted later. The crab not sampled should be sexed, weighed, and 'counted over' the side of the vessel.

If there are **too many juvenile Tanner crabs** to sample completely in a reasonable time frame, then subsample them. This could be the case if there are 6,000 or more crabs in the sample haul. Often one sex is more dominant than the other in the catch, so take a large subsample of crab to adequately sample both sexes. Every crab in the subsample will be sorted by sex and a total weight per sex will be collected. At least 200 crab of each sex will be measured. If you find that the subsample still has too many crabs to measure within a reasonable amount of time count the remainder over the side of the vessel. Indicate clearly on the front of both the on-deck sampling form and crab form exactly how the crab catch was handled as well as the number of crabs per sex were counted over the side. The percentage of males to females and the average weights in the subsample will be used to estimate the total number of male and female crab in the unsampled portion of the haul. Since this is only a rough estimate of the number of crab caught in the haul, use this method of sampling only when necessary.

King, Tanner, and Dungeness crabs shall be categorized by shell condition. There is a degree of subjectivity in this process, but an effort should be made to be consistent. See Appendix B for details on shell aging categories.

Tanner crab carapace widths (CW) are measured from inside the spines while king crab carapace lengths (CL) are measured from the eye socket to the medial posterior edge of the carapace (Appendix C). Crab CW outside the spines are checked for legal status (biological measurement range from 136-139 mm CW for legal Tanner crab, and  $\geq 140$ -157 mm CL for legal king crab). Measurements are recorded to the nearest millimeter using Vernier calipers. One hundred Tanner crabs with a CW greater than 50 mm will also be measured for chela height from each haul in Marmot Bay. Only the right chela of each crab is measured and regenerated claws are excluded. Measurements should be taken inside the spines at the point of greatest height (Appendix C).

Mature female Tanner and king crabs reproductive condition is measured by checking for the presence of an egg clutch and estimating the percent fullness of the egg clutch to the nearest 10%. Signs of bitter crab syndrome, black mat, nemertean worms or cottage cheese disease (Appendix D) exhibited by crabs should be noted during crab data entry. Dead eggs or matted egg cases are possible indicators for the presence of nemertean worms and crabs with those conditions should be inspected thoroughly.

Crab data are entered directly into the waterproof deck-computer. Data will be entered separately according to species and sex. For ease of data entry, adult and juvenile females should be separated. It is the responsibility of the person entering the measurements to insure completeness and accuracy of the data.

After every haul, the deck computer data will be saved and downloaded to the dryhold computer. The new data must be added to the access database, and a copy of the measurements from the haul printed out. In the event that the deck computer fails, data will be recorded on an ADF&G crab form (Appendix A.3). At the end of each day the crab catch is summarized on the daily station summary form (Appendix A.4). Data will be edited daily to ensure that errors can be corrected.

### *Downloading Crab Data from the Deck Computer*

Once all crab measurements have been entered into the deck computer, on the touchscreen touch ‘clear form’ followed by ‘download to dryhold’. A “calculating” message will appear in the lower left corner of the gray frame. Next open the crab database on the dryhold computer. Select the button that says ‘append deck crab data to dryhold data’ on the entry screen, then choose yes when it asks if you wish to append ‘x’ number of rows. When complete, **print a paper copy of the haul data**. This must be done after every haul! Before sampling the next haul, save all data on the deck computer. Be sure the form is clear of the previous haul data and ready for the next haul. This will prevent duplicate data in the database.

### *Handling the Subsample*

Commercially-important finfish that are subsampled consist mostly of flatfishes such as arrowtooth flounder, starry flounder *Platichthys stellatus*, flathead sole *Hippoglossoides elassodon*, butter sole *Pleuronectes isolepis*, rex sole *Errex zachirus*, dover sole *Microstomus pacificus*, English sole *Pleuronectes vetulus*, sand sole *Psettichthys melanostictus*, northern and southern rock sole, and Alaska plaice *Pleuronectes proboscideus*. **All species should be returned to the sea as soon as possible**. Miscellaneous fish and invertebrates will be speciated and counted whenever possible, although time constraints occasionally require grouping of some species (i.e., sponges, brachiopods, clams, sea pens, anemones, hermit crabs, sea urchins, worms, and polychaetes). Garbage, kelp, empty shells, etc. are lumped into the “debris” category and weighed. The cruise leader should work to insure as many species as possible are positively identified, especially the shrimp, sea stars, snails, sea cucumbers, and sculpins. Special care should be taken to identify the red sea cucumber *Parastichopus californicus* and not to identify it as just a “cuke” (Appendix F). See Appendix E for a current species list. All of the crewmembers should be familiar with all species on the list.

The platform scale will be tared to the correct size basket or tray. When there are multiple baskets of the same species of fish, then a representative subsample of that species will be measured, but all baskets will be weighed to the nearest 0.1 g. Mud should be rinsed off prior to weighing. When putting fish into baskets, there is a tendency to pick up the larger fish first, which results in the first baskets

having a higher percentage of larger fish while the later baskets have higher percentage of smaller fish. **It is imperative that the subsample is a representative sample of the catch.** To ensure a representative sample, either mix up the baskets or measure fish from the first and last sorted baskets. Which sampling technique used will depend on the general size distribution observed in the sample. Consult the cruise leader if unsure, before discarding fish.

Baskets of fish that are weighed, but not measured, are recorded in the *subsample weights, non-measured* column on the on-deck sampling form. The baskets of fish weighed and measured are recorded in the *subsample weights, measured* column. Record the number of individuals of a species in the *Count* column. When a species is whole-hauled, a check mark should be entered in the *percent* column. In the past errors have been made because abbreviations of the species name have been recorded on the on-deck sampling form. When in doubt of the short form for the species, write out the full common or scientific name of the species.

### ***Pacific Cod and Walleye Pollock Subsampling***

Every effort should be made to whole-haul sample Pacific cod and walleye pollock. Occasionally abundance will be too high to weigh every fish. Fill 4-5 separate baskets of Pacific cod or walleye pollock for weighing. The fish remaining in the sorting bin can be counted over the side of the vessel. To determine the average weight of the fish counted over, calculate the average weight of the Pacific cod or walleye pollock that were in the baskets sorted for weighing and measuring. Since all the Pacific cod or walleye pollock in the tow were accounted for 100% can be recorded in the percent column of the on-deck sampling form. When walleye pollock or Pacific cod are too abundant to count over, subsample them from the splitting net and treat the data like all other subsampled species. Do not attempt to estimate the total number and weight of the haul, the access database will provide the estimates.

### ***Fish Measurements***

All commercial finfish species are measured. Finfish and sharks are measured from snout to the fork or mid-point of the caudal fin. Skates are measured along the dorsal surface from the tip of the nose to the anterior notch of the pectoral fin as well as from the tip of the nose to the end of the tail (Appendix G). Skates are measured twice to develop a conversion factor from the measurement type that ADF&G uses to the type used by NMFS. In tows where skates are too abundant to measure twice, dual measurements will be taken from an equal number of small, medium, and large skates, regardless of their proportion in the tow.

The majority of the measurements are done with a polycorder (Appendix H). There are no hard and fast rules regarding the number of fish to be measured. When fish size is relatively uniform a minimum sample size of 50 fish should be considered adequate; however, when the lengths in the sample are variable more fish should be measured. One hundred fish per sample with mixed sizes is not unreasonable. Remember, it's the number of fish not the number of baskets. Halibut and skate lengths measured without a polycorder need to be recorded on the deck form, then entered into the polycorder

before downloading to the computer in the dryhold. When halibut or tagged Pacific cod measurements are recorded directly onto the polycorder, note this on the on-deck sampling form. To avoid scratching or damaging the polycorder stripes, lift rough-scaled fish (i.e. starry flounder) instead of sliding them across the board. Scratches will inhibit the wand from reading the bar codes on the stripes.

### ***Rock Sole Identification***

Northern and southern rock sole will be differentiated according to characteristics defined by the National Marine Fisheries Service (NMFS) (Orr and Matarese, 2000). The blind side skin on southern rock sole is more transparent and the abdominal muscle pattern is clearly visible. Gill rakers of southern rock sole are more blunt and stout than those of northern rock sole. Southern rock sole have gill raker counts of 6-10 while northern rock sole are 10-14. Fish with 10 rakers are to be identified by blind side skin characteristics. Small fish (less than 20 cm) are difficult to identify and are to be entered as unidentified rock sole in the database.

### ***Weathervane Scallop Measurements***

At least 20 weathervane scallops per haul will be measured for shell height. If time allows, sample as many scallops as possible. Scallop shell height is measured to the nearest millimeter, taking the straight-line distance from the umbo to the outer shell margin (Appendix G). Measure only the top valve. The top valve is shorter and the radiating ribs are narrower than on the bottom valve. Use these characteristics to distinguish which side to sample. Do not measure broken or badly chipped shells. Diseased or recently dead scallops are retained and packaged for shipping to the pathology lab. Measurements should be recorded on an ADF&G crab form, being sure to fill in the species blank with “scallops”, along with haul number, and the total number of scallops in the haul.

### ***Access Trawl Database***

Prior to initial data entry into the Access database, vessel and cruise settings must be updated. On the Master form click Edit, then Update Vessel/Cruise (e.g. 0301). Click done after corrections are made. See Appendix H for further file maintenance and details on data entry.

After each haul, all data will be downloaded from polycorders and the on-deck computer and imported into the Microsoft Access database on the dryhold computer. Remember to record halibut, skate, shark, and tagged Pacific cod lengths into the polycorder before downloading.

Select the Data Entry icon. Access will load and open the database. Once the Master menu is opened data can be entered.

### ***Downloading the Polycorder***

Always start the dryhold computer first. Do not start the polycorder transfer until the yellow colored Downloading Polycorder form appears on the PC screen. Click 'OK'. Connect the RS-232 cable to the polycorder and to the computer. Select the Transfer Data menu and wait for the Transmit Type? prompt. Transmit type is 0 (standard). Press 'Enter' on the polycorder. The data will scroll past on the polycorder. The program will ask you if you want to download another polycorder. When done select 'N' and the data will print out. DO NOT delete the data from the polycorder until the data has been printed and checked. Make sure the counts for each species make sense and there are no abnormal lengths. If you find errors, select 'Edit', make corrections and then 'exit'. After exiting the length summary form will appear on the screen. Double-check all changes. File the printout in the survey binder. To clear the data so it is ready for the next haul, go to the polycorder menu and select the erase data option. 'Shift Y' (on the 3 key) will answer the question "Sure?" There will be a series of beeps and the data will be erased permanently. Go to "collect data" on the menu and type in the next consecutive haul number.

The polycorder's batteries should be checked frequently. To test, insert the Battery Tester RS-232 port onto the polycorder, press '4', check battery on main menu. The maximum voltage is 8.4 volts. Recharge the polycorder when voltage drops below 6.8 volts. Let the battery drain as much as possible before recharging (Appendix H).

### ***Entering Catch Data into the Database***

Once in the Microsoft Access database press the 'Enter Catch' button, enter a haul number, and Microsoft Access will calculate the estimated weights for the haul from the length data. The Catch Entry form for data entry will be opened. Enter the weights from the on-deck sampling form. The program will prompt for a subsampling code. Occasionally 100% of the haul is sampled (code 1), however the majority of the time the hauls will be subsampled (code 2). Enter the proportions sampled. Enter the total animal weight calculated from the on-deck sampling form.

Open the Species List by clicking on the down arrow within the Species List Combo box. Entering the first few letters of the species will activate the list. Enter the weights in the appropriate column, usually the subsample weight column. If there is a *non-subsampled weight*, click the button above this column or press the F12 key. To enter *multiple basket* weights, click the 'Multiple Baskets' button. In this mode a window pops up and multiple weights can be entered. Press 'Enter' on a blank line to close the basket form. Enter 'N' for species that are subsampled and 'Y' for species that are whole-haul sampled. The program automatically estimates weights for all fish lengths entered. Enter the computer calculated weight for halibut, skates, and tagged cod. When there is a large difference in the measured and calculated weights, the computer will prompt for a new entry. The measured weight is always preferable to an estimated weight provided no errors have occurred. To delete a species entry, highlight the species column and press 'escape' (Esc). After all the data has been entered, select Quit, Print, and Save. Return to the main menu. Look over the printout to make sure that it makes sense before filing in the survey binder. Check the circle on bottom of the on-deck sampling form when entry is complete.

Back up the data by copying the database onto a zip disk every couple of days during the cruise. Also, after each leg of the survey, the data must be backed up onto a zip disk or copied from the data folder to a zip disk. Run the backup process twice for duplicate sets of disks for safety (Appendix H).

### ***Tanner Crab Fecundity Study***

Female Tanner crabs will be collected from the Northeast and Eastside Sections of the Kodiak District to determine clutch fullness and fecundity. During this survey, our collection of 240 crabs that began in 2001 will be completed. Thirteen crabs will be taken from Chiniak Bay, 19 from Ugak Bay, and 27 from Kiliuda Bay (Table 2). In each area, individuals from three size classes (<90mm, 90-100mm, >100mm) will be put into separate zip lock bags, labeled with date, haul number, size class and then frozen. This information will also be recorded on the on-deck sampling form. In the lab, egg masses and spermathecae will be dissected, weighed, and processed for histological analysis.

### ***Sampling for Bitter Crab Syndrome (BCS)***

Hemolymph smears from 30 randomly selected Tanner crabs will be prepared from each haul in Alitak Bay, totaling approximately 500 smears (Appendix I). This area was previously identified as an area of high prevalence of bitter crab syndrome (Pearson and Myers 1992). Each slide is referenced with the cruise number and then numbered in sequential order starting at number one (i.e., 0301-1). A separate crab form will be used to record all information with the sample number in the comment column. Data from these crabs will also be copied onto a standard crab entry form and entered into the crab measurement database. A duplication of paperwork makes it easier to separate the crab sampled for (BCS) from the rest of the haul in the database.

### ***Tanner Weight Sampling***

To determine if the allometric equation used to convert Tanner crab carapace width to a weight is accurate for each district/section, individual Tanner crabs will be weighed on the Marel scale periodically throughout the survey. This weight, along with the carapace width and other crab information should be recorded on the ADF&G crab data form. A sample goal of 200 male tanner crabs larger than 95 mm CW and 50 fecund female tanner crabs will be weighed in each of the Northeast, Eastside, Southeast, Southwest, Westside, and North Mainland Sections of the Kodiak District, as well as the Chignik and South Peninsula Districts.

### ***Pacific Cod Tagging***

A Pacific cod tagging program was initiated during the 1997 survey to study migration, growth patterns, and to identify inshore and offshore populations. The goal is to tag at least 5-10 Pacific cod per haul. Only Pacific cod that are in good condition (i.e., not bloated, distended, or with open wounds) will be selected. A fluorescent spaghetti tag is threaded into a tagging needle and inserted through the musculature at the base of the dorsal fin, then the tag ends are fastened together. Use tags in sequential order and be careful not to tag too low in the muscle. Gentle handling and quick release of the Pacific cod are key to good survival. Size, tag number, and release location are recorded on the tagging release form prior to release (Appendix A.5). Tagged Pacific cod will be entered as species code 21722 into the database while untagged Pacific cod are assigned species code 21720. Weights of the tagged Pacific cod will be estimated from length-frequency tables.

### ***Walleye Pollock Otolith Sampling***

Walleye pollock otoliths will be collected for NMFS. The goal is to obtain a random sample of age structures representative of the population available to the survey. The target number of otoliths to be collected across the entire survey is approximately 600. Sample 20 walleye pollock for otoliths every other day throughout the entire survey. To ensure that fish of all sizes have the same chance of being selected, it is suggested to systematically set aside every *n*th fish while taking length-frequencies with *n* being approximated by dividing the estimated number of fish in the length sample by 20. Rinse the otoliths with fresh water before placing them into vials filled with a solution of 50% ethanol and 50% fresh water in vials to preserve the otoliths, making sure they are well covered. Record length and sex with each otolith sampled on the specimen form (Appendix A.6).

