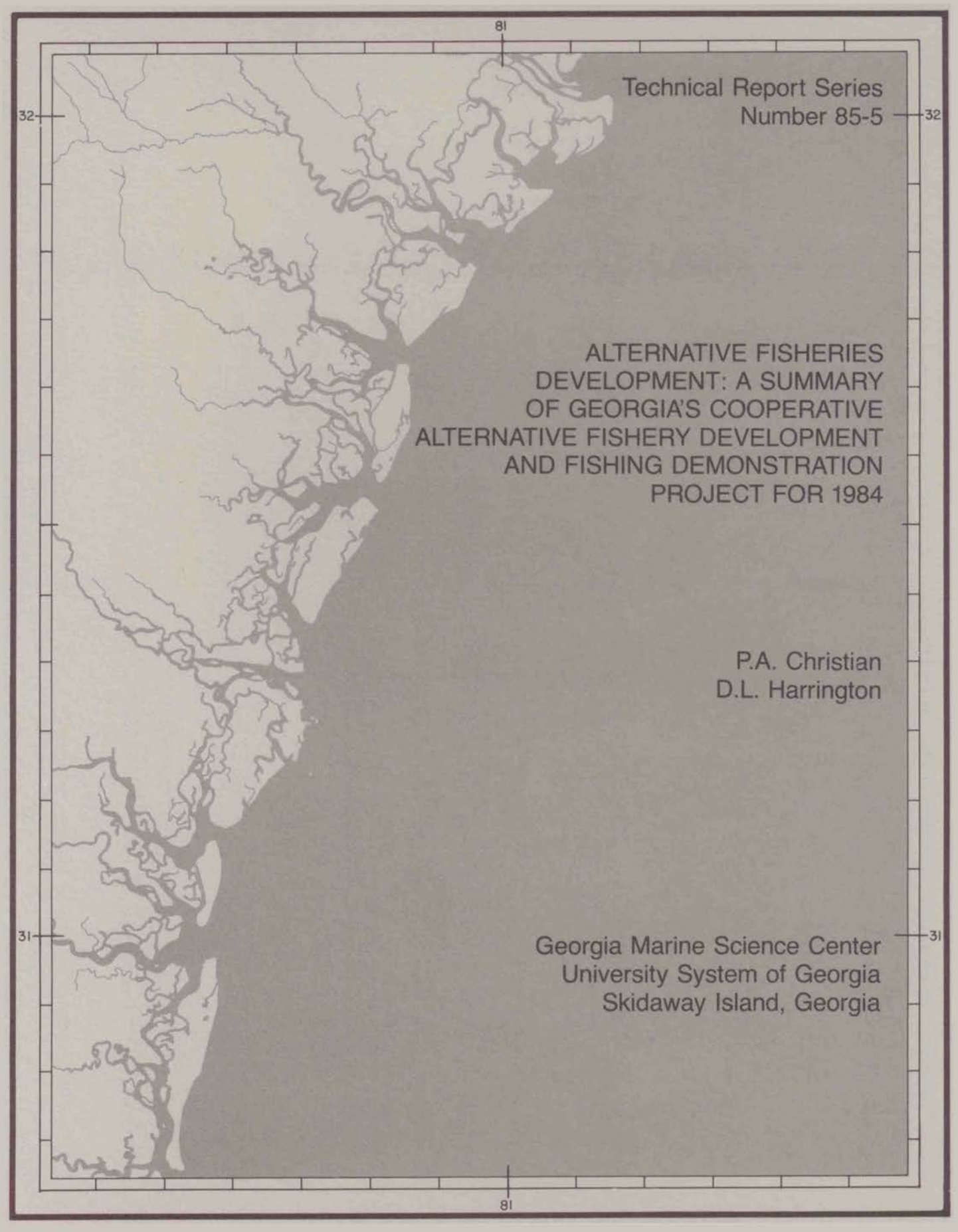

Technical Report Series
Number 85-5

ALTERNATIVE FISHERIES DEVELOPMENT: A SUMMARY OF GEORGIA'S COOPERATIVE ALTERNATIVE FISHERY DEVELOPMENT AND FISHING DEMONSTRATION PROJECT FOR 1984

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ALTERNATIVE FISHERIES DEVELOPMENT: A Summary of Georgia's Cooperative Alternative Fishery Development and Fishing Demonstration Project for 1984

Technical Report 85-5

by
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The Technical Report Series of the Georgia Marine Science Center is issued by the Georgia Sea Grant Program and the Marine Extension Service of The University of Georgia on Skidaway Island (P. O. Box 13687, Savannah, Georgia 31416). It was established to provide dissemination of technical information and progress reports resulting from marine studies and investigations mainly by staff and faculty of The University System of Georgia. In addition, it is intended for the presentation of techniques and methods, reduced data, and general information of interest to industry, local, regional, and state governments, and the public. Information contained in these reports is in the public domain. If this publication is cited, it should be cited as an unpublished manuscript. This work was supported by the Gulf and South Atlantic Fisheries Development Foundation, Inc. under contract number 24-12-20000 and by the NOAA Office of Sea Grant, A/G-1. The U. S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that may appear hereon.

