SYNOPSIS OF THE ADF&G SCALLOP MEETING, ANCHORAGE, ALASKA, JULY 15, 1993

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Regional Information Report No. 5J93-07
Alaska Department of Fish & Game
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P.O. Box 25526
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PREFACE

The purpose of this report is to summarize discussions during the ADF&G scallop meeting held on July 15, 1993 in Anchorage. Information, reflected in this report, should be considered as preliminary. Readers should bear in mind that any subsequent reports by Bill DuPaul, Donn Tracy, and analyses of other observer data will be much more accurate representations of data than the preliminary impressions discussed by participants at this meeting.

This meeting was attended by James Brady, Bill DuPaul (Virginia Institute of Marine Sciences, VIMS), Carl Ellis (Observer Training Center), Jeff Koenings, Gordon Kruse, Earl Krygier, Doug Mecum, Peggy Murphy, Bill Nippes, Tom Shirley (University of Alaska Fairbanks), Donn Tracy, Deborah Vause (Observer Training Center), and David Witherell (North Pacific Fishery Management Council).

PURPOSE OF MEETING

This meeting was held to debrief Bill DuPaul and Donn Tracy after their at-sea observations during the 1993 scallop fishery off Yakutat. Dr. DuPaul's trip was jointly funded by VIMS, Alaska Sea Grant and ADF&G. We thought that we might benefit from having an east coast scallop expert interact with our staff by providing informed comments on scallop biology, fisheries, and our new observer program. Because the scallop observer program was very recently implemented and because the Alaska Board of Fisheries will address scallop management in spring 1994, we felt that this would be a good time to reflect on our data gathering programs and the interim fishery management plan.

DRAFT AGENDA

The following agenda was slightly modified to include discussions on levels of observer coverage and bycatch. This agenda was loosely followed so as to not constrain interesting discussions.

I. Introductions

II. Adoption of agenda

III. Overview of the east coast sea scallop fishery (Bill DuPaul)

IV. Data collection programs of the east coast sea scallop fishery (Bill DuPaul)

   A. How data are collected?
   B. What do data mean?
   C. Reflections on data collection programs for the Alaskan weathervane scallop fishery, given east coast experience

V. The Alaskan scallop observer program (staff)

A. Status of implementation
B. Do we sample what we need and need what we sample?
C. Sampling efficiencies and priorities
D. Are there needs for logbooks or other data collections?
E. Analyses of observer data: what can we learn?
F. Areas of needed scallop research

EAST COAST SEA SCALLOP FISHERY

Overview

Bill DuPaul presented slides on gear and fishing operations, overheads on data summaries, and a video on at-sea handling of sea scallops during the east coast fishery. Gordon Kruse has a copy of this video, and he would be happy to loan it to interested staff upon request.

Gear

Dr. DuPaul's slides were particularly useful in showing various types of east coast scallop trawl and dredge gear. Most of the east coast scallop trawlers are vessels that otherwise fish for shrimp and flatfishes. They use two-seam flounder trawls. The size of the nets vary by vessel; nets with 50-100 foot ground ropes are common. The trawl nets are constructed in such a way that the fishermen can turn them over if necessary. The trawlers are extremely efficient, and 100 basket tows have been recorded when there is sufficient resource. A typical trawler ices live scallops which are later shucked ashore. Scallops can be shell stocked for up to seven days (dock to dock).

Bill pointed out a number of problems with trawl gear for scallops on the east coast including retention of small scallops and high catch rates. Trawl nets with 4-4.5" mesh were shown to be more efficient than dredges. However, an increase in trawl mesh size to 5" reduces the catch significantly. Doug Mecum pointed out that there have been applications for fishing permits in Alaska to use experimental scallop nets. Given the problems that Bill DuPaul pointed out, Doug became even more concerned about these so called "experimental" nets than he was before.