### ***Groundfish Stomach Sampling***

This year during the Marmot leg of the survey stomach samples of walleye pollock and arrowtooth flounder (group 1), and Pacific cod and Pacific halibut (group 2) will be collected. Sample sizes are 15 stomachs per group, for a maximum number of stomachs per haul of 30. The goal is to sample one species from each group every haul. For example, sample walleye pollock and Pacific cod during haul 10 and then sample arrowtooth flounder and Pacific halibut during haul 11. A precise outline of the sampling procedure is outlined in Appendix J.

### ***Haul photos***

Digital photos will be taken of the catch of each haul after it is dumped from the net, into the sorting bin. Try to get the entire catch into the picture. At the end of the day, the pictures will be saved on the dryhold computer and labelled with haul number and date, and can be deleted from the disk. Make sure there is adequate room on the disk for haul pictures the next day.

### ***QTC View Seabed Classification***

The QTC View system maps habitat types in terms of substrate hardness by recording echo waveforms. Waveforms are classified into groups, which correspond to different bottom types. Ground-truthing with video, and sediment grabs is a key part of acquiring valid data. The system will be deployed opportunistically on the vessel when it is available. Appendix K has more complete instructions on how to use the system.

### ***Marine Mammal Observations***

Marine mammal observations by crewmembers should be opportunistically recorded on a marine mammal sighting form (Appendix A.7). Detailed physical descriptions of the mammals and interactions observed with fishing gear, the vessel, or other marine mammals will be recorded.

### ***Temperature and Depth Data Logger***

Depths and bottom temperatures are recorded by a data logger during each haul. The logger is attached to the headrope of the net and records the water temperature and depth, approximately 2 meters above the bottom. Tows average 20 minutes and data is recorded in one-minute intervals. Every couple of days, data will need to be downloaded to the dryhold computer. The data logger program that is installed on the dryhold computer must be opened before plugging the data logger into the computer, or the logger will not register. A graph of temperature, pressure, and depth is recorded. Be sure to save the downloaded data before setting the logger up for the next set of hauls. Record the temperature range of each haul on the corresponding skipper trawl record form.

### ***Data Forms***

It is the responsibility of the cruise leader to ensure that all the forms are completed and removed from the boat after each leg of the trip. Forms are to be organized according to species, sex and put into sequential order by tow. Starting with the first tow and page on top. All data removed from the vessel is to be taken directly to the shellfish office and given to the assigned person or filed in the designated filing cabinet. This will prevent lost data.

## **SURVEY EQUIPMENT CHECKLIST**

### ***Sampling Equipment***

2 crane scales, extra charged batteries, charger	Dandylines and cables
Shackles, swivels, hammerlocks, rings	Nets – 3-5, 400 eastern otter trawl

Astoria trawl doors	Mending twine and needles
Sampling table	Bin boards
35 fish baskets	White plastic sorting containers
3 fish shovels	Temperature and depth data logger - AA batteries, plastic tubes (holders)
Fish measuring boards	blue board with code strips
tagging board	Polycorders - 4
Polycorder wands – 10	3-4 extra polycorder measuring strips, brass tracks
Spaghetti tags and needles	Board for holding needles with the tags
Syringes – 3cc(20g 1 ½) reorder no. 309579 Becton Dickinson & Co. Franklin Lakes NJ	1,000 VWR microslides – 3x1inx1.2mm, frosted on one end (catalog # 48312-013)
Slide boxes -VWR	Calipers – at least 3, small and large
King crab genetics sampling box	Stomach sampling equipment (from NMFS)
Flexible measuring tapes – 3 or 4	Knives - victornox
Scissors	Forceps
2 computers, waterproof and Micron	Zip drive
Disks – 3½ inch floppy, 3 zip disks	Binders to hold data forms
Hole punch, pencils	3-4 reams of paper
Video camera	Video tape
Monopod for camera	Digital camera and 3 ½ high density disks
NMFS ADP and Species codebooks	Form 1: Skipper Trawl Record Form
Form 3: Crab Measurement Form	Form 2: On-deck Sampling Form
Form 4: Crab Summary Form	Form 5: Pacific Cod Tagging Form
Form 6: Specimen Form	Form 7: Marine mammal sighting Form
Project operational plan	Species identification books:
Alaska’s Saltwater Fishes and Other Sea Life – D. Kessler	Guide to Northeast Pacific Rockfishes – D. Kramer and V. O’Connell
Guide to Northeast Pacific Flatfishes – D. Kramer, et al.	Pacific Fishes of Canada – J.L. Hart
Fishes of Alaska – Mecklenberg, et al.	Printout of last year’s stations, date, starting and ending position, latitude/longitude, heading, crab counts
Survey Charts with current station plans – 23	Okidata printers, power cable, connector to PC, spare ink cartridges
RS-232 connector (polycorder to PC for downloading)	Recharging polycorder adapters –3/4
Power-pack battery backup (UPS)	Surge protectors
Calculators	Clip boards
Ziplocks for polycorder	Rubber bands

***QTC View and Walleye Pollock Sampling Equipment***

QTC View	4 trays of vials
Power supply cable	Otolith sampling forms
Computer serial cable to connect QTC and PC	Forceps
Transducer cable to connect QTC to transducer	Knives or hacksaw for sampling otoliths
Laptop	Ethanol
HD disks and zip disks.	Plastic dispensing bottles.

**PERSONNEL AND SURVEY SCHEDULE**

*Resolution crew* – Captain Ron Kutchick, Denis Cox, Danny Wilson

*Chiniak Bay –  
June 17 and 18*

*Marmot Bay –  
June 19-23*

*Eastside Kodiak –  
June 25 to July 17*

Kally Spalinger (cruise leader)  
Mike Cavin  
Tom Dinnocenzo  
Dave Gilliland  
Carl Peterson

Mike Ruccio (cruise leader)  
Mike Cavin  
Tom Dinnocenzo  
Dave Gilliland  
Carl Peterson

Mike Ruccio (cruise leader)  
Tom Dinnocenzo  
Dave Gilliland  
Carl Peterson

*South Alaska Peninsula, Chignik, and  
The Eastern Aleutians -  
July 22 to August 26*

*Westside Kodiak and North Mainland –  
September 4-14*

Mike Cavin (cruise leader)  
Wayne Donaldson  
Tom Dinnocenzo  
Dave Gilliland  
Carl Peterson

Kally Spalinger (cruise leader)  
Tom Dinnocenzo  
Dave Gilliland  
Carl Peterson

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- Jackson, D.R. 1990. A bottom trawl survey of crab and groundfish in the Kodiak Island and Alaska Peninsula Areas, June through September, 1989. Alaska Department of Fish and Game, Division of Commercial Fisheries, Westward Region, Regional Information Report 4K90-22, Kodiak.
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Reynolds, R. E. and Powell, G. C. 1964. King crab *Paralithodes camtschatica* (Tilesius), trawl survey of Long Island Bank, east of Kodiak Island, Alaska, June 1963. Alaska Department of Fish and Game, Division of Biological Research, Informational Leaflet 44, Kodiak.

Table 1. Species that are whole-haul sampled.

<i>Common Name</i>	<i>Species Name</i>
Alaska skate	<i>Bathyraja parmifera</i>
Aleutian skate	<i>Bathyraja aleutica</i>
Atka mackerel	<i>Pleurogrammus monoptygius</i>
Bering skate	<i>Bathyraja interrupta</i>
Big skate	<i>Raja binoculata</i>
Box crab	<i>Lopholithodes foraminatus</i>
Dungeness crab	<i>Cancer magister</i>
Giant wrymouth	<i>Cryptacanthodes giganteus</i>
King crab	<i>Paralithodes camtschatica</i>
Hair crab	<i>Erimacrus isenbeckii</i>
Lingcod	<i>Ophiodon elongatus</i>
Longnose skate	<i>Raja rhina</i>
Octopus	<i>Octopus dofleini</i>
Pacific cod	<i>Gadus macrocephalus</i>
Pacific halibut	<i>Hippoglossus stenolepis</i>
Pacific herring	<i>Clupea harengus</i>
Pacific sleeper shark	<i>Somniosus pacificus</i>
Red sea cucumber	<i>Parastichopus californicus</i>
Rockfish	<i>Sebastes</i> spp. and <i>Sebastolobus</i> spp.
Sablefish	<i>Anoplopoma finbria</i>
Salmon	<i>Onchorhynchus</i> spp.
Salmon shark	<i>Lamna ditropis</i>
Spiny dogfish	<i>Squalus acanthias</i>
Snow crab	<i>Chionoecetes opilio</i>
Squid	<i>Berryteuthis magister</i>
Tanner crab	<i>Chionoecetes bairdi</i>
Walleye pollock	<i>Theragra chalcogramma</i>
Weathervane scallop	<i>Patinopecten caurinus</i>
Wolf-eel	<i>Anarrhichthys ocellatus</i>

Table 2. Female Tanner crab fecundity study.

Carapace Width (mm)	Sample size required for 2003		
	Chiniak Bay	Kiliuda Bay	Ugak Bay
<90	0	0	2
90-100	1	8	0
>100	12	19	17
<b>Total</b>	<b>13</b>	<b>27</b>	<b>19</b>

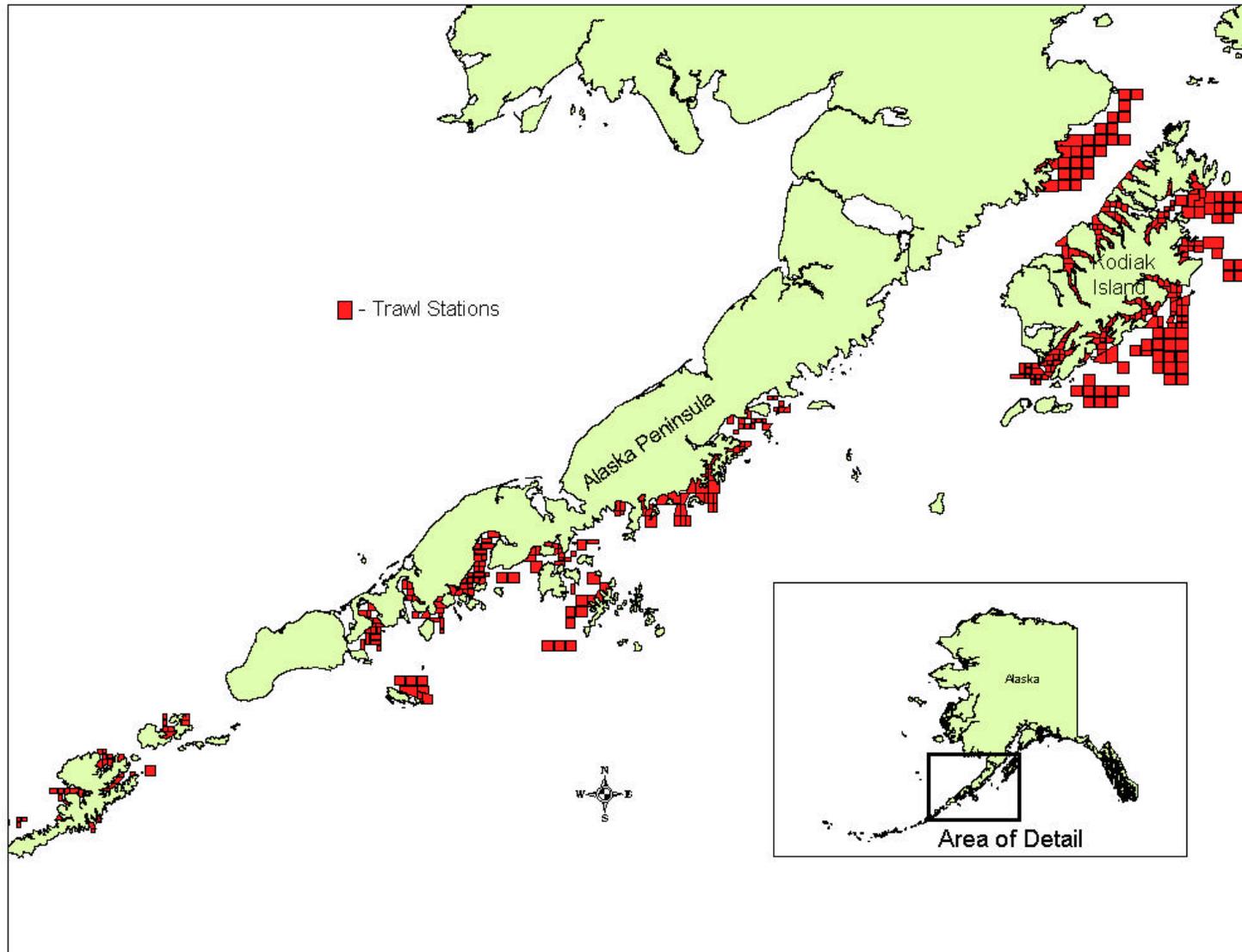


Figure 1. Westward Region trawl survey area, 2003.

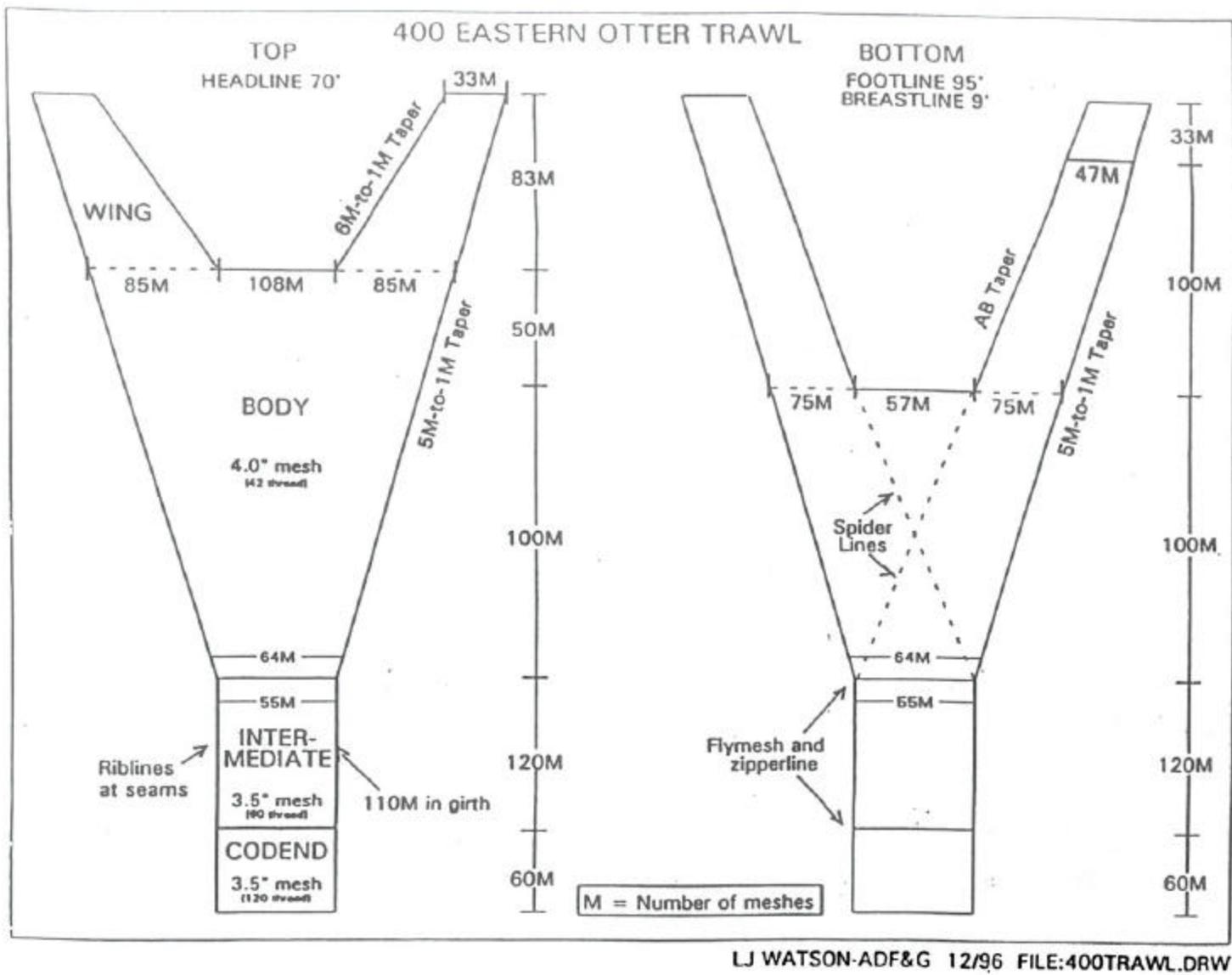
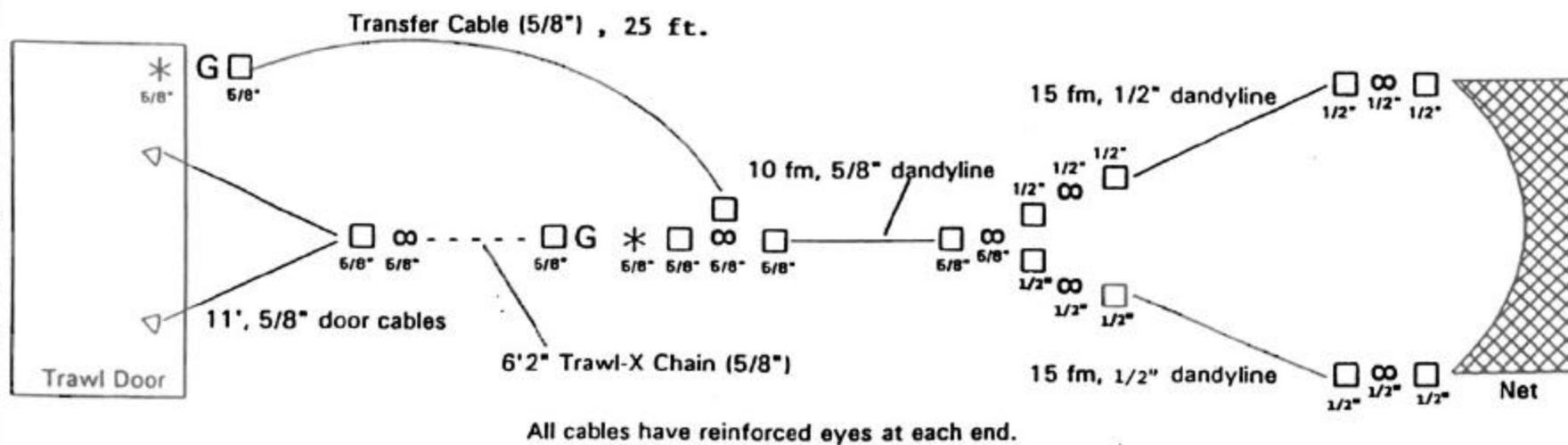