ACKNOWLEDGMENTS

The completion of this project would not have been possible without the cooperation and assistance of the following captains and their crews: Captain John McIver, Captain Herbert McIver, Jr., Captain Hewey Hodges, Captain Dennis Cox, Captain Edward Smith, Captain Lewis Arnsdorf, Captain Jimmy Moore, and Captain Carl Moore. Robert Massey and Rick Causey also deserve mention for allowing their captains to participate in this project.

In cooperation with the captains, the dock-side facilities deserve a special mention. Mike Phillips, of Phillips' Seafood, provided detailed trip expenses and marketing information. Leonard Crosby and Kathy Jones of Bryan Fishermen's Cooperative, Inc. also provided information on marketing and trip expenses.

Jack Rivers, Charlotte Ingram, Amanda Parker, and Jackie EuDaly also deserve recognition for their help in drawing the figures.

Finally, a special thanks goes to Lura Relihan for typing, proofing, and helping to finalize this report.

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INTRODUCTION

In the spring of 1984, six vessel operators participated in a cooperative effort to investigate the feasibility of using traditional shrimp boats for harvesting finfishes. Concurrently, another shrimp boat operator was interested in the harvesting of royal red shrimp (Hymenopenaeus robustus) and deep-water crabs, such as red crabs (Geryon sp.) and rock crabs (Cancer sp.).

Most of the craft engaged in this project were shrimp trawlers. They converted to bottom longlining, fish trawling, or deep-water shrimp trawling. In addition, a snapper boat, which was built to fish with snapper reels or "bandit rigs" (Prytherch, 1983), was converted to bottom longlining.

Results presented include the following:

(1) Descriptions of boat conversions and cost data

(2) Diagrams and descriptions of gear modifications

(3) Descriptions of fishing methods

(4) Trip summaries, including market outlets, prices, expenses, problems, and solutions

BACKGROUND

This project was part of an ongoing program to determine the feasibility of establishing alternative fisheries for vessel operators along the southeast U. S. Coast. The GEORGIA BULLDOG is a 73-ft. shrimp boat operated by the University of Georgia Marine Extension Service and the Georgia Sea Grant Program. It was converted to a multiple-purpose fishing vessel and is actively engaged in exploratory offshore fishing and gear development. A logical extension of the work carried out on the GEORGIA BULLDOG was to involve commercial vessel operators. They made necessary conversions to their boats and fished them on a commercial basis. Problems of industry are often solved by industry or by a joint effort between industry and researchers. The use of cooperating vessels allows for greater coverage of offshore fishing grounds and for the testing of ideas generated by the practical experience of the operators. Fishing these boats on a commercial scale also permits more realistic economic evaluations.

METHODS

Seven boats participated in this project. Four vessels were rigged for bottom longlining, and one vessel for both bottom longlining and fish trawling. One participant's vessel was rigged for fish trawling only, while another vessel was modified for trawling in deep water for royal red shrimp. Characteristics of the seven boats, names of the vessel owners/captains, and fishing methods are:

(I) John McIver - Captain/Owner
Boat Name: SEA WALKER
Home Port: Bellville, Georgia
Size: 72 ft., LOA
Hull: Wood, Desco Marine
Engine: Caterpillar 3408 with a 6:1 reduction gear
Fishing Method: Bottom Longlining

(II) Herbert McIver, Jr. - Captain/Owner
Boat Name: MR. MAGOO
Home Port: Bellville, Georgia
Size: 72 ft., LOA
Hull: Wood, Desco Marine
Engine: Caterpillar 3408 with a 6:1 reduction gear
Fishing Method: Bottom Longlining

(III) Robert Massey - Owner
Hewey Hodges - Captain
Boat Name: GREY GHOST
Home Port: Richmond Hill, Georgia
Size: 62 ft., LOA
Hull: Wood
Engine: Caterpillar 343 diesel with a 6:1 reduction gear
Fishing Method: Bottom Longlining