Bill showed some slides of dredge gear that helped understand the configuration, including the frame, shoes, cutting bar, tickler chain, and chafing gear. Types of chafing gear include donut spacers (or "cookies") and slit tires. Split tires are useful on hard bottom as they help protect the gear from excessive wear, but they are not needed on soft bottom. Donut spacers cut down on the

inter-ring spacing and reduce escapement of small scallops from the gear. Likewise, the number of links connecting the rings affects the efficiency of the gear. Bill indicated that no more than two links are needed on the gear. The New Bedford dredge is very heavily constructed due to the very rocky bottom in that region; all rings were double linked, and those rings that hit bottom were triple linked. However, this type of construction is not necessary on gravel/sand/mud bottoms.

Bill showed data that indicated that dredges with larger rings caught larger scallops more effectively than dredges with small rings. A 2" ring does not catch large scallops as well as small scallops. A 3.5" ring caught fewer small scallops and more larger scallops than even a 3" ring.

Product Quality

Bill DuPaul's video dealt with product quality, particularly with respect to the care needed to guard against thermal "abuse" that occurs on the east coast. Thermal abuse problems are a function of high water and air temperatures. On the east coast, use of an ice and water mixture during warm weather is recommended for maintenance of quality. The ice:seawater mixture used for thermal cooling was 1:2.

Sodium tri-poly phosphate (STP) may also be used to wash/process scallops and can also increase meat moisture content. It helps scallops retain water, extend shelf life, and actually results in a product preferred by consumers.

Unfortunately, the practice of holding scallop meats in ice water will increase their weight. For example, if you soak scallops of a size corresponding to 46 meats per pound (mpp) in ice and sea water for 5-6 hours, they could become 40-41 mpp scallops. Later, after ice melt, they may become 38 mpp.

Some east coast fishermen have skirted meat count regulations by soaking scallops in water to increase weight. As a result, Food and Drug Administration (FDA) has begun monitoring scallops for a maximum of 80% moisture content.

Data Collection and Analysis

Data quality has been a problem in the sea scallop fishery along the east coast. Problems include illegal landings, avoidance of meat count regulations, and others.

On the east coast, NMFS has a voluntary sea sampling program that has functioned with varying degrees of success. Problems have

arisen when voluntary participants have received citations for fishing violations.

In an independent program, Dr. DuPaul has observed a number of scallop vessels on the east coast over the years. Examples of three of his data forms are provided in the Appendix.

Cooperating vessels on the east coast regularly retain scallops from the last tow of a trip for dockside sampling to allow documentation of gonad and stomach weights. In the mid-Atlantic, analyses of these data have led to the hypothesis of two spawnings per year. Gonads ripen in January through March and spawning occurs in April through June. A second, less intense spawning occurs in the fall.

Maturation appears to be food driven, whereas temperature may be a proximate cue. As food availability increases, stomachs get larger and gonads begin to mature, then spawning occurs. Meat weights also correlated with gonad and stomach weights. Percent water content in live scallops was shown to vary by 3-4% from Long Island to North Carolina. No concurrent data on salinity and water content have been collected.

On the east coast, there seems to be a consensus that no relationship between parent stock and recruitment exists, but that recruitment is environmentally driven. Bill DuPaul felt that biomass estimates from National Marine Fisheries Service surveys are problematic due to large measurement errors associated with the contagious distribution of scallops.

A very recent publication provides some evidence for a stock-recruit relationship in sea scallops in some areas:

> McGarvey, R., F.M. Serchuk, and I.A. McLaren. 1993. Spatial and parent-age analysis of stock-recruitment in the Georges Bank sea scallop *(Placopecten magellanicus)* population. Can. J. Fish. Aquat. Sci. 50: 564-574.

Bycatch

Along the east coast, bycatch has not been much of an issue, although significant bycatch occurs in some areas. To the south, bycatch is comprised mostly of species such as monkfish and summer flounder, whereas to the north it is mostly yellowtail flounder, monkfish and other flounders. Bycatch of non-commercial species occurs, too. Monkfish appears to be the most prized bycatch, and scallop fishermen cut off the tails for sale. Recently, size limitations of monkfish have been proposed for the east coast.