Figure 2. A 400 eastern otter trawl.

**RIGGING FOR 400 EASTERN OTTER TRAWL**  
70' HEADLINE - 95' FOOTLINE

- |   |            |
|---|------------|
| □ | HAMMERLOCK |
| * | FLATLINK   |
| G | G-HOOK     |
| ∞ | SWIVEL     |
| ▽ | SHACKLE    |



LJ WATSON-ADF&G 12/96 FILE:400RIG.DRW

Figure 3. Rigging for a 400 eastern otter trawl.

## **APPENDIX**

Appendix A.1. Skipper trawl record form and instructions.



ALASKA DEPARTMENT OF FISH AND GAME  
2003 TRAWL SURVEY  
SKIPPER TRAWL RECORD

Ron Kutchick  
Skipper's Name

\_\_\_\_\_  
Survey Area

Cruise <sup>1</sup> Number	Haul Number	Region	Survey Area	Stratum	Station Number	Vessel Code	Date			
0   3   0   1							month	day	year <sup>23</sup>	
									0   3	
(1) Starting Position				Compass Heading (magnetic)		Trawl Time		Dist- Towed		
Latitude		Longitude				Start	End			
degrees/min		degrees/min				:	:			
(2) Haul Back Position						Elapsed				
Position X		Position Y								
Position X		Position Y				(minutes)				
Depth (fathoms)			Weather			Scope (fathoms)	Gear Perf.	Bottom Temperature		
Maximum	Minimum	Avg.	Cloud	Sea	Swell					
Skipper's Comments (gear problems, snags, weather, tides, etc.):										
57. Cloud Cover			Code	58. Sea State (feet)			Code	59. Swell (feet)		
Clear			1	0 - 2			1	0 - 2		
1/8 obscured			2	2 - 4			2	2 - 4		
1/4 obscured			3	4 - 6			3	4 - 6		
3/8 obscured			4	6 - 8			4	6 - 8		
1/2 obscured			5	8 - 10			5	8 - 10		
5/8 obscured			6	10 - 12			6	10 - 12		
3/4 obscured			7	12 - 14			7	12 - 14		
7/8 obscured			8	14 - 16			8	14 - 16		
Completely overcast			9	Over 16			9	Over 16		
63. Gear Performance				Code	Gear Performance				Code	
Gear performance satisfactory				1	Mudded down				26	
Gear performance unsatisfactory				20	Telemetry malfunction				50	
Doors nonfunctional (crossed, collapsed)				21						
Net nonfunctional (collapsed, torn, twisted, etc.)				22						
Hung up				23						
Trawl upside down				24						

Initials: \_\_\_\_\_

---

*Skipper Trawl Record Instructions*

This form records each haul: area, date, position, time trawled, depth, length of tow, gear performance, and weather conditions.

<u>Column Heading</u>	<u>Columns</u>	<u>Contents</u>
Cruise Number	1-4	Sequential # by year, cruise (i.e. 0301).
Haul Number	5-7	Beginning with 1, each haul is numbered sequentially through each trip regardless of gear performance.
Haul Location	8-16	8- Net number . 9-10 Survey area (not used). 11-12 Strata (not used.). 13-16 Station Number (Consult charts).
Vessel Code	17-18	Resolution = 30.
Date	19-24	Month/day/year.
Starting Position/ Haul Back Position	28-39	Lat. Long., degrees/minutes (to .01)
Compass heading	40-42	Heading towed.
Trawl time	43-48	43-46 Using 24 hour clock. 47-48 Elapsed time of tow (mins.).
Haul Depth	51-56	51-53 Minimum Depth (Fathoms). 54-56 Maximum Depth (Fathoms).
Weather	57-59	57-Cloud, 58-Sea, 59-Swell (criteria on data sheet).
Scope	60-62	In fathoms (cable deployed).
Gear Performance	63-64	For each haul use performance codes on data sheet. Written description should accompany problem tows.
Bottom Temperature	65-67	Recorded upon download of temp. probe and entered on skipper form.



On-deck Sampling Form - Species Composition

*Header Information:*

Total Wt.	Total Weight of catch and trawl.
Bag (tare) Wt.	Weight of empty trawl net.
Animal Wt.	Subtract net weight from total weight.
Vessel	Vessel name conducting survey.
Cruise	Enter sequential year cruise number (i.e. 0301).
Haul	Sequential haul number for specified tow.
Date	Date (mm/dd/yy) of specified tow.
Location	Nearest bay or headland.
Recorder's Name	The name of the person/people recording data on the form.

*Data fields:*

Species name	List species name, either common or scientific, for each species sampled within the tow.
c.o.	Enter the number of individuals that were counted over the side of the boat, but were not weighed.
Whole-Haul weights	Species that are whole-haul sampled; enter weights in kg in this column.
Subsample Weights (non-measured)	Species from the subsample but lengths were not taken, enter weights in kg in this column.
Subsample Weights (measured)	Enter weight of animals in the subsample that were measured.
Count	Enter number of individuals from the subsample, or the whole-haul sample in this column. All animals, when possible, are to be enumerated if not measured on the polycorder.
100%	Check mark this column for all species that are whole-haul sampled. For species that are subsampled, no percentage is needed.

Mark the circle at the bottom of the form when data entry is complete.

Appendix A.3. ADF&G crab data form and instructions.

**ADF&G CRAB DATA FORM**

Page \_\_\_\_\_ of \_\_\_\_\_

SPECIES \_\_\_\_\_  
 SEX \_\_\_\_\_  
 VESSEL \_\_\_\_\_  
 DATE 

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

STATION NUMBER 

--	--	--	--	--

  
 POT ORDER 

--	--	--	--

  
 BUOY NUMBER 

--	--	--	--

  
 TRAWL HAUL NUMBER 

--	--	--	--

  
 SAMPLING FACTOR 

--	--	--	--

COUNT-OVERS

	S P E C I E S	S E X  C O D E	C A R A P A C E  L E N G T H  (M M)	C A R A P A C E  W I D T H  (M M)	S H E L L  C O N D I T I O N	D I S E A S E  C O D E	E G G S			C O M M E N T S
							% C L U T C H  F U L L N E S S	D E V E L O P M E N T	C O N D I T I O N	
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										

**CODE INSTRUCTIONS**

- SPECIES**
1. *L. AEQUISPINA*
  2. *P. CAMTSCHATICA*
  3. *P. PLATYPUS*
  6. *C. BAIRDI*
  7. *C. OPILIO*
  9. *C. MAGISTER*

- SEX CODE**
1. Sublegal Male
  2. Legal Male
  3. Juvenile Female
  4. Adult Female

- SHELL CONDITION**
0. Soft
  1. New
  2. Old
  3. Very Old

- DISEASE CODE**
1. Black Mat
  2. Bitter Crab Syndrome
  3. Nemertean Worms
  4. Parasitic barnacle

- EGG DEVELOPMENT**
1. Uneyed eggs
  2. Eyed eggs

- CLUTCH CONDITION**
1. Dead Eggs Not Apparent
  2. Dead Eggs < 20%
  3. Dead Eggs > 20%
  4. Barren with Clean "Silky" Setae
  5. Barren with "Matted" setae.  
empty Egg Cases

*ADF&G Crab Data Form*

Species and Sex	Common name or scientific name of crab listed in the first column of the form (only one species per form). Male or Female (only one per form).
Vessel	Name and/or number of vessel conducting survey.
Date	Month, day and year on which information is collected and recorded.
Station Number	Number assigned to specific location of trawl.
Pot order	For pot surveys only—not used on trawl survey.
Buoy Number	Number of buoy—pot surveys only, not used for trawl survey.
Trawl haul number	Numerical sequence of hauls.
Sampling Factor	Used to indicate the ratio of samples to entire catch. A ‘1/1’ entry would indicate all crab caught were measured a ‘1/10’ entry would indicate that one crab was measured for every ten crabs caught of the same species, sex, and shell age.
Countovers	Enter the number of crabs counted over the side of the vessel and not measured. Each sex goes on its own form.
Species	Use codes listed on bottom of form, the numerical code must match the written species indicated at the top of the form.
Sex and Legal size	Codes are listed at bottom of form. The numerical code represents sex and legal size.
Carapace length	Indicate to nearest millimeter.
Carapace width	Indicate to nearest millimeter.
Shell condition	Codes are listed at the bottom of the form: 0, soft                      Crab 0-2 months since molt. 1, new                        Crab 3-12 months since molt. 2, old                         Crab 13-24 months since molt. 3, very old                 Crab 25 plus months since molt.
Disease code	Codes are listed at the bottom of the form. Potential diseases or parasites not listed should be noted in the comment section.
Eggs % clutch	The percent of egg fullness of the clutch, as estimated by measurer. Use increments of 10s.
Development	Codes are listed at the bottom of form for (2) eyed and (1) uneyed eggs.
Clutch condition	Codes are listed at the bottom of the form for (1) no dead eggs, (2) dead <20%, (3) dead >20%, (4) silky, (5) matted.
Comments	For notation of anything anomalous on individual crab such as parasites, morbidity, etc.



Daily Station Summary Form.

Title	Fill in year of survey in header information.
Location	Fill in geographic area, Kodiak, Chignik, Ak Peninsula, Eastern Aleutians.
Recorder	Your name.
Vessel	List by name.
Page	Sequential page number for the entire survey.
Station	Fill in station name as it appears in the trawl survey operational plan or from the survey charts.
Haul Number	Fill in the sequential haul number as it appears in the skipper's haul form.
Average Depth	Average depth as calculated from the skipper haul form.
Date	Month and date.
Male Kings Legal Sublegal Mature	Total number of legal and sublegal male king crab captured in the specified station. Mature males >114 mm.
Female Kings Mature Juvenile	Total number of mature and juvenile female king crab captured in the specified station.
Male Tanners Legal Sublegal	Total number of legal and sublegal male Tanner crab captured in the specified station.
Female Tanners Mature Juvenile	Total number of mature and juvenile female Tanner crab captured in the specified station.

Appendix A.5. Pacific cod tagging form and instructions.

Pacific Cod Tagging Form

TAG NUMBER (C)	DATE	LENGTH	RELEASE LOCATION	ADDITIONAL COMMENTS
01				
02				
03				
04				
05				
06				
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08				
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44				
45				
46				
47				
48				
49				
50				

*Pacific Cod Tagging Form*

Tag Number	Forms are pre-numbered with the last two digits that will appear on each tag. Fill in the first three digits from each tag used, making sure to keep tags in order.
Date	Date that fish was tagged and released.
Length	Fork length of fish being tagged and released.
Release location	List sequential haul number from haul where fish was released this information will be matched to the Skipper's logbook information at a later date.
Comments	Note anything anomalous about cod particularly if upon the release the fish looks as though it might be moribund.



*Specimen Form*

This form records the length, sex and corresponding otolith number for walleye pollock otolith sampling.

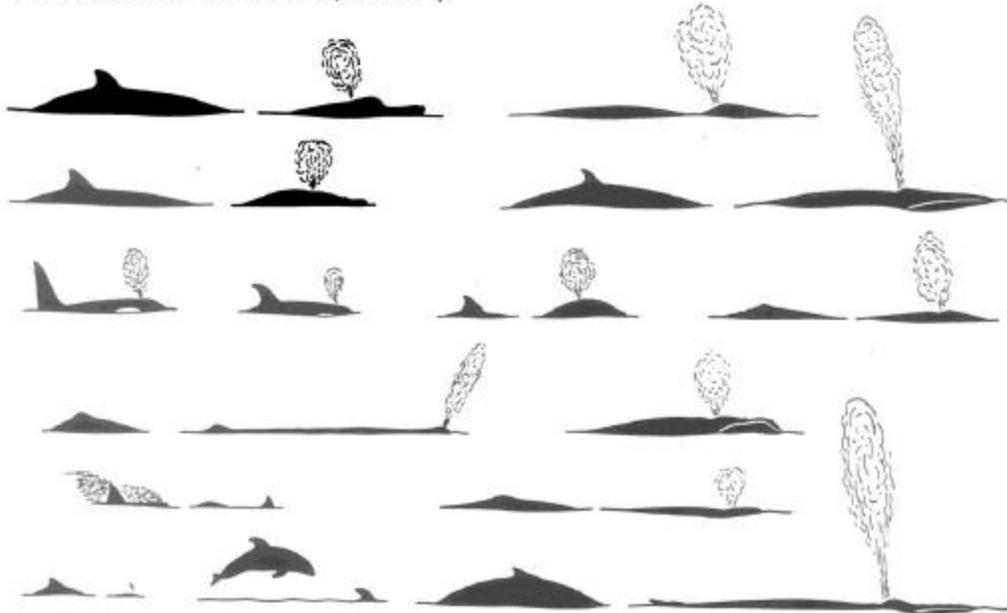
Vessel	1-3	Enter vessel, <i>Res</i> for Resolution
Cruise	5-7	Sequential number by year, cruise i.e. 001
Haul	9-11	Each haul is numbered sequentially.
Stratum	13-15	Leave blank
Species Code	17-21	Enter the 5 digit species code (i.e. walleye pollock, 21740).
Species Name		Enter species name
Frequency	36-60	Leave blank, or to be filled in at a latter date.
Subsample Type		
Weight Determination		
Age Structure		
Age Determination		
Maturity Table		
Your Name		Enter name of samplers and date.
Date		
Sex	23	Enter F or M for sex.
Maturity	25	Leave blank
Length	28-31	Measure length in cm and convert to mm.
Weight	37-41	Leave blank
Age	45-46	To be entered at a later date.
Specimen Number	53-57	Enter the sequential number from the label on the vial.