(IV) Rick Causey - Owner
Dennis Cox, Edward Smith - Captains
Boat Name: KINGFISHER II
Home Port: Bellville, Georgia
Size: 44 ft., LOA
Hull: Fiberglass, Thompson Marine
Engine: General Motors 453 diesel with a 3:1 reduction gear
Fishing Method: Bottom Longlining and Bandit Fishing

(V) Lewis Arnsdorf - Captain/Owner
Boat Name: MISTY DAWN
Home Port: Richmond Hill, Georgia
Size: 68 ft., LOA
Hull: Wood, San Sebastian
Engine: Twin General Motors 671 diesels, each with a 4:1 reduction gear
Fishing Method: Bottom Longlining, Fish Trawling, and Rock Shrimping

(VI) Jimmy Moore - Captain/Owner
Boat Name: CAPT. MERRITT
Home Port: South Port, North Carolina
Size: 69 ft., LOA
Hull: Fiberglass, Desco Marine
Engine: Cummings KT 1150 diesel with a 6:1 reduction gear
Main Winch: McLeroy 520
Fishing Method: Roller-Rigged (cookie sweep) Fish Trawling

(VII) Carl Moore - Captain/Owner
Boat Name: STEPHANIE LYNN
Home Port: Richmond Hill, Georgia
Size: 87 ft., LOA
Hull: Steel
Engine: Caterpillar 3412 diesel with a 7.5:1 reduction gear and a Kort nozzel
Main Winch: McLeroy
Fishing Method: Royal Red and Rock Shrimping

Information in this report was given freely by the cooperating captains as part of an agreement that the information was public property and was to be made available to other commercial fishermen. In addition, each vessel operated as a teaching facility, offering advice and demonstrations on gear techniques to interested fishermen.

Information was collected from each boat captain on a trip-by-trip basis. Copies of the captains' logs, packing slips, shipping slips, prices received for fish, and expenditures (i.e., fuel, ice, bait, and groceries) were collected after each trip. Only those expenses directly related to the conversion effort were included as conversion expenses. Personal interviews were conducted to gather additional information on, for example, problems with gear modifications, locations fished, and changes in fishing techniques.

Mention of a particular brand name, company, or fish market in this report is not an endorsement.

RESULTS AND DISCUSSION

Four different fishing methods were utilized by the seven boats involved in this project. Bottom longlining will be discussed first, followed by fish trawling, rock shrimping, and royal red shrimping.

I. Bottom Longlining

A. Conversion expenses

The SEA WALKER, MR. MAGOO, GREY GHOST, MISTY DAWN, and the KINGFISHER II were rigged for bottom longlining. Individual vessel conversions appear below:

1. Conversion expenses for the M/V SEA WALKER

   a. Longline reel: Captain McIver had his longline reel constructed by a local welder, similar to a 36-inch longline reel produced by Port Canaveral Maintenance and Fabrication, Inc., Cape Canaveral, Florida. The reel was constructed of steel, then galvanized. The level-wind for the reel had a brass worm-gear with a stainless-steel pawl and pulley mounted underneath (Figure 1). Materials, labor, and insulation cost of the reel was $2,050.

   b. Hydraulic drive system: The reel was powered by hydraulics. The hydraulic system pump was mounted directly to the main engine, and was engaged and disengaged by a Klutch Master PTO hydraulic pump drive clutch. The complete hydraulic system, hoses, pumps, 30-gal. hydraulic tank, and valves were installed at a cost of $2,374.

   c. Bottom-longline cable: About 16,000 ft. of 3/16-inch galvanized electrode cable with aluminum stops every 20 ft. were purchased from Dawson Pipe and Cable Co., Portland, Texas. The cost of the cable with shipping was $1,732.

   d. Branch lines or snoods: Captain John McIver constructed his snoods similar to those used aboard the GEORGIA BULLDOG (Figure 2). Materials for 1,000 snoods were purchased from