Fishery Management

New changes to the east coast sea scallop management plan (amendment 4) are occurring. These include: crew size limits (9); total days at sea (monitored by transponders) that will be successively reduced annually; and implementation of gear restrictions. Gear changes include no chaffing gear or liners and a 3.25 inch ring size.

THE ALASKAN FISHERY: REFLECTIONS FROM THE EAST COAST EXPERIENCE

Overview

Observations were made aboard the *F/V Provider* and *F/V Carolina Girl II* off Yakutat. Scallop dredges were generally towed at 5 knots and the average length of tow was about 1 hour. Dredge width was 15 feet. Crew size for both vessels was 12. As an aside, the largest vessel in the fleet, the *F/V Mr. Big*, carried a crew of 15.

Donn Tracy and Bill DuPaul offered the following overview of the Yakutat scallop fishery. This fishery opened July 1 and closed July 11, 1993. Vessels concentrated effort in two areas: Cape Yakataga (142° W) between 6-11 miles offshore and the Dangerous River (139° W) between 3.5-5 miles offshore. Average depth fished off Cape Yakataga was 38-40 fm where scallops averaged 115-120 mm SH (few scallops <100 mm SH) and 33-35 meats/lb. In contrast, fishing on the observed vessel occurred between 45-60 fm (other vessels may have fished shallower) off the Dangerous River. There, average size was about 115 mm SH (many <100 mm SH) and scallops averaged about 33-39 meats/lb. Growth appeared to be slower among scallops to the east (deeper) than to the west (shallower).

Donn felt that 10-11 age classes may have been represented in the catches. Also, he thought that scallops in deeper waters appeared less fragile than those in shallow areas. Damaged scallops that had injuries from previous gear encounters were found with greater frequency off Cape Yakataga than off the Dangerous River.

Bycatch

Both Bill DuPaul and Donn Tracy were impressed how "clean" the catches were off Yakutat. Observed bycatch included lots of starfish parts (perhaps 200-300 pounds per tow), arrowtooth flounder (abundant), rock sole (abundant), hermit crabs (lots), skates, lyre crabs, and small Tanner crabs (25-30 mm carapace width). Small numbers of lingcod, sidestripe and pink shrimp were also caught. In tows he observed, Donn saw very few adult crabs: one Tanner crab and two Dungeness crabs. No halibut were observed.

Gear

Bill DuPaul felt that on soft bottoms, such as observed off Yakutat, chaffing gear was not needed to protect gear. Because chaffing gear is used to protect the gear from bottom contact, there should be no chaffing gear on the apron (top) of the dredge. On the apron, chaffing gear acts to retain small scallops.

Product Quality

Given water and air temperatures common in Alaska, Bill DuPaul did not think that thermal abuse would be a problem for weathervane scallops. However, leaving scallops on deck for extended periods of time will cause quality problems. Shell stocking, the procedure whereby scallops are stocked in the "round" and shucked ashore does not appear to be a viable option on soft, muddy bottoms off Alaska. One reason is that, at least off Yakutat, the amount of mud in the tow would cause severe product quality problems caused by build-up of hydrogen sulfide.

Some Atlantic sea scallops have been marketed as a "roe-on" product. A major problem with this product form for some species and areas is paralytic shellfish poisoning (PSP) which is common throughout much of Alaska and has been reported on Georges Bank and north on the east coast. Roe-on product development has occurred along the mid-Atlantic. The toxins accumulate in the scallop mantle and roe. The FDA action level is 80 μ/100 g of tissue. As an aside, in the following paper, 58 μg/100 g of saxitoxin was noted in weathervane scallop adductor muscle from Alaska:

> Shumway, S.E., and A.D. Cembella. 1992. Toxic algal blooms: potential hazards to scallop culture and fisheries. Bull. Aquacul. Assoc. Canada 92-4.