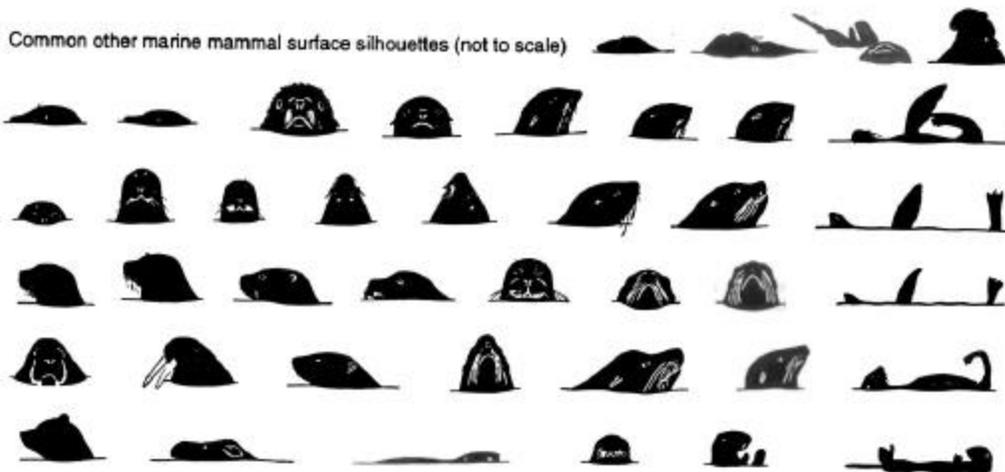
Appendix A.7. (Page 2 of 2)

These are silhouettes of most genera of marine mammals known to occur in and around North America. Subtleties exist between closely related genera. Care should be taken in identifying species. Assessing one's level of confidence with copious notes and observations is more valuable than a brief misidentification. Please circle appropriate silhouette(s).

Common cetacea surface silhouettes (not to scale)



Common other marine mammal surface silhouettes (not to scale)



BEAUFORT SCALE (Sea Condition)	wind	wave height
0 glassy, calm	0, 1 kts	calm
1 light ripple	1 < 4 kts	light air 1/4'
2 small wavelets	4 < 7 kts	light breeze 1/2'
3 scattered whitecaps	7 < 11 kts	gentle breeze 2'
4 small waves, frequent whitecaps	11 < 17 kts	moderate breeze 4'
5 moderate waves, many whitecap	17 < 22 kts	fresh breeze 6'
6 all whitecaps, some spray	22 < 28 kts	strong breeze 10'
7 breaking waves, spindrift	28 < 34 kts	near gale 14'
8 medium high waves, foamy streaks	34 < 41 kts	gale 18'
9 high waves, dense foamy streaks	41 < 48 kts	strong gale 22'
10-12 not meaningful (time to go home)		

## Appendix B. Shell aging for Tanner, king, and Dungeness crab.

---

Shell age determination is made for all king, Tanner, and Dungeness crab sampled. Shell age should not be recorded for crabs not measured. Consistent and accurate shell aging techniques using shell appearance are difficult because there is some subjectivity involved. Time of year and substrate type, when known, is used in determining shell age as both can influence external crab characteristics.

Most commercially important species of crabs found in Alaska undergo an annual molt in spring through to summer. It is possible for crabs, sampled in December, to have old shell characteristics but in fact will have a 'shell of the year' and have not skip molted.

Additionally, crabs that inhabit a hard bottom will have the appearance of aging more rapidly than those that inhabit a soft bottom. It is important to bear in mind these factors when determining shell age.

Use the following characteristics in determining shell age.

### **Tanner crab:** (*C. bairdi*, *C. opilio*, *C. tanneri*, *C. angulatus*)

- (0) Soft Soft exoskeleton which is not fully calcified and flexible. Often chelas will remain slightly pliable and can be used to assess if crab have recently molted. Ventral surface devoid of scratches, carapace pink to brownish red in color. Exoskeleton spines very distinct and sharp if not pliable.
- (1) New Shell Exoskeleton fully calcified and not pliable. Ventral surface with little scratching, carapace color pink to brownish-red, often with iridescence still present. Exoskeleton spines and dactyl spines sharp. Shells < 1 year old.
- (2) Old Shell Ventral surface with numerous scratches and abrasions. Exoskeleton tan or light brown. Exoskeleton spines worn and dactyl points not sharp. Females will exhibit grasping marks on merus section of legs. Epifauna may be present but is not the sole characteristic that should be used to determine shell age. These crab have skipped a molt cycle and their shells are 2 years old.
- (3) Very old shell Ventral surface with numerous scratches and abrasions. Exoskeleton dark brown to near black in color; spines heavily worn, dactyls dull, epifauna almost always present. Females will have multiple grasping marks on merus section of legs. These crabs will have skipped multiple years of molting and their shells will be 3+ years old.

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-Continued-

**King crab:** (*P. camtschaticus*, *P. platypus*, *L. aequespina*)

(0) Soft Soft exoskeleton not fully calcified and flexible. Chela often pliable if the rest of the body/legs are not. Color very bright, ventral surface bright white, dactyls and body spines very sharp if not pliable.

(1) New Shell Ventral surface bright white, very few scratches or abrasions present, dactyl and body spines sharp, body colors bright. Shells < 1 year old.

(2) Old shell Ventral surface yellowish and stained, high degree of wear on coxa, dactyls dulled, body spines not overly sharp, body color dulled. These crabs will have skipped one molt cycle and their shells will be 2 years old.

(3) Very old Ventral surface light brown with multiple scratches and abrasions, coxa heavily worn, dactyls very dull, body spines dull, body color dark and often scratches and abrasions present on ventral surfaces. Epifauna often present. These crabs will have skipped multiple molt cycles and their shells will be 2+ years old.

**Dungeness Crab:**

Use same characteristics as king crab.

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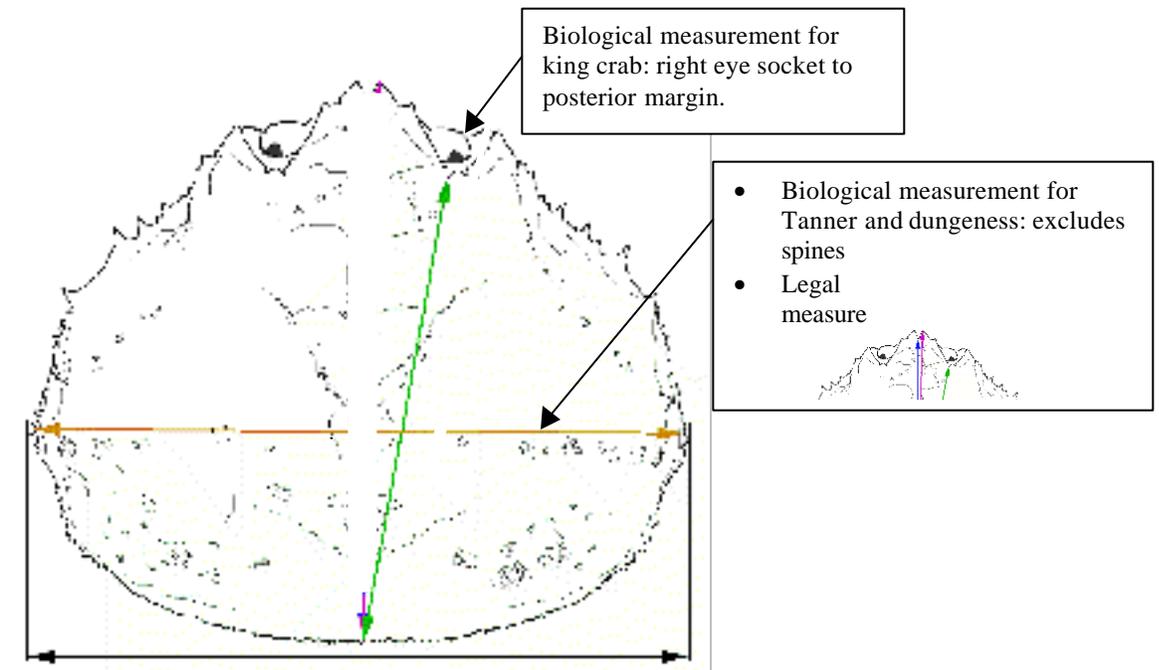
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## BIOLOGICAL CRAB MEASUREMENTS

All biological measurements are in millimeters unless otherwise noted.

All king crab species: The biological measurement for all king crab is carapace length. Using the vernier caliper, measure from the straight-line distance from the posterior margin of the right eye orbit of the carapace to the center of the posterior margin.

All Tanner species and Dungeness: The biological measurement for Tanner crab and Dungeness is the distance across carapace width not including spines. Measure the greatest straight-line distance across the carapace at a right angle to a line midway between the eyes to the posterior margin.



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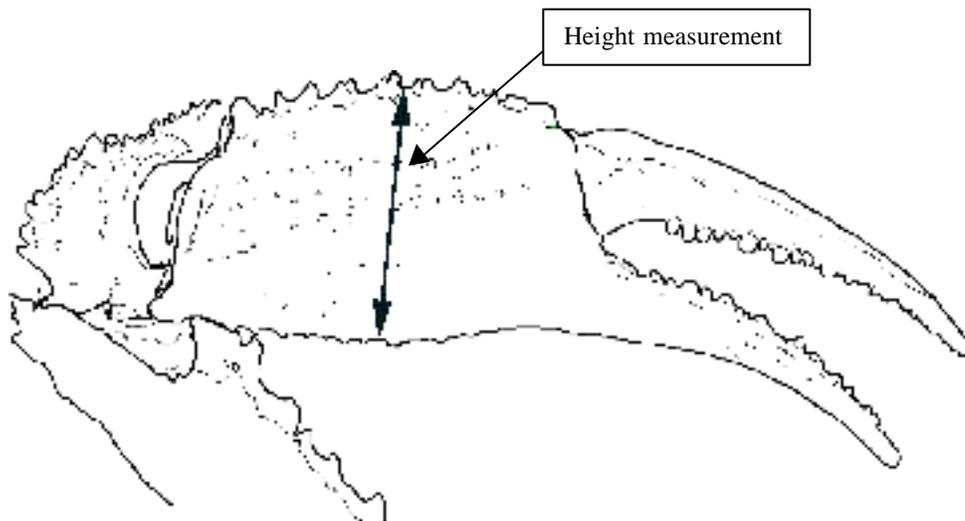
-Continued-

### **LEGAL CRAB MEASUREMENTS**

The legal measurement for king and Tanner crab is the straight-line distance across the carapace at a right angle to a line midway between the eyes to the midpoint of the posterior portion of the carapace and shall include the spines on king and Tanner crabs. Dungeness are measured in a straight line distance across the carapace anterior to the tenth anterolateral spine (not including these spines). On king crab, the tergum, which is connected to the lower margin of the carapace by a visible suture, is not included in this measurement. (See previous diagram for legal measurement on tanner crabs).

### **CHELA HEIGHT MEASUREMENTS**

Chela height measurements are the greatest height on the right chela excluding spines.



## Appendix D. Diseases and parasites.

---

The following are either listed in the parasite column with the appropriate number code or listed in the comment section of the crab and fish measurement form.

### Briarosaccus callosus

The rhizocephalan barnacle *B. callosus* has a worldwide distribution and parasitizes many crab species causing castration in the male and female crabs it infects. This parasite is found exclusively among king crab species. The externa of the parasite will be located in the abdominal flap of male and female crabs and will vary in size from as small as a jellybean to as large as a chicken egg. Coloration in the externa varies from pale yellow to pink to deep red. *B. callosus* is uncommon around Kodiak and along the Alaska Peninsula

### Nemertean worms

These worms are found in clutches of adult female crabs. The nemertean worms prey on developing embryos and are most easily spotted in conjunction with clutches that have a high number of dead embryos. These worms can be found in the egg clutches of all commercially important crab species found in Alaska. They are small in size, red in color, and often 's' shaped during the early stages of development.

### Bitter Crab Syndrome

Bitter crab 'disease' is caused by a dinoflagellate blood parasite. Live crabs in the latter stages of infection will have an exaggerated pink carapace or legs and milky blood observed if a leg is cracked. Crabs heavily infested with this syndrome are not marketable because of chalky flesh color and a bitter aftertaste.

### Black Mat

Black Mat syndrome is a fungus that forms a thick, tar like mass on the carapace and appendages of Tanner crabs. It is distinguished from general epifaunal growth by its fibrous like texture when scraped.

### 'Cottage cheese' disease

This microsporidian infection is recognizable by the white, large curd cottage cheese like appearance of the viscera. It is most obvious when the carapace is removed but can be visible in the tail sections of heavily infected crab that can be noted by their swollen abdomens.

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-Continued-

Chitinoclastic Bacteria or 'torch'

This parasite is a bacterium that consumes the chitin in the shells of crabs. It occurs as dark spots or lesions that penetrate the host's exoskeleton. The affected region will look as though a blowtorch has been used to burn the crab. Occurrence of this parasite should be abbreviated in the comment section as 'CCB'.

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Appendix E. Species list

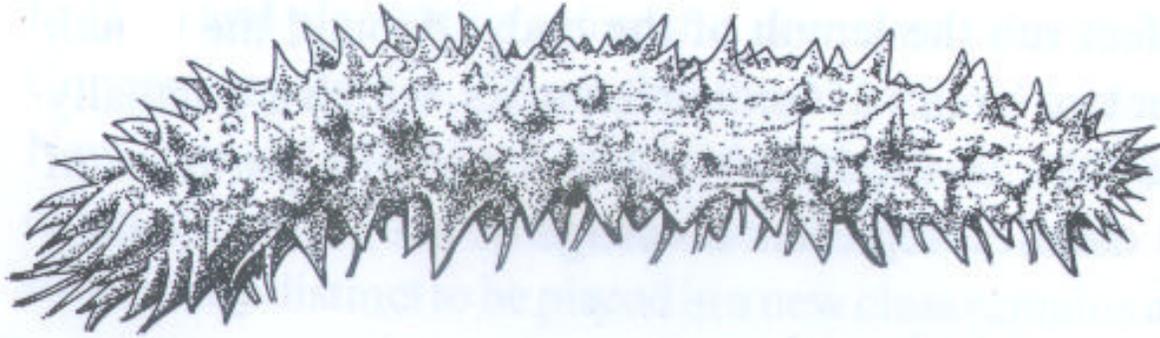
Species Name	Species Code	Species Name	Species Code
Alaska plaice	10285	dusky rockfish	30150
anemone	43000	eelpout	24100
<i>Aplidium sp.</i>	98310	egg case (snail)	71001
argid shrimp (unidentified)	66570	English sole	10170
arrowtooth fld.	10110	eualus shrimp (unidentified)	66170
<i>Asterias amurensis</i>	81742	eulachon	23010
atka mackerel	21921	flathead sole	10130
barnacle	65100	flatworm	92000
basket star	83010	fragile urchin	82530
<i>Bathyploides sp.</i>	85180	<i>Fusitriton oregonensis</i>	72500
<i>Bathyraja sp.</i>	405	giant wrymouth	23792
bay scallop	74104	great sculpin	21370
<i>Berryteuthis magister</i>	79210	green urchin	82510
big skate	420	greenland cockle	75285
bigmouth sculpin	21420	greenland turbot	10115
bivalve shell	99993	greenling (unidentified)	21900
bivalve shells	99993	hair crab	69400
black rockfish	30330	hairy triton snail	72500
blackcod	20510	halibut	10120
boccaccio rockfish	30400	harlequin rockfish	30535
box crab	69270	helmet crab	68781
brachiopod	97000	hermit crab	69010
brittlestar unid.	83000	hermit sponge	91016
bryozoan	95000	herring	21110
<i>Buccinum sp.</i>	72740	hippolytid shrimp (unidentified)	66150
butter sole	10270	humpy shrimp	66045
cancer crab (unidentified)	68010	hyas crab	69578
<i>Cancer oregonensis</i>	68040	idiot rockfish	30020
capelin	23041	jellyfish	40500
<i>Chlamys sp.</i>	74104	jingle	75605
chum salmon	23235	juv. P.cod	21721
clams	74000	juv. walleye pollock	21741
cockles	74981	kelp crab	69530
<i>Colus sp.</i>	71710	Kennicott's beringius	71770
coonstripe shrimp	66050	king crab (red)	69322
<i>Crangon crangon</i>	66502	king salmon	23220
crangonid shrimp	66500	left-hand welk	71755
<i>Ctenodiscus crispatus</i> (ninja star)	81780	light dusky rockfish	30152
<i>Cucumaria fallax</i>	85201	lingcod	21910
cuke unid.	85000	longnose skate	440
dark dusky rockfish	30151	longsnout prickleback	23836
<i>Dasycottus setiger</i>	21390	<i>Molpadia sp.</i>	85115
debris	99999	monster snailfish	22226
decorator crab	68510	moonsnail (unidentified)	71525
dogfish	310	mussel	74050
dover sole	10180	<i>Myocephalius sp.</i>	21375
Dungeness crab	68020	<i>Myoxocephalus polyacanthocephalus</i>	21370
		<i>Neptunea sp.</i>	71800

-Continued-

Appendix E. (page 2 of 2)

<b>Species Name</b>	<b>Species Code</b>	<b>Species Name</b>	<b>Species Code</b>
northern rock sole	10261	sea pen	42000
northern rockfish	30420	sea potato	98082
nudibranch (unidentified)	71010	searcher	20720
octopus	78403	sharpchin rockfish	30560
Pacific cod (P.cod)	21720	shortfin eelpout	24191
Pacific Ocean Perch	30060	shorttraker rockfish	30576
Pacific Sandfish	21592	shortspine thorynhead	30020
Pacific staghorn sculpin	21380	shrimp (unidentified)	66000
pandalid shrimp	66019	sidestripe shrimp	66120
<i>Pandalis borealis</i>	66031	silky buccinum	72752
<i>Pandalis goniurus</i>	66045	skate	400
<i>Pandalis hypsinotus</i>	66050	skate egg case (unidentified)	401
<i>Parastichopus californicus</i>	85020	sleeper shark (Pacific)	320
<i>Pentamera lissoplaca</i>	85169	smooth lumpsucker	22175
pink salmon	23230	snail	71500
pink shrimp	66031	snail eggs	71001
plain sculpin	21371	snailfish	22200
poacher	20040	southern rock sole	10262
pollock (walleye)	21740	spinyhead sculpin	21390
polychaete	50000	sponge	91000
priblilof neptune	71820	spot shrimp	66040
prickleback	23800	squid	79000
prowfish	24001	starfish	80000
<i>Pycnopodia helianthoides</i>	80160	starry flounder	10220
red irish lord	21346	Stearn's volute	72790
red striped rockfish	30430	sturgeon poacher	20040
red urchin	82520	sweet sea spud	85115
red-banded rockfish	30475	Tanner crab	68560
rex sole	10200	tomcod	21710
ribbed neptune snail	71870	tube worm (unidentified)	50010
ribbed sinstral snail	71755	tunicate	98000
rock sole	10260	urchin	82500
roughey rockfish	30050	wattled eelpout	24185
sablefish	20510	weathervane scallop	74120
saffron cod	21735	white-spotted greenling	21932
salmon shark	232	yellow Irish lord	21347
sand dollar	82730	yelloweye rockfish	30420
sand lance	20202	yellowfin sole	10210
sand sole	10250		
scallops (unidentified)	74100		
scallops (weathervane)	74120		
sculpin	21300		
sea cucumber	85000		
sea mouse	50160		
sea peach	98205		

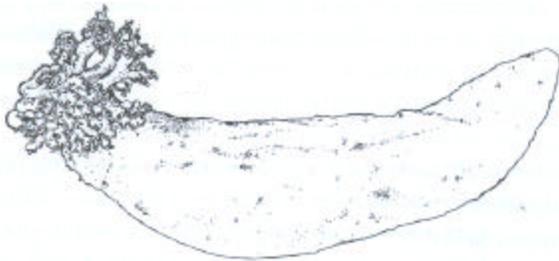
Appendix F. Common sea cucumbers.



*Parastichopus californicus*



*Pentamera lissoplaca*

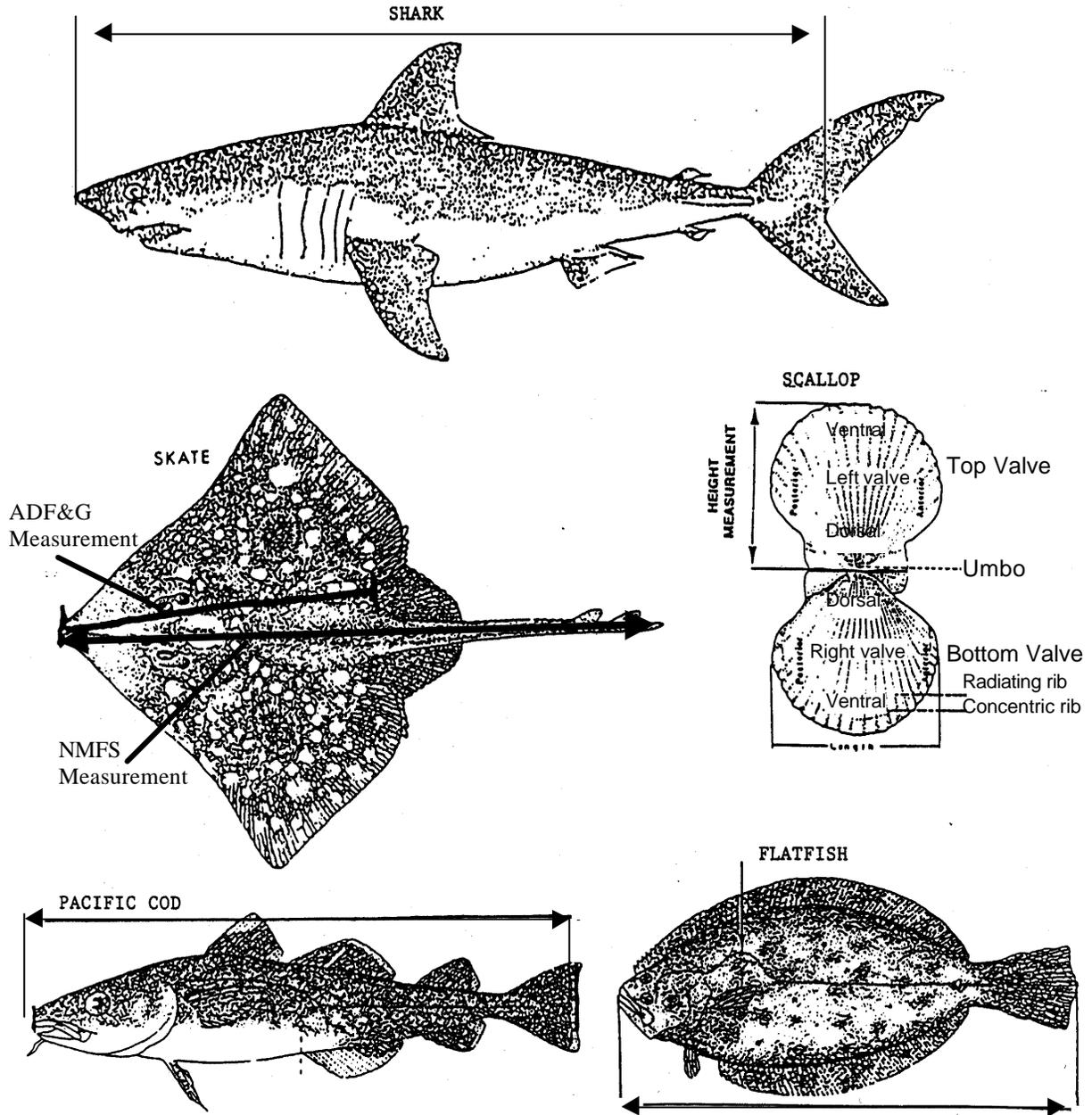


*Cucumaria fallax*  
(Sea football, deflated)



*Molpadia intermedia*  
(Sweet sea spud)

Appendix G. Biological measurements for roundfish, flatfish, sharks, skates, and scallops.



Appendix H. Data entry program and polycorder instruction manual.

# **Data Entry Program and Polycorder**

## **INSTRUCTION MANUAL**

**Revised  
1998**

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## GENERAL DATA ENTRY INSTRUCTIONS

### AT THE BEGINNING OF THE SURVEY

#### \*\*\***IMPORTANT!**\*\*\*

The programs and database should be set up prior to the survey, but the Vessel / Cruise may not be known, so it is essential that the field party chief check the Vessel Cruise number in the database before starting the first leg. This is a simple process.

On the **MASTER** form, click on **EDIT** and then **UPDATE VESSEL / CRUISE**. This will bring up a form which will display the current settings. If they are OK, just click **DONE**, else make corrections and click **DONE**.

These values reside in the **VESSEL\_CRUISE** table in the database, and in the **VES\_CRU.BAK** file; they are used to make your printouts. This table and file are the only way the data can be identified to vessel and cruise, which are \*not\* fields in any of the tables, although Vessel and Cruise are now exported to all backup files (.BAK files).

**DO NOT** change vessel / cruise during a cruise; if you need a different vessel / cruise for a special experiment, start a new database.

### AT THE BEGINNING OF EACH LEG

The file **DATA\_ENT.MDB** contains all the code and tables necessary for the **Data Entry** program, as well as all the data collected in the database. At the beginning of each leg, check to see if the previous FPC has backed up this file into the **C:/DATA/LEGx** (x = leg number) subdirectory and back it up if necessary, since you will be deleting data from it.

From the Main Menu in the **Data Entry** Program, press **EDIT** and then in the Edit Menu, click on **Delete Data**. Click on the **Press for New Leg** button in the Delete Data Menu. You will be warned about deleting data, but this is the right time to do it (you did back the original up to the LEGx subdirectory, right?), so click on **OK**. You are now ready to enter data for your new leg.

Note that deleting the data doesn't reduce the size of the database file, which should be compacted. If you don't feel comfortable with the following instructions, they can be skipped, but you will get better performance if you follow them. Open ACCESS (not **Data Entry**) and do not choose a database. From the main tool bar at the top of the window, press the **Tools** menu and then select **Database Utilities**. From this menu, select and click **Compress Database**. At this time, you select C:\DATA\DATA\_ENT.MDB from the browser selection. ACCESS will suggest a compressed database name, usually DB1.MDB. Just use this default, and click **OK**. After compression, get out of ACCESS and get into the C:/DATA subdirectory. Delete the old DATA\_ENT.MDB file (it should have been backed up under one of the LEGx subdirectory by now), and RENAME the DB1.MDB file to DATA\_ENT.MDB. You will see that the database is megabytes smaller.

NOTE: All legs will be working in the C:/DATA directory; the LEGX subdirectories are only for storing old data.

## DOWNLOADING POLYCORDER / ENTERING DATA

### STARTING OUT

The new **Data Entry** program is a Windows 95 based program implemented in the ACCESS 97 database system, also a Windows 95 program. Once in Windows, check to see if the **Data Entry** icon is visible; if not, click the Data Entry group to expose the icon. If there is no icon, see the section **CREATE ICON FOR DATA ENTRY** on page 20.

To enter data, click the **Data Entry** icon. You will see ACCESS load and open the database. You are ready for all data related tasks when you see the **MASTER** menu of buttons open. Simply press the button for the service you want to use. Most of the time operations will operate from left to right: DOWNLOAD POLYCORDER then ENTER CATCH and later ENTER SPECIMEN. You can review previously entered data, edit and backup data, and analyze the database for errors and from the lower part of the menu. A manual LENGTH ENTRY form is available, but you are encouraged to use the polycorders whenever possible, and strongly discouraged from use of manual length entry for any important species, since the strength of the built-in data checking is heavily dependant on polycorder data.

Most functions related to editing data are available by clicking the **EDIT** button, which opens a new menu with buttons for editing catch, length and specimen data. You can also add species to the polycorder and species lists from this menu or from within the **CATCH ENTRY** form.

Virtually all of your data entry and editing will occur in ACCESS. Catch data will be printed out using an ACCESS report generator.

### SEQUENCE OF EVENTS

#### 1. DOWNLOAD POLYCORDER

If there is any question of whether the polycorders are from the correct haul or not, check the

haul number prior to downloading them.

Connect the RS-232 cable to the first polycorder and prepare all polycorders for transfer. You can wait at the "TRANSFER DATA" menu item or enter that mode and wait at the "TRANSMIT TYPE?" prompt. Transmit type is 0. See page 25 for complete polycorder download instructions.

## 1. DOWNLOAD THE POLYCORDER

Download all polycorders from your haul. A printout will be automatically generated after you accept the data in the summary form. You should always download all polycorders for one haul together in one download session. See the section "Forgot a polycorder" in the Problems and Solutions section, page 13, for instructions if you can't do this.

**\*\*\*\*\*ALWAYS START THE COMPUTER TRANSFER FIRST! \*\*\*\*\***

**Do not start the polycorder transfer until** you see only the yellow colored "DOWNLOADING POLYCORDER" form, with no pop-up forms (click on **OK** to get the computer ready). If you have more than one polycorder to download, it is a good idea not to answer the "Download another polycorder?" prompt until you have prepared the second polycorder for data transfer. If you answer "Y", it is possible to be timed out by the download program while you are setting up the second polycorder. On the other hand, the program will wait indefinitely for your response to the "Download another polycorder?" prompt.

## 2. CHECK CATCH SUMMARY AGAINST CATCH FORM

**It is much easier to correct polycorder errors at this point, before you start entering the catch data.**

Scan the summary for abnormal lengths (a flag in the final column), check that both sexes are present for each species (in some cases a single sex may be correct, but it should be checked), and most importantly, check the estimated weights against the measured weights on the deck catch form. Small differences are normal and can be ignored. Values that differ substantially between the ACCESS form and the deck form should be investigated thoroughly. See the Troubleshooting Problems section, page 11, for suggestions.

If you find problems with the polycorder data, simply hit the **EDIT** button. When you exit EDIT, it will return you to the **Length Summary** form, where you can double check that your corrections have taken care of the problems. You should continue the **EDIT / Length Summary** sequence until all problems are resolved. When you are satisfied with the data, hit the **QUIT** button to exit. You will be given the choice to save (with automatic printing of the length frequency data), or abandon without saving, which will delete all your length data for this haul. If you choose this option, you will have to transfer all polycorder data again. Since Polycorder data is unrecoverable after they have been reset, the program is designed to not allow you to exit without printing your data.

### 3. ENTER CATCH

After you press the **ENTER CATCH** button and give it a Haul number, ACCESS calculates estimated weights for that haul from the length data and then opens the Catch Entry Form for data entry.

Be sure to fill in the header section (**SUBSAMPLE TYPE**) before entering biological data. **If you need to edit the header after you have started entering biological data, click on the SUBSAMPLE CODE box, and you will be asked if you want to edit the header. Click OK and the EDIT HEADER form will open. As soon as you have entered your new data, the form will close and return you to your current CATCH form.**

After you have filled in the header, open the species list by clicking on the “down arrow” on the species list combo box, if it does not open on its own. All species recorded during this survey in previous years are in this list. To enter multiple basket weights for a species, click the **Multiple Baskets** button. In this mode, a window pops up and a series of basket weights can be entered and is summed automatically. Hit <Enter> on a blank line to close the basket form, and the data is automatically entered into the appropriate Weight field. This is slow for entering most data where there is a subsample weight only, so a "Single basket" mode is also available, which enters data directly into the cell. Most people find it easiest to enter all the data containing multiple basket weights first and then switch to "Single basket" mode for the rest of the data. The button is a toggle however, so you can switch back and forth whenever you want. If you need to enter data into the **NON-SUB** column, you need to either click the button above this column, or hit the <F12> key

The Catch Entry Form contains several data checking features:

You must select a species from the built in list.

(Although new species can be easily added to this list.)

You cannot enter the same species twice.

The number of lengthed fish is filled in automatically for species downloaded from the polycorder.

The weights of measured fish are automatically checked against the estimated weights from the polycorder

The estimated weight or number is visible at the bottom of the screen as long as you are in a cell.