Product Yield

Bill DuPaul noted that off Yakutat catches averaged about 30-40 baskets per tow. On the east coast, where scallop stocks are low, currently there are 300-400 participating vessels that are averaging 2-4 baskets per tow. Of course, catches of individual vessels vary. Bill felt that the Alaska fishery could not withstand prolonged fishing effort and maintain current catch rates.

He also noted a difference in yield between the two coasts. Sea scallops have a greater meat yield for a given shell height (SH) than weathervane scallops. Off Yakutat a 52-55 pound basket of scallops yielded about 4.5 lbs of meats for about a 7-10% recovery rate. On the east coast, a basket of sea scallops averages about 8 lbs of meats, but it may reach 11 lbs/basket.

Bill noted a relationship between scallop size and meat yield. For example, weathervane scallops of size 110-120 mm SH yielded about 36 mpp, those of size 100-110 mm SH yielded 47 mpp, and those of size 90-100 mm SH yielded about 63 mpp.

Scallop Biology

In their observations of the Yakutat scallop fishery, Bill and Donn noted that nearly 100% of the scallops were completely spawned out. Previous published reports documented spawning off Yakutat from mid-May through mid-June. Therefore, its not too surprising that all scallops in Yakutat were spawned out by July. This apparent synchrony of spawning of weathervane scallops may differ from east coast sea scallops which may demonstrate two spawning periods and variations in annual timing.

Fishery Management

Bill DuPaul favors several gear regulations, including minimum ring size, prohibition of chaffing gear, and limiting crew size because of the relation between crew size and harvest rate. The use of minimum ring size reduces the catch of small scallops. Bill noted that the sea scallop almost doubles in size from age 4 to 5, so it makes a lot of sense to target 5 year olds for that species. Bill DuPaul was encouraged by our 4" ring size restriction coupled with the fact that a diversity of size classes appears to exist in the catches.

At current stock conditions in Alaska, Dr. DuPaul indicated that vessel's catch rates exceed their crew's processing (shucking) rates. Therefore, crew size limitation is an important efficiency control in the scallop fishery.

Some interesting discussions concerned the use of a minimum size limit. Bill Nippes felt that this could be a viable option in the future. Bill DuPaul noted that the practicality of shucking small scallops is probably the limiting factor leading to the discard of scallops <100 mm SH (about 63 mpp). That is, use of a minimum ring size, annual catch quotas, and the realities of the economics of fishing may effectively restrict minimum size of harvest.

Use of a minimum scallop size limit has enforcement implications. Its use mandates observer coverage to be 100%. Enforcement of such a regulation may pose onboard logistical problems regarding the timing of the legal measurements during the catch/shucking processes. For example, a shucker could well choose to discard a small scallop that came from a basket of "retained" scallops.

RECOMMENDATIONS ON THE ALASKAN SCALLOP OBSERVER PROGRAM

The following list represents recommendations offered by Bill DuPaul and Donn Tracy concerning data collection from the weathervane scallop fishery off Alaska.

1. Shell height measurements can be extremely valuable. They show shifts in culling behavior, and perhaps more importantly, they show changes in year class success. Size frequencies can be measured much more efficiently with measuring boards than calipers. Calliper measurements are time consuming and many scallop shells have broken margins that reduce precision of measurements anyway. Regarding measuring boards, thought should be given to standardizing measurements to the nearest 1 mm or 5 mm.

2. Bill DuPaul had some suggestions on a different sampling strategy for size distribution. In making this recommendation, it was noted that scallops are not randomly distributed within the dredge; mud and small scallops tend to sort within the bag. For tows when species composition is done, it may be most convenient to measure size frequency of retained and discarded catches by the following procedure. First, when a dredge is dumped aboard and baskets of retained catch are selected, the crew should be instructed not to discard any of the "un-retained catch." Thus, shell heights from the complete discard pile can be measured. If sub-sample of catch is desired, it should be taken from one side of the tow to insure no bias due to stratification. Then, after recording the total number of baskets of retained catch, shell heights can be measured from a sub-sample of 2-3 baskets. The collection of size distributions from retained and discarded catch will help to determine total catch, mortality, and culling behavior of the crew.