The estimated average weight is displayed at the far right hand side.

When you are done entering data, click the **QUIT** button to exit the entry form. You will be prompted as to whether you want to quit and save, quit and not save, or cancel (return to the form).

### 4. ERASE POLYCORDER DATA

You must erase the data in the polycorder to prepare it for the next haul. It is best to wait until after you have entered the data to erase the data, but if you don't have time to enter the catch, examine the Length printout carefully against the Catch form and if everything seems satisfactory, you can erase the data in the polycorder. As long as the data is successfully saved from **Length Summary**, you no

longer need the polycorder data, although some problems, like forgetting to download one polycorder are much easier to correct if all the polycorders still contain data.

To erase polycorder data, scroll down the polycorder main menu to "Erase Data" and press <ENTER>, respond to the prompt "ERASE ALL DATA?" by pressing <SHF> then <3>, which corresponds to "y". All data on the polycorder will be erased.

Hit <ESC>, <0> (that's a zero), <ENTER> to get into the Haul header. Set the number for the next haul to prepare the polycorder for its next use.

## 5. ENTER SPECIMEN

The Specimen Form is set up a little differently from the catch form. The Specimen Form is set as "Sorted baskets" as default, assuming that the data entered will be a series of one sex of fish followed by a series of another sex. In this mode, the **Sex** field is filled in at the beginning and then automatically fills in the same sex for each subsequent record. You must press the button at the top of the Sex column to change to a new sex, or press <F6>. If your data has mixed sexes, simply press the "Sorted baskets" mode and the cursor will stop in the **Sex** field for each record ("Unsorted baskets" mode). Most other columns in the form work in a similar way; **if the button at the top is grey, the cursor will not stop in that column, but it will stop in any column with a blue button at the top.** These are all toggle buttons and can be turned on and off whenever required during data entry.

When the first record is entered, you will be prompted with the next consecutive specimen number for that species (or 1, if it is not yet in the database). If you enter your data sheets in the correct order, this can act as an early warning system if there is a problem with the Specimen Number sequence. The specimen number is automatically updated from record to record. Note that the updating is canceled if you leave the new record line and edit an earlier line! If you edit a previous line, you will need to enter the specimen number one or two times to "prime the pump" for the automatic incrementing to work. The reason for this is that the program is set up to accept blank specimen numbers. This is convenient in cases where weight-length data is collected concurrently and interspersed with otolith data.

The form is also set up as default to automatically fill in the trailing zero on length data, so you only need to enter "24" to get "240" in the length column. If you do not want this feature, simply click the **cm** button to return to **mm** entry. This is a toggle and can be repeatedly changed as convenient. This feature is also turned off if you leave the current line and edit earlier data, so you must enter "240" when editing to see "240" in the box. This is a little awkward, but better than a zero being added each time you scroll through the data! The automatic feature is re-initiated when you start entering new data again.

When you are done entering data, click the **QUIT** button to exit the **Specimen Entry** form. You will be prompted as to whether you want to quit and save, quit and not save, or cancel (return to the form).

## 6. EDIT DATA (if necessary).

The editing forms look very similar to the entry forms, but are maximized for moving around in the form rather than checking the data or quickly adding new lines. If you are half-way through a form,

and realize that you need to edit the length data before you continue, it is probably easiest to abandon the form (Quit, do not save OR Abandon form), rather than entering a lot of new data in the Edit forms. If you have almost all the data entered, then you may want to save and edit later.

**Edit Catch does not automatically warn you about differences between estimated and observed weights, but it does show the estimated value for the current cell in a box at the bottom.**

**NOTE: In all the editing forms, if you see a button above a column, you need to click that button to enter the field or to use a pull down menu (such as SPECIES CODE and NAME).**

## 7. ADDING SPECIES TO LISTS.

Adding a new species to a list in **Data Entry** is easy. You will see an **Add Species to List** button in the Edit Menu and there is also an **Edit** button next to the **Select Species List** buttons inside the Catch Entry form. Clicking these buttons gives you the option of adding species to any of the Standard or Complete lists. You can also add a species to the polycorder list.

### AT THE END OF EACH LEG

Your latest backup disk can be brought home directly as data disks. You can run the backup process again for a duplicate set of disks for safety. The backup data consists of all files named xxxx.bak in the C:/DATA/BACKUP directory.

The Data subdirectory will be cleared for the next leg, so for an additional backup, you can copy all your length files and the .BAK files from C:/DATA/BACKUP into the C:/DATA/LEGx subdirectory appropriate for your leg.

## ANALYSIS DATABASE

A separate database, named ANALYSIS.MDB, is available for running queries and manipulating the data. ANALYSIS.MDB is simply an empty ACCESS database with the DATA\_ENT.MDB tables *attached* to it. This attachment is set up so that you cannot change the data in the attached tables. The advantage of ANALYSIS.MDB is that you can write, edit and modify your own queries and tables with no danger of accidentally changing anything in the DATA\_ENT.MDB database. The attached tables can be used in any query or macro as if they were actual ANALYSIS.MDB tables, except that you cannot add or change the data in them.

The ANALYSIS database also has a feature to import HAUL data. You will need to copy the XXXXX.HDB (where XXXXX = vessel and cruise) file from the bridge computer to a diskette and carry it to the data entry computer. Place the diskette in the data entry computer and open the ANALYSIS database. Open the MASTER form and click on IMPORT HAUL DATA. This function will only accept data from a floppy disk in the A: drive. Upon completion, you will have full database access to your haul data.

**It is strongly recommended that you use this database for all data queries and analysis which are not built in to the Data Entry MASTER form.**

## DATA CHECKING

The Data Editing database has now been incorporated into the regular database. Usually, this section is used only after each leg for final editing, but can be used at any time if desired. This section should always be used sequentially: First **Check table relationships**, then **Analyze Catch Data**, then **Analyze Length Data**. The sequence is important, because subsequent checks assume that the errors found by a prior check have been corrected. Specimen analysis can be done at any time. Note that you will **NOT** need to **Import All Data** to use these analysis sections while at sea.

Within **Analyze Catch Data**, buttons should also be clicked from left to right sequentially, first **Check Catch Calculations**, and then **Check Catch Outliers**. Likewise, **Analyze Length Data** should also be used sequentially, first **Compare Raw Length numbers to Length frequency**, then **Compare Catch numbers to Length Frequency** and finally **Look for Length Outliers**.

Each of the forms will permit you to edit data from any haul presented in the table. Simply click on the row you want to edit and click the **EDIT** button and the appropriate catch or length edit form will appear. After you have edited your data, you should use **Data Checking** again. The Length outlier form also has a toggle button to filter the data. You can look at the whole data set or only at the outlier data.

## TROUBLESHOOTING PROBLEMS

### POLYCODER PROBLEMS

ON DECK / DATA EDITING:

#### **DISCREPANCIES IN ESTIMATED WEIGHT**

If the estimated weights and catch weights differ by a large amount, the following are the most common reasons:

**Failure to change species codes, or the same species code used twice (once incorrectly)..**

Solution:

Look for pairs of discrepancies, one high and one low or absent. If there was a failure to change species, it may be difficult to figure out the where the error occurred. Two good clues are differences in species lengths (a large species measured before or after a small species), and alternating male/female codes.

Use **Edit Length** to examine and edit all the polycorder files.

**Random "big length" barcode misread.** You may find a fish with an abnormally long length, caused by a misread of a barcode. These can increase the estimated weight noticeably, especially for small

species. Many of the egregiously large values will be flagged by the Length Summary form after downloading the polycorders.

Solution:

The problem will be flagged in Length Summary. Use EDIT to examine and edit the incorrect polycorder file. In the case of random "big length" entries, the best solution is to delete the record containing the error. Remember that this changes the count of fish. For most sample sizes of 100 or more, this is an inconsequential error, but if there are few fish, you should make a note (+1) on the catch form and add the fish to the numbers column when entering data. Note that the Catch Entry program waits for your response when it automatically fills in a number in the numbers field; this is your opportunity to type in a different number if necessary.

### **POLYCORDER DATA "DISAPPEARS"**

Occasionally it will appear that all the data you have collected has "disappeared" from the polycorder; when you look at the length data, it has started with line '1' again and all values are '0'.

Solution:

The polycorder can collect data for more than one "Haul", so when you are at the HAUL level (just after pressing "Collect Data" from the main menu, or "ESC" from the length data level), you can scroll down with the arrows to a new line, which will look like this:

HAL

56 <--- This is your correct haul number  
0 <---- This is a bogus haul, which can receive data.

To retrieve your data, simply scroll the arrow up until the cursor is next to the real haul number, and then press ENTER. Your data will be just as you left it.

NOTE: This extra "Haul" can cause problems with downloading. If you have a polycorder with this error, download it last. Also make sure that the cursor is pointing to the right haul number before you download.

Although data can be collected from several different hauls in this way, you will not be able to download it without major problems. Avoid using arrow keys in the HAUL level.

### **FREQUENT RANDOM HIGH LENGTH ERRORS OR POLY CORDER JUMPS TO THE WRONG COLUMN AT THE WRONG TIME**

Pay careful attention to the "error" beeps on the polycorder. Sometimes you will only have to re-enter the value, but in some cases the beep indicates that you have moved to a new field or line. Many complicated problems can be eliminated at the source by checking the next few length entries for correct data after an "error" beep has been heard.

If errors seem to be happening at an increasing rate, it is likely that the measuring boards are getting scratched and/or delaminating. Dirty or heavily slimed boards can also cause this problem.

Solution:

Check all length boards and remove damaged lamination or replace the length strips with undamaged ones. The main cause of strip damage is large rockfish like rougheye, shorttraker and blackgill rockfish, whose large head spines can ruin a strip in one haul. Try to handle these fish carefully to extend the life of the boards.

If the boards look OK, they probably are, and frequent wash-downs may help eliminate the problems.

### **SPECIES CODE PRINTS OUT AS ZERO OR OTHER ANOMALIES FOR A NEW SPECIES ADDED TO THE POLYCORDER LIST**

There is probably a problem with the polycorder species list. Refer to “Incorrect Species Codes”, page 18 of this manual.

### **SOME POLYCORDERERS SEEM TO HAVE WEAK BEEPS**

The volume of the polycorder beeps is not programmable, like the frequency and duration of the sound is. There appears to be considerable difference in volume between different polycorders.

Solution:

There is no solution to the volume problem, but it may be mitigated by experimenting with the frequency and duration of the beep. Some tones are more readily heard over ship noise than others. Note that if the duration of the beep is extended too much, speed of data entering may be affected.

### **DOWNLOADING POLYCORDERERS:**

#### **FORGOT A POLYCORDER**

Sometimes you may realize that you have two or more polycorders to download only after you have downloaded one and exited the download program. You can download another polycorder at any time; **Data Entry** will combine the added data with any other data previously in the database to produce a new printout of total length frequency.

### **EDITING POLYCORDER LENGTH DATA**

#### **1. IF CATCH HAS NOT BEEN ENTERED:**

On the MAIN menu, click the EDIT button to get the EDIT MENU. Click on EDIT LENGTH, and enter the haul number.

A new printout will be generated at the completion of accepting the data in Length Summary.

## 2. IF CATCH HAS ALREADY BEEN ENTERED:

Edit the polycorder data using Edit Length as described above.

Note that the LENGTH table in ACCESS contains frequency and not raw data, but you will always be editing the RAW DATA, which is presented in the Editing form in the same order as it appeared on the polycorder. **Data Entry** will recalculate and update both the LENGTH and RAW LENGTH files when you exit Length Summary

REMEMBER, it is much easier to fix polycorder errors before entering the catch data.

### TIPS FOR CATCH ENTRY

Occasionally, **Catch Entry** will run into an error that results in the user being dumped into a code window. Do not panic. This may necessitate re-entering the data you are currently working on, but a few rules will prevent damaging or corrupting the data in the database. First, note the line of code that is highlighted on the screen and try to describe the conditions that caused the problem so it can be looked at back in Seattle. Then close the window by clicking on the "X" (standard Windows close window icon) in the upper right hand corner of the screen. The program will warn you that the code will be terminated, click OK to all questions. If you return to the **CATCH FORM**, click the Quit button, and EXIT WITHOUT SAVING. Then EXIT ACCESS. If you have had more than one weird problem where no error occurred before, CLOSE WINDOWS 95 and restart the computer.

**The golden rule for problems in ACCESS is to ALWAYS close down ACCESS completely after a program problem or error, and then restart it.**

Repetitive errors in one session or errors with negative error numbers ("Reserved error -2234", for example) indicate problems in WINDOWS 95. Close down Windows and start the computer again. If this solves the problem, you do not need to record the problem (there is no programming problem to solve). If you get a message about a corrupted data base after restarting ACCESS, simply answer OK or YES to the question about repairing it. ACCESS does a good job of repairing this type of problem automatically.

Data entry tips:

It's a good idea to use a single click to press buttons throughout the **Data Entry** program (this is not true in Windows in general, which is very inconsistent). Do not start entering data until the form has opened, or you may have unpleasant surprises.

The default setting is for **MULTIPLE** baskets, which uses a pop-up window to collect multiple weights and numbers and sum them. This is the only mode which will allow you to enter [NON-SUB] weights. When you have entered all data with multiple baskets and [NON-SUB] values, you should switch to **SINGLE** basket mode, which is much faster.

The program will not stop in or allow you to edit the summary columns, combined weight and numbers and average weight; you cannot modify the [SPECIES CODE] column either. It is completely linked to the [SPECIES NAME] via the drop-down menu for selecting species. If you want to change the species name, click the arrow next to the [SPECIES NAME] combo box and the menu will appear.

**It is important to turn off MULTIPLE baskets when editing data in the catch form, in addition to being annoying, you can get unexpected behavior if it is left on while scrolling around on the form. Change to SINGLE basket mode whenever you leave the current new record to edit another line.**

## **DROP DOWN SPECIES MENU**

There are two annoying bugs in ACCESS affecting the drop-down species menu. The first is a tendency for the window to drop down and then close with a blank, especially when you are entering data quickly. To re-open the window, click on it with the mouse and it will drop down again, or click on the small arrow to the right of the box. The second annoying bug, if you have a selection partially typed in the drop-down list, it will usually not let you change to a new list until the list cleared, and you will get a message saying the "The selection you type must match the list", You will need to press the <ESC> key one or two times to clear the current selection before changing lists. Most of the action of the drop-down menus is not programmable, so we will have to live with these annoyances for now.

It is very difficult to move around the Catch Entry form while **MULTIPLE** basket mode is on. If you need to edit data, switch the mode to **SINGLE** basket to move to the field you want. If you need to re-enter a large number of baskets, switch back to **MULTIPLE** basket mode when you have placed the cursor in the correct field. You can move through the data with arrow keys or the mouse.

## **DELETING DUPLICATE SPECIES (RECORDS WITH THE SAME SPECIES CODE)**

**-Error Message: "The changes you requested to the table were not successful because they would create duplicate values in the index....(etc)."**

This message occurs when you try to enter a record which has the same [Species Code] as a previous record in the same haul. This event is annoying to deal with, but understanding how ACCESS works may help clarify why the program acts as it does.

ACCESS treats the data you are entering as potential candidates for inclusion in the database. As you enter the fields (columns) you see them on the form, but they are not included in the database (actually a temporary table at this point), until you "commit" them by moving to a new line. Whenever you reach the end of a record (either [Subsample Weight] or [SAMPLED ALL?], depending on the type of split), the form automatically moves to the next line and commits the record to the database.

Similarly, whenever you move out of the current record with an arrow key or mouse, whatever data is in the record at this point gets committed to the database. This means that ACCESS must resolve any verification or key conflicts before it allows you to leave the line. If any field requires a value (like [SAMPLED ALL?]) or if there is a key conflict in any of the fields, you are stuck in that line until you resolve the problem. In order to maintain the integrity of the database, the [Species Code] field is a key field and cannot contain duplicate values.

Note that you are always working on a line that has a little "pencil" illustrated at the far left hand (non-data) column. If you move around the data, you will be followed by a little arrow in that column indicating which record you are in. Clicking on this cell (on the little arrow or pencil) selects the whole record for processing. Normally, you can highlight this cell by clicking on it and hit the <DELETE> key and the record will be deleted after prompting you. This will not work if you have a key conflict, which is an annoying feature of ACCESS, but one we may have to live with.

**Solution:**

If you get stuck in a record and want to delete it, you must resolve all conflicts. This includes filling in all required fields and eliminating key duplicates. The fastest way to do this is to enter fake data satisfying the conditions and then deleting the field. If you are required to have a [SAMPLED ALL?] value, fill in an arbitrary "y" or "n". Click on the [SPECIES CODE] cell (far left data field) and fill in any arbitrary species that you know has not been entered into the database.

You have now made the deus ex machina happy and can delete the record as described above. Alternately of course, you could delete the previous duplicated record at this time, but you will have to re-enter the correct species code on the edited line again.

Remember, after all this work, to edit the data properly to reflect the combination of weights from the two entries (assuming that they were two separate legitimate entries and not the same basket entered twice).

**SAMPLED ALL COLUMN**

The [SAMPLED ALL?] column is automatically filled in with the values according to your answers to the fields listed in the table below:

[Subsample type]	[Same Proportion?]	[SAMPLED ALL?]
1	(not required)	Y
> 1	Y	N
> 1	N	(enter for each record)

NOTE: When editing a catch form, if you enter a different subsample type, the program will generally automatically fill all the [SAMPLED ALL?] fields with the correct value as contained in the table above (except for the last case, where you will have to edit each line correctly by hand to reflect the data). This update will not occur until you leave the header and start working on the catch data values.

## DATABASE PROBLEMS

### REBUILDING A DAMAGED DATABASE

If the ACCESS database is damaged beyond repair, or if you suspect that considerable uncorrectable corruption of the data has occurred, you will need to use your backup data to create a new data entry ACCESS database.

To reset the database, copy the damaged database (C:\DATA\DATA\_ENT.MDB) into a subdirectory of your choice, just in case it is of any use in the future. Renaming DATA\_PROBLEMS.MDB or similar may be a wise idea. Delete the file C:\DATA\DATA\_ENT.MDB. Copy the empty database DATA\_ENT.MDB from the C:\DATA\EXPERT subdirectory back into the C:\DATA subdirectory. Rest the cursor on your new database file and click the right mouse button while your new database file is highlighted to bring up the file menu, and click **Properties**. You need to UNCHECK the box that says **Read-only (ONLY ON THE NEW COPY YOU JUST MADE!)**. The original is made read-only so that no modification can be made to it while it sits in the C:\DATA\EXPERT directory.

Next, copy your most recent good backup into the C:\DATA\BACKUP directory. Compare the dates/times of the file on your backup floppy disk to the files already in the BACKUP directory, to ensure that the floppy disk files are more recent than those in the BACKUP directory. If the floppy disk represents your best set of data, copy all files with the extension .BAK into the C:\DATA\BACKUP directory.

Next, start the **Data Entry** program from its icon, which will bring you back to the standard **MASTER** form. Click on **DATA CHECKING** in the lower left hand side of the form. Then click on **Import all data**. All your data will automatically be imported and placed into tables.

When you are done, the database will contain exactly the same data it did at the time of your last backup. Check the Summaries forms (click **SUMMARIES** on the Main Form) to see what data already exists in the database. You will need to enter all data collected after your most recent backup again. This will require entering the length data from the printouts using the **ENTER LENGTH** (manual length entry) button.

### INCORRECT SPECIES LISTS

Normally, your version of the DATA ENTRY program will be customized to your survey. Occasionally you may find yourself at sea with a program that obviously has the wrong catch species list (you can't find fish common to your survey in the standard and/or complete lists), or the wrong polycorder list (the length printout will have the wrong fish associated with the polycorder species number). There is a database in the C:\DATA\EXPERT directory to correct these problems, SPLST.MDB. Open ACCESS from WINDOWS, (or start up Data Entry from the icon, and then exit the Main Form by clicking the small (lower) "-" in the upper left hand corner of the screen). You will be in the main ACCESS window, which defaults to the **TABLES** list. Scroll down the list (or you can type the first letter of the table to get in the general vicinity) until you find the problem table

**SPECIES\_LIST** for the Catch species lists, or **LENGTH\_WEIGHT\_PARAMETERS** for the polycorder list.

Rename the table to something like "PROBLEM\_splst\_standard" etc. (just in case things don't work out, you still have the original list). Write down the original name of this table, you will need to remember it for the following steps. Renaming anything in ACCESS uses the same procedure: highlight the table (or other item) with your mouse by clicking **\*\*once\*\*** on it. Then while it is highlighted, click the first main menu item **F**ile at the upper left hand side of the screen. Choose **R**ename... from the drop-down menu OR right click while the table is highlighted and a menu including **R**ename... will appear. After you click on **R**ename..., A box will open for you to type in the new name.

Now click on the icon that looks like a folder (second from the left on the second menu bar), or open **F**ile and choose **O**pen Database... You will have to navigate around to the C:\DATA\EXPERT directory, where you will see SPLST.MDB is available. Select this database.

SPLST.MDB contains all current species lists for all surveys. Select the appropriate one (for example SPECIES\_LIST\_goa, or LENGTH\_WEIGHT\_PARAMETERS\_bs), and click on **E**dit on the menu bar and select **C**opy. This places the table into the windows clipboard. Follow the instructions above to open a new database (you don't have to close the current one yourself, ACCESS will close the current database automatically before loading a new one), this time returning to C:\DATA to select DATA\_ENT.MDB. When this database is open, click on **E**dit on the menu bar and select **P**aste.

You will be prompted for a new name. Use the original name of the table you renamed at the first step above, and NOT the one with the survey extension. If your problem file was LENGTH\_WEIGHT\_PARAMETERS, and you started by renaming this PROBLEM\_LENGTH\_WEIGHT\_PARAMETERS, the name of your new copied table will be LENGTH\_WEIGHT\_PARAMETERS. This is important, since the Data Entry program is expecting the old name, not the name from the SPLST.MDB database. You will now have replaced the old, incorrect version with the appropriate one for your survey.

NOTE: If only one species appears to be incorrect in the LENGTH\_WEIGHT\_PARAMETERS table, you can correct it directly by opening the table in ACCESS and editing the table directly.

## (RE)INSTALLING DATA ENTRY PROGRAM

### DIRECTORIES:

#### C:\DATA

ANALYSIS.MDB  
DATA\_ENT.MDB \*\*

#### C:\DATA\EXPERT

DATA\_ENT.MDB \*\*

DATAPLUS.EXE  
MACEMEM.695  
MEMORY.198  
SPLST.MDB

*\*\* Note that DATA\_ENT.MDB is copied into both C:\DATA and C:\DATA\EXPERT*

### **INSTALLATION:**

To install Data Entry, create the subdirectory **C:\DATA** and under that, the two subdirectories **C:\DATA\BACKUP** and **C:\DATA\EXPERT**. Copy all files as listed above into the appropriate subdirectories.

### **CREATE ICON FOR DATA ENTRY:**

Find **C:\DATA\DATA\_ENT.MDB** using Windows Explorer or My Computer. Highlight the file name (don't double click, or you'll start it!), and then right click on the mouse. From the pop-up menu that appears, click on **Copy**. Now position your cursor onto the main Windows Desktop (where all the other icons are) and once again right click on the mouse. From the pop-up menu, click on **Paste**. An icon will appear on the desktop. You only need to click on this icon to bring up the **Data entry** program.

### **CREATE ICON FOR THE ANALYSIS DATABASE:**

Repeat exactly the steps under "CREATE ICON FOR DATA ENTRY" again, except choose **C:\DATA\ANALYSIS.MDB**.

**POLYCORDER MANUAL**

## MAJOR DOS AND DON'TS FOR THE POLYCORDER

### DO:

1. Press the “Download polycorder” button in the Data entry program on the computer **before starting the polycorder transfer. It should say "Downloading polycorder" before you start the polycorder transfer.** Very unpredictable results and possible data loss can occur if you start the polycorder transfer before the "polycorder transfer" routine is waiting.
2. **Download the polycorder after each haul.** The current programs cannot deal with multiple hauls.
3. **Watch the polycorder screen while changing species and sex.**  
Errors resulting from auto-copying faulty data is very hard to correct after the haul is over.
4. **Line the fish up between the bar codes.** Measuring the fish while it is covering even or odd codes will lead to bias in the data, since you will unconsciously read the closest bar code to the fish.
5. **Enclose the polycorder in a plastic bag so that there is complete waterproof protection for the RS-232 connector on the top.** The polycorders are sealed, but the port can be damaged by saltwater.
6. **Always keep the adapter cable on the polycorder.** The adapter cable protects the permanent RS-232 port on the polycorder. If the adapter gets damaged, use the spare from the polycorder case, and let Seattle know to make up a new one.
7. **Mark any damaged or problem polycorders clearly with a label providing a description of the problems.** This will distinctly tag bad polycorders and facilitate repair.
8. **Spray the RS232 connectors with contact cleaner (NOT WD-40!) periodically.**

### DON'T:

1. **Don't press hard on the light pen.** The pen will work best with no pressure. If the pen repeatedly fails to read the code, rinse the length board.
2. **Don't leave the polycorder unused while in data collection mode.** Move back to the "Haul" window, since the light pen will then turn off.
3. **Don't use the "ERASE APPLICATION" feature.** It is password protected, but don't fool with it anyway.
4. **Don't erase anything that requires a password to erase.** Erasing data does not require a password.
5. **Don't use a chipped bar code pen.** The major cause of damage to the length strips is scratching from the bar code pen. Spare tips are available in the polycorder case. Use silicon sealant to seal the joint between the pen and the tip when you replace it.
6. **Don't disconnect the barcode pens or interface strips with wet or slimy gloves.** It is essential that the RS-232 port remain free of moisture and salt.

## COLLECTING DATA WITH THE POLYCORDER

In the following instructions the "<>" symbols will always be used to designate a polycorder key and "{}" will designate a bar code on the length strip. For example, the escape key is designated <ESC>, and the bar code for "Sex" is designated {SEX}.

### Using the polycorder keypad.

The keypad on the polycorder is like an enhanced numeric keyboard. Hitting any key will enter the number marked on the key. To enter alphabetic characters, use the <SHF> key to choose the proper letter. For example, the "5" key has the letters "M", "N", and "O" on it. To enter a "M" you would press <SHF> <5>, and to enter an "O", you would enter <SHF><SHF><SHF> <5>. After trying this a few times, you will be glad that under normal circumstances, you will not have to enter any alphabetic characters.

The <ON/OFF>, cursor control and <Enter> keys are self explanatory. The <ESC> key will normally bring you up to the main menu area.

Note that a <SHF>, "cursor key" will move you ten lines in the direction of the cursor, which makes this a fast way to travel through a file on the polycorder. <SHF><SHF>"UP" will bring you to the beginning of the file, and <SHF><SHF>"DOWN" will go to the end of the file.

### Password

In order to ensure that applications are not accidentally erased instead of data, a password has been set on all application functions. This also affects any use of the MODE functions. Simply type an <A> (that's a <Shift><7>) at the password prompt.

Do not ever erase anything that requires a password, unless you know exactly what you are doing.

### Starting polycorder.

Press the <On/Off> button to turn polycorder on. Press <Enter> until you get to the main (Length) menu. Press <0><Enter> to start data collection. The first screen is a header file to collect the haul number. If a haul number is present, you need to erase the previous data. (Press <ESC> and choose <2><Enter>: see Erasing data). Enter the haul number and <Enter>. From now on, you will use the barcode wand to enter all data.

### Entering data.

Read the polycorder species number from the species list. (For example, Pacific halibut is number 4). Use the wand to enter the length {4} from the length frequency board. You will hear a single beep. Next, choose the sex you wish to measure from the length barcode corresponding to standard RACE sex codes ({1} = male, {2} = female, and {3} = unsexed). You will again hear a single beep. You can now begin measuring fish. For each fish, read the barcode that overlaps the fork

length of the fish. Keep the fish centered between the two rows of bar codes to eliminate selection of odd or even codes (see Important: below). The polycorder will beep three times for each successfully entered length. Note that species and sex are automatically duplicated each time a length is entered.

To change sex:

Enter the {SEX} code from the length strip (this moves the cursor to the left, or onto the sex column)

Enter a new sex from the length strip.

**(Alternate method):**

Enter the {SWITCH} code from the length strip (this changes the data as follows:

MALE (1) -----> FEMALE (2)

FEMALE (2) -----> MALE (1)

UNSEXED (3) -----> MALE (1)

This new method should save time.

To change species:

Enter the {SPECIES} code to change to the species column)

Enter a new species code using the method described above.

After the beep, the cursor will automatically move to the sex column.

Enter sex as previously described.

You are now ready for the next species.

Note that you can also completely navigate throughout the data by using the {L}, {R}, {U} and {D} bar codes to move the cursor Left, Right, Up and Down, respectively.

Note: Use the jumper cable with the bar code wand, since the connectors will fit better. The bar code wand connectors fit poorly on polycorder port.

## **EDITING DATA IN THE POLYCORDER**

Occasionally, you will make an error that will require you to correct data while on deck. Use the cursor movement bar codes to move around, and normal bar codes to change data in each column.

You can also navigate throughout the data using the keypad. If you use the keypad, wash your gloves before using the keys, to keep the polycorder clean and slime free.

You can not eliminate a line from the polycorder record, so if you are not going to use a line, just enter a "0" length in the length column. The downloading program simply ignores the whole line if the length is 0. Don't leave a line with a "0" species and a real length; change the length to zero too.

Once you move the cursor into the species or sex columns, the autocopy feature is disabled and you can move freely among the columns. When length is entered, the autocopy feature is re-activated.

**The polycorder remembers the last species and sex entered to autofill the columns. It is important to remember that if you move "up" (i.e. lower record numbers) in the data records, the polycorder will still remember the last species and sex entered, and will autocopy**

**these into the new area you are editing, if you enter a length.** You will not have a problem if you use the arrow keys to enter data only in the species and sex columns. Carefully monitor the data if you need to edit lengths, and reenter the species and sex. After this the autocopy feature will use the newest values to copy.

If you have extensive editing to do, it may be a better strategy to use the editor feature available during the polycorder download process. Make notes of line numbers to edit, and correct them later on the PC.

#### Ending entry session.

When measurements are completed, press the <ESC> key (twice) and <On/Off> to turn the polycorder off. The laser in the wand stays on the whole time the cursor is in a data column, and will drain the batteries if the polycorder is left on. [Pressing <ESC> once to enter the "Haul" header window will turn off the light, and still allow quick access to the data; **let the polycorder rest in the Haul window whenever you need to stop using the polycorder for an extended period of time during a length measurement session**]. Stow the wand in a safe place. The cord on the wand will allow it to fall completely to the deck if dropped. These wands are expensive, and need to be treated carefully.

### **DOWNLOADING DATA FROM THE POLYCORDER**

Remove the RS-232 connector to the bar code wand and replace it with the RS-232 connector to the PC serial port (this must be a NULL MODEM cable).

Start the Data Entry program from the icon in Windows on the data entry PC.

Press the **Download polycorder** button on the MAIN menu. Turn on the polycorder, get to the Length menu and select option number 1, Transmit data. Press <Enter><0> (Standard transmit). The polycorder is now standing by to transmit.

The program will ask you to press any key when ready. If the polycorder is on standby (as described above), you are ready. Strike any key on the PC, and then press <Enter> on the polycorder. Don't press the enter key on the polycorder before the PC is ready. You should see data scrolling by on the computer screen.

The program will ask if you want to download another polycorder. If you are finished, enter "n", and your data will print out.

If you wish to download another polycorder (SAME HAUL ONLY!!), enter "y", and you will be asked to strike any key when ready. This gives you the opportunity to change cables between polycorders and put them in stand by mode.

Carefully examine the printout to see if the data appears to be correct and complete. If the download program terminates abnormally, note the error message. You may need to edit the data on the polycorder to get a good download. Blanks or character data in an integer field could cause download program errors. Correct these using the cursor keys on the polycorder (in "Collect data" mode), and try the download again.

The transfer program will warn you if you already have data in the database under the same haul number. If this happens, you will need to check the haul numbers of your current length data in the database and edit if necessary.