3. Estimation of bycatch may need more thought. For example, it was difficult to estimate the weight of shells and broken starfish that were mostly bits and pieces cut up by the scallops and dredge. Also, determination of sex of juvenile Tanner crabs was not possible.

4. Some difficulty was experienced in the ageing of scallops by observers. There is likely to be observer-related variability in measurements. Therefore, an alternative procedure is to have observers retain shells to be aged in the laboratory by one experienced person.

5. It was suggested that we consider doing simple volumetric meat counts as a "quick and dirty" indicator of changes in size distribution. On the east coast they use a Pillsbury frosting cup; it equals about a pound. This procedure resulted in measurements in the range 31-37 mpp off Yakutat.

6. We should consider using observers to develop a good record of gonad condition by routine photography of specimens. Bill DuPaul photographs six individuals per slide. It was noted that once scallops spawn, you cannot determine sex of a scallop very easily. As with ageing, a photographic record would remove some of the measurement errors associated with individual observers. As an aside, ADF&G developed a photographic series for Southeast Alaska port samplers to estimate the incidence and severity of net-marked coho salmon. In such cases, a photographic record can provide a good reference guide to observers.

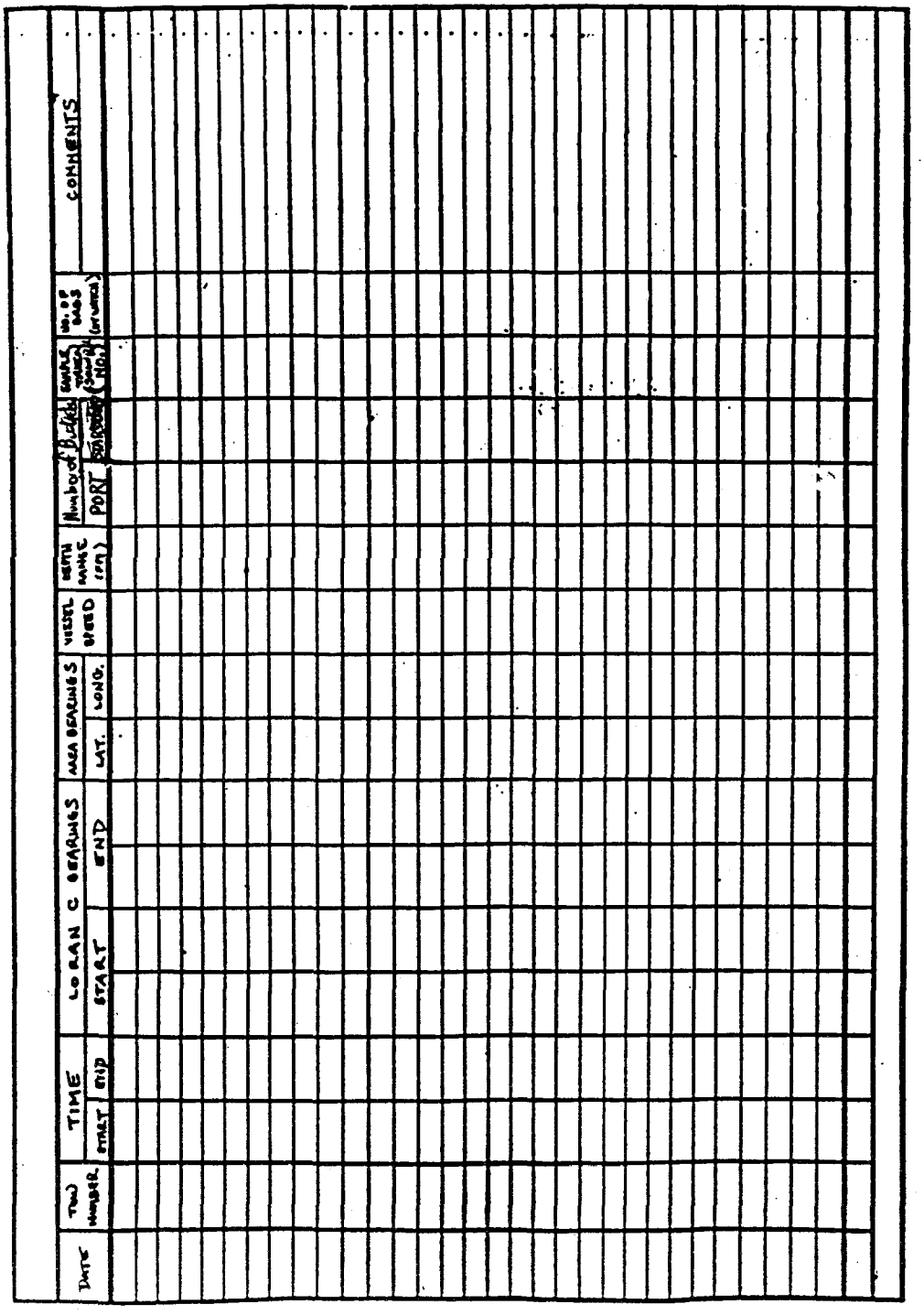
7. Where practical, we might consider requesting some vessels to retain scallops from the last tow of trip for dockside collection of specimens for subsequent analyses of gonad and stomach weights and determination of relationships between shell height and meat weight. This practice has been used effectively by Bill DuPaul on the east coast.