#### Data checking:

The polycorder system eliminates the time needed to transcribe data from forms to the computer, but it requires some extra attention in data checking to detect errors inherent with this system. Someone should compare the printout to the catch form immediately after dumping the polycorders. Many of the problems associated with forgetting to change sex or species while collecting data are only correctable soon after the haul. This will catch errors while the order of data collection is still fairly clear in people's minds. Also check for suspicious trends like a single recorded sex for species where the sexes are equally common, and abnormally large numbers of one species, which may indicate that the species number wasn't changed between species. The LENGTH SUMMARY form, which is presented after polycorder downloading, will help in this analysis.

Also note the instructions for CATCH entry in the main manual for information on how estimated weights from the length data is used to check the recorded weights on the CATCH form.

Please report consistent problems or any other helpful comments to Robin after the cruise.

#### Erasing data:

Do not erase the data on the polycorder until you are absolutely sure that the data in the database are correct. Once erased, the polycorder version of the data is permanently gone. It is probably a good idea to erase the data just prior to collecting data from the next haul.

To erase the data:

Get to the Length Menu (usually by pressing <ESC> from whatever your current mode is).

Cursor to or enter <2><Enter>

to get into the erase data mode.

Enter <SHF><Y> (on the "3" key)

to answer the question "SURE?".

You will hear a series of beeps and the data will be erased.

Do not choose <E>, Erase application from the main menu! If you erase the application you must reset the application on the polycorder. Trust me, this is not something you really want to do. (If you do accidentally erase the application, you will need to reload the polycorders memory, see page 29.)

## **MAINTAINING THE POLYCORDER**

#### Checking the batteries:

Check the polycorder batteries frequently. To test batteries, insert the "BATTERY TESTER" RS-232 port onto the polycorder. Press <4> "Check battery" on the main menu. After a moment, the current voltage will appear on the screen.

The maximum voltage is about 8.4 volts, and normal operations will occur between 7.0 and 8.0 volts. Recharge the polycorder when voltage drops below 6.8 volts. It is important to let the polycorder batteries drain as much as possible before recharging. The Ni-Cad cells will operate best if drained before recharging. Do not recharge the polycorder if the voltage is above 7.0 volts.

Note that the polycorder Manual section on charging batteries does not have the correct instructions for testing batteries. Use the method described here.

#### Recharging the polycorder:

The polycorder will take four to six hours to recharge, so charging overnight is the most practical option. You can probably recharge it enough in a half hour to allow downloading of data if the batteries have reached minimum charge.

If a polycorder seems to have a very short useful life on deck, try the following before replacing the Ni-Cad pack: Drain the Ni-Cads completely by leaving the polycorder on overnight in the data collection mode (bar code wand ON). After the unit is completely drained of power, charge it for eight hours. In almost every case, this will restore an apparently faulty battery pack.

If this procedure fails after several attempts, a spare battery pack is available in the polycorder case. Open the polycorder shell by removing six screws in the back of the unit. Remove and save the old pack and insert the new one, taking extreme care not to pinch the battery cable between the case and the battery holder (we have had this cause a short in the past). Carefully re-attach the back plate, making sure that the O-ring seal is seated well, and replace the screws. These screws should be snug, but not extremely tight (the top pair in particular should not be over tightened - the seal at the top should not be more compressed than the seal around the bottom side). Recharge the polycorder for eight hours.

#### NOTE:

If your polycorder loses its programming (all you see when turning it on is "Mode?"), reset it according to the instructions below. **Keep a close eye on this polycorder; if it loses its memory for a second time, it may indicate that the lithium backup battery is dead.** If a polycorder is used with a dead lithium battery it will lose all data if the NiCad batteries go dead on deck! Normally you can download a "dead" polycorder because the lithium cell keeps the memory alive until the NiCads are recharged. Polycorders with a suspected dead lithium cell should not be used until the lithium cell is replaced, which requires opening the case and soldering a new one in. Do not attempt this if you have not been instructed how to do it ahead of time.

#### Important:

We have found that some users have a tendency to use the innermost bar code most of the time. Since the innermost codes are even lengths, you can check the data by looking at the length frequency

output for a species that is numerous in the catch. These may show distinctly high frequencies for most even lengths and depressed frequencies for odd lengths.

It is important to develop a lengthing technique that avoids this tendency. One method is to put the fish directly in between the sets of bar codes and then determining which code mark the fish overlaps. There is only a tiny space between even and odd codes, and most fish will overlap one.

One of the potentially disastrous errors on the polycorder may occur when changing species and/or sex. If you mistake the number of beeps (which is very common when two polycorders are going at once, or when the hydraulics are loud), you can start to enter data in the wrong columns. Since species and sex are automatically repeated, a nonsense code can be repeated throughout a data column. This may be nearly impossible to correct once the fish are thrown away. For this reason, we recommend that you **always look at the screen after making a species and/or sex change, to confirm that the data are correct.**

## SOLVING TECHNICAL PROBLEMS FOR THE POLYCORDER

### Reloading memory onto the polycorder.

If the polycorder program becomes corrupted, starts to act strangely, or the "Dataplus" mode fails to come up at all (you only see **Mode?** when you start the polycorder), it is time to reload the memory. If there is any question of the program acting strangely, just go ahead and reload the memory. It can't hurt the polycorder, and will probably fix your problem (but see the note below about downloading all data from the polycorder first). See the section on replacing the backup battery, if there is a possibility that the battery has failed.

**Make absolutely sure that you have downloaded all the data you want from the polycorder, since this method will erase everything.**

Use Windows Explorer or My Computer to locate **C:\DATA\EXPERT\dataplus.exe**, and double-click it to get it started.. Once the program starts, type in <C>, then <S>. Use <F2> to locate, or just type in the file name "MEMORY.198". (Use MACEMEM.695 ONLY for the 448K polycorders which MACE uses). Dataplus should tell you it is ready to send and is waiting for a signal from the polycorder. On the polycorder, enter a <M><Enter><A><Enter><3><3>. A long stream of memory will dump onto the polycorder. The file transfer may take a long time, but you will see a stream of data scrolling down the screen as it downloads. Check the application carefully after using this method to see that everything is OK. This method essentially replaces all memory in the polycorder with a memory image created at the Center, which should be identical to the polycorders when they left the Center.

### To change the default "beep" tone for autocopied columns:

There are two different beeps available for the polycorders, so multiple users do not get confused by sounds from another polycorder. The tone length and pitch are maintained in a program called "SNG1".

To change the data entry tone, hit <M><Enter><A><1><3> to get to the edit program list. Use the <L> and <R> keys to find "SNG1". Hit <Enter> when you see "SNG1". Use the <R> key to get the PARAMETER screen, which should have a number like "50,5" on it. Enter a new value for pitch and length separated by a comma. Higher numbers are higher in pitch and longer in tone. An example would be 60,5 which would be a 60 tone (medium high pitch) and length 5 (relatively short). The comma is <SHF><SHF><0>. Hit enter after entering the numbers and <ESC> to leave this mode and the change is automatically entered.

Since there are two tones in the SNG1 file, you need to edit lines 1 and 3 to change both tones. You can even set the tones to different pitches. The default tones are 40,5 on one polycorder and 55,5 on the other.

If something goes wrong, or the polycorder fails to work properly, you will need to load "SNG1.PGM" from the computer back onto the polycorder, using the method described above. This will restore the original file and default tones.

Be very cautious in "Edit Program" mode. Do not change any other programs.

To change the standard beep tone (This is not the data entry tone!), hit <M><Enter><A><5><2> to get to the protocol list. Use the <L> and <R> keys to find "BEEP TONE". Enter a new value for pitch. Higher numbers are higher in pitch. You can also change the length of the BEEP by changing "BEEP TIME" in the same menu.

They lived happily ever after.

*THE END*

## Appendix I. Blood smears for bitter crab disease examination.

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### *Sampling Equipment:*

1. 1,000, 25 X 75, 1.2mm frosted slides.
2. 500, 1cc syringes with 20 gauge needles.
3. Diff-Quik stain set (3 solutions per set: a fixative solution, a second preservative, and a dye.
4. Hematology slide staining set (3 polypropylene containers in a metal rack and a slide holder for 25 slides) used for fixing and staining slides.
5. Distilled water.
6. Slide boxes (holds 100 slides).
7. Pencils to number slides.
8. Crab measurement forms to record details on each crab.

All items can be ordered from VWR scientific.

Slides should be labeled on the frosted edge of the slide with the sequential number, and year prior to sampling. The sequential number will be transcribed onto a crab measurement form in the comment column corresponding to the crab being sampled. All information on size, sex, shell condition, etc., will be written on the crab form. It is essential that slides used in making smear preparations are not scratched, non-corroded, and meticulously clean, free from grease, dust, acid, or alkali and that slides be handled by their edges.

From each location, randomly select 30 crab from each haul. Each crab will be numbered in sequential order for the cruise.

*Bitter Crab sampling protocol - Ted Meyers, Fred Division, ADF&G 1990.*

### *Method 1*

This is a non-destructive procedure for sampling hemolymph using a 1 cc tuberculin syringe and a 22 gauge needle requiring a separate needle and syringe per crab specimen. Two drops (one drop may not be enough from the needle bore) of hemolymph are expressed from the syringe onto a glass slide previously labeled with appropriate data on the crab.

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To collect the hemolymph, the needle should be inserted into the arthroial membrane of the coxal joint of any leg. Also the elbow joint of the right or left cheliped is very good for obtaining hemolymph since these joints are usually presented in a bent position while the crab is in a defensive posture. The needle needs to be plunged about halfway to obtain the flow of blood. Be sure to wipe surface of the membrane clean with a paper towel so extraneous material does not contaminate the sample.

Each collector needs to experiment to get the hang of it first. Whichever leg is used, be consistent.

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### *Method 2*

In the absence of needles and syringes blood may be collected by pulling a rear walking leg and allowing 1-2 drops of hemolymph onto a glass slide. The drops will be large so be careful not to put too much on the slide. This is the less desirable technique since crabs may die later from the handling.

### *Making a Blood Smear*

Do not make smears too thick or too thin and do not let any saltwater drip onto the slide as it causes artifacts in stain and cellular detail.

A drop or two of hemolymph is expressed onto a glass slide just below the frosted end and a clean slide is brought to the drop(s) until contacted and then moved to the end of the slide. Capillarity between the clean slide and the sample slide will spread the smear evenly along the length of the sample slide. Experimenting with the size of the drop of hemolymph and the acute angle of the clean slide will produce different smear thickness. It is suggested to discard the clean slide, but it may be reused as long as its used edge is thoroughly wiped clean of the previous sample.

Place the slide with the hemolymph smear in the slide holder used for staining. After spreading the hemolymph, hold the slide on edge to allow excess to accumulate and then blot that excess with a towel, before putting the slide in the holder. This helps prevent mold and bacteria from destroying the slide. Let the slides dry thoroughly before closing the holder and storing it.

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Back in the lab. Fill each polypropylene container with one of the solutions. Each of the bottles is labeled with the contents. The slides are dipped first in the fixative five times. Second, the slides are dipped in solution 1 five times. The slides are then dipped five times in solution 2. Each dip should be followed by a short draining period such that the repeated dipping in the fixative and solution takes about a minute.

Following the final dip in solution 2, rinse the tray and slides with distilled water until the rinse water runs clear. Remove the slide from the tray and lay them out to dry, stained side up, in a horizontal position on paper towels away from dust. Slides should be stored in a slide box that prevents adjacent slides from contacting one another.

Used needles and slides should be collected and disposed of in an acceptable manner. Some hospitals will incinerate the materials. A commercial landfill may require a special fee for disposal of laboratory products.

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1. **Species to be sampled:**

**Group 1:** Walleye pollock, Arrowtooth flounder.

**Group 2:** Pacific cod, Pacific halibut.

2. **Sample size:**

**15** stomachs per haul for each species.

Maximum number per haul: **30**, however, if fewer fish are available, collect whatever is available.

3. **Sampling priorities:**

1. For each haul, **must** sample one species from **Group 1** (Walleye pollock and arrowtooth flounder). **Alternate** walleye pollock and arrowtooth flounder every haul.

2. For each haul, **must** sample one species from **Group 2** (Pacific cod and Pacific halibut). **Alternate** Pacific cod and Pacific halibut every haul.

4. **Sampling procedures:**

(1). Collect fish which show **no** sign of either net feeding or regurgitation.

\*Signs of net feeding and regurgitation (**DO NOT KEEP THESE**):

-prey items in mouth or gill rakers

-flaccid (loose and bloated) looking stomach

\*Signs of “natural” stomachs (**KEEP THESE!**):

-naturally empty stomachs appear tight and contracted

-stomachs appear tight around any prey inside

(2). If the fish is determined to be collectable, measure the fork length, determine the sex, the spawning condition, excise the stomach and place in a stomach bag. Try to collect 5 specimens from every 10 cm size group (e.g. collect 5 stomachs from each of the <30 cm, 30-40 cm, and >40 cm pollock in haul.) For small fish ( $\leq 20$  cm), do not excise the stomach but instead make a slit in the body cavity to allow penetration of formalin to the gut and place the samples of whole fish in a large stomach bag with a label. Submerge these in a bucket of 10% buffered formalin (to make the formalin solution, add sea water into the 5 gallon bucket about half full, then add one liter 37% of formalin in the bucket. Add one rounded 1/8 cup of baking soda per bucket).

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- (3). Each stomach bag should contain a specimen label which records the species, vessel, cruise, haul, specimen number, the fork length of the fish, sex, and the spawning condition (spawning=1 or not spawning=0).
  - (4). For each species, start specimen number at 1 and assign a number consecutively till the end of the cruise.
  - (5). A specimen form is also filled out for each species in each haul. The specimen form should record the species, vessel, cruise, haul, fork length, sex, spawning condition (spawning or non-spawning), date and specimen number. (Individual fish weight does not have to be taken.)
  - (6). Use the ring lids to cover the bucket each time you add some stomach collections into it. Seal the bucket (by using the unbroken lid) only when the bucket is full or at the end of the cruise.
  - (7). Put different species collections in different buckets. Use the permanent mark pen to write the species name, vessel, the address (National Marine Fisheries Service, Food Habits Lab, Bldg. 4, 7600 Sand Point Way NE, Seattle, WA 98115-0070) on the unbroken lid each time you seal a bucket.
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## Appendix K. QTC View operation.

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Ensure that the following connections have been made. The serial cable is split, running from the serial port on the blue box to the serial port on the computer and the DGPS. The transducer cable is permanently installed in the wheel house and is wired into the transducer feed at the junction box to the echosounder and runs to the transducer port on the back of the blue box. The power cable connects to the transformer and 110 VAC power source. Always use protected UPS power for the system.

Currently the system is deployed in the calibration mode only as we assess the variability of bottom types found in the survey area. The system is rebooted every day. Every morning open the CAPS program from the icon on the desktop. Check the raw waveform from the file menu, watching for stray spikes caused by interference with other electronic gear and insuring that there is only a single spike, which is above 2 on the Y-axis, and at the proper depth which is registered on the X-axis. The rest of the waveform should be near the X-axis. The system parameters should be set and stable throughout the survey, with a base gain of 12 kHz and a minimum depth of 10 m shallower than the minimum depth to be encountered, although zero meters can be used.

Select Start from File>Calibration menu, naming the file for the date, (i.e., 16Jun03). Press Start to begin the calibration. Records should begin to accumulate, about one per second. Sometimes the signal is interrupted from the transducer because the bottom is too soft, and the system will stop accumulating records, so check periodically through the day to assure it is still running. There are three lights on the front of the blue box: 1) “Trig”, indicating transducer signal on, 2) “Clip”, indicating clipping of the signal meaning that the gain needs to be lowered if it lights more than occasionally, and 3) “Data”, indicating that data is being transmitted to the computer. Check either that the trig and data lights are flashing or that records are accumulating on the computer screen to assure the system is working.

Calibration creates two files, the .ffv and .cat. They grow at about 3 MB per hour. Always check the computer hard drive at the beginning of the day to make certain there is enough storage space. Save the data on a zip disk as required. Do not rename the files.

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