ACKNOWLEDGMENTS

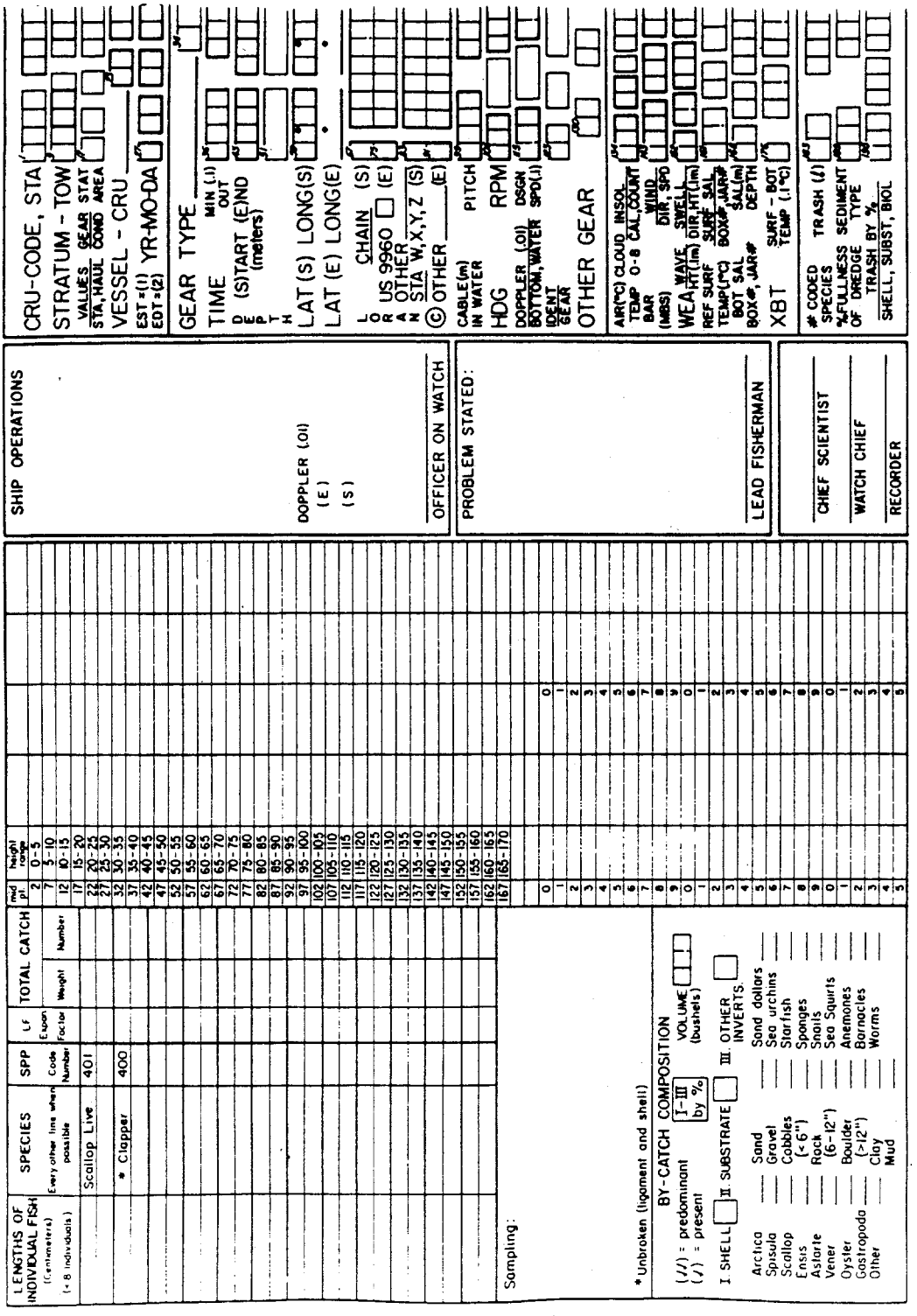
Sincere gratitude is extended to Mark Kandianis, owner and skipper of the *F/V Provider*, and Jaun Araiza (skipper) and Bill Wells, Jr. (owner) of the *F/V Carolina Girl II*; all individuals involved with these vessels went well out of their way to make the at-sea observations of Bill DuPaul and Donn Tracy very successful. The authors also extend appreciation to Bill DuPaul and Donn Tracy for conducting at-sea observations, for taking part in our staff meeting, and for reviewing this report. Special thanks are also extended to VIMS and Ron Dearborn of the Alaska Sea Grant Program for co-funding Dr. DuPaul's travel, and to Carl Ellis and Deborah Vause of the Observer Training Center for their hospitality during our meeting.

APPENDIX: THREE OF BILL DUPAUL'S DATA FORMS (p. 1 of 3)

TOW DATA LOG



APPENDIX: THREE OF BILL DUPAUL'S DATA FORMS (p. 2 of 3)



APPENDIX: THREE OF BILL DUPAUL'S DATA FORMS (p. 3 of 3)

WORKSHEET: SCALLOP SHELL HEIGHT, MEAT WEIGHTS, AND GONADS (MATURITY)

FISHING VESSEL: ____________________

DATE OF SAMPLE: ____________________

TIME OF SAMPLE: ____________________

LORAN: BEG: __________ END: __________

LENGTH OF TOW: ________ HRS. ________ MIN.

DEPTH: BEG: __________ END: __________

WATER TEMPERATURE: BEG: ________ END: ________

DREDGE SIZE: PORT: ________ STARBD: ________

NUMBER OF BASKETS IN TOW: ____________

DATE PROCESSED: ____________________

TIME PROCESSED: ____________________

SAMPLE ICED: ________ YES ________ NO

SAMPLE CONDITION: ____________________

LOCATION WHERE SAMPLED: ____________________

AIR TEMPERATURE: ____________________

COMMENTS: ____________________

SAMPLE: --SHELL HEIGHT (MM)--MEAT WEIGHT (GRAMS)

OBSER. NUMBER	SHELL HEIGHT	SHUCK WEIGHT	TOTAL WEIGHT	LESS ADD.	GONAD WEIGHT	REMARKS
1						
2						
3						
4						
5						
6						
7						
8						
9						
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						
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