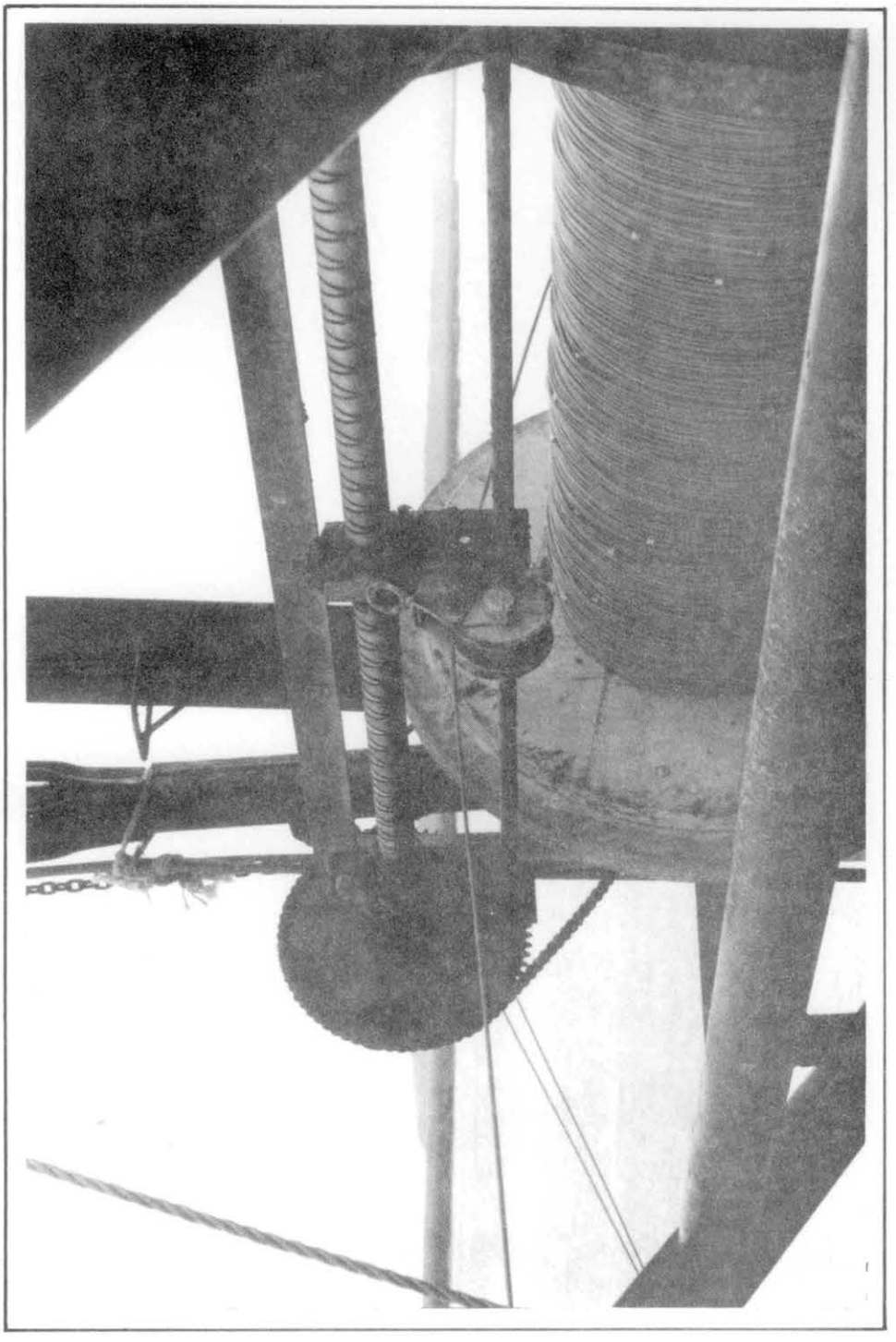


Figure 1. Level-wind arrangement

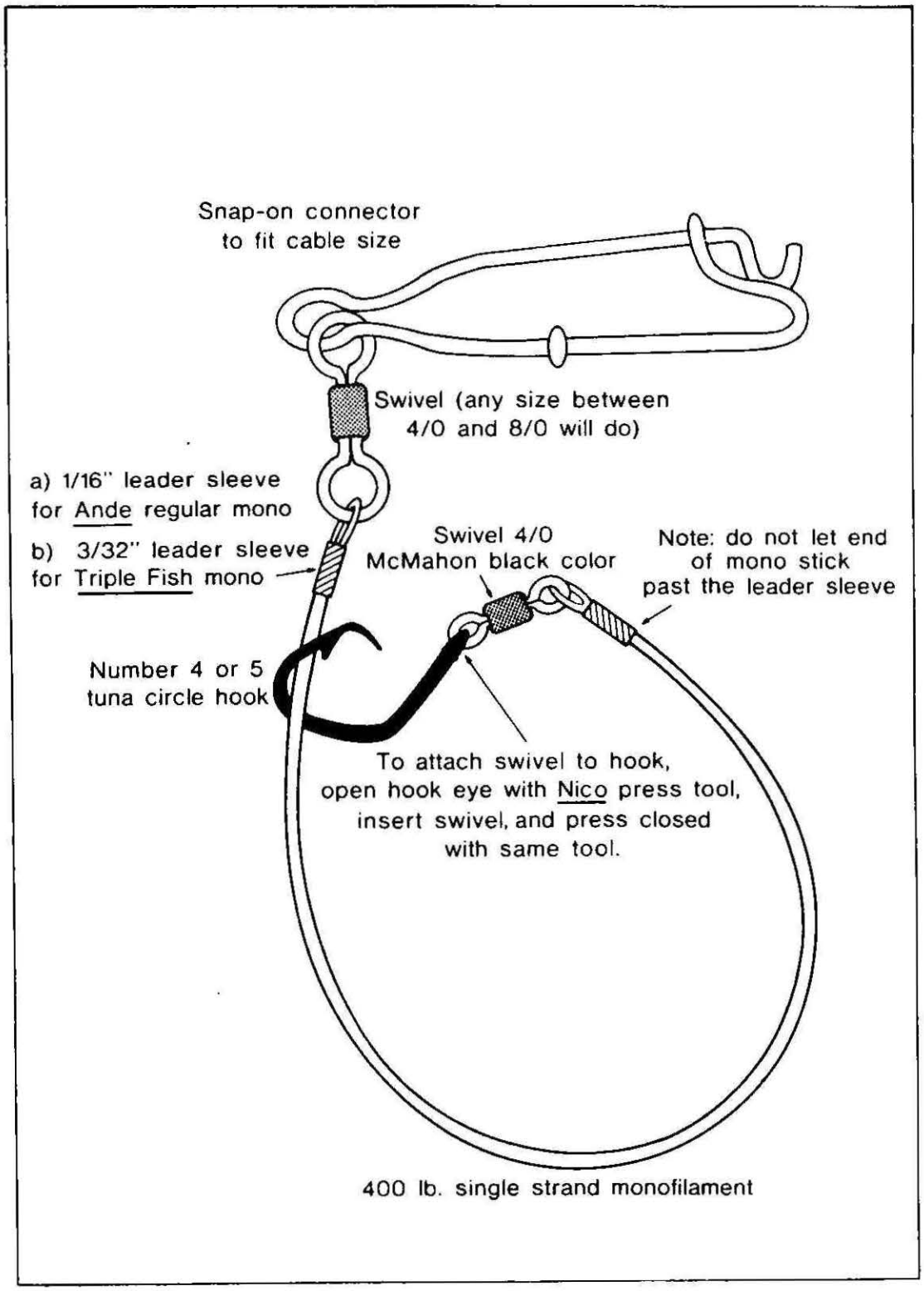


Figure 2. Description of bottom-longlining snood

SNL Corporation, San Sebastian, Florida at a cost of $1,101.

e. Miscellaneous: Blocks (two fat-boy blocks and one lobster block), davit, and materials for a gutting table, chilling box, baiting table, and hook holders cost $449.

f. Total conversion costs were $7,706.

2. Conversion expenses for the M/V MR. MAGOO

Herbert McIver, Jr. and his cousin, John McIver, converted their vessels essentially the same way. Total conversion expenses for the M/V MR. MAGOO were $7,658.

3. Conversion expenses for the M/V GREY GHOST

a. A surface-longline reel was purchased and modified for bottom longlining. Cost of the used reel was $800, which included the spool, frame, and bearings. No hydraulics or level-wind were included.

b. Modifying the reel:

(1) First, a level-wind system had to be installed. A 1:48 ratio reduction gear box was used to move a number 80-gauge chain around slowly in front of the winch. Cable was guided by the movement of the chain with a swivel welded to one link and a small wire pulley welded to the top of the swivel. The gear box was driven by the winch drum, with a 3:1 reduction sprocket/chain arrangement. For every three revolutions of the winch drum, the sprocket that turned the shaft on the reduction gear box would only make one revolution. The total cost of adding the level-wind was $220.

(2) The second modification was to power the reel. Retrieval speed is not as important in bottom longlining as in surface longlining; pulling power is essential to successful bottom longlining. With the drum empty, a pulling power of 1,000

lbs. and an average retrieval speed of about 500 ft./min. are considered minimal. To accomplish this, a Char-Lynn hydraulic motor no. 103-1008-225 was mounted directly to the winch drum shaft by means of a Dodge coupling with a heavy duty teflon bushing. Total cost of powering the reel was $280.

(3) Total cost for converting a standard surface-longline reel to a bottom-longline reel was $500.

c. Mounting the reel: The M/V GREY GHOST is a shrimp boat with a center mast. Therefore, the most suitable location for the bottom-longline reel is just forward of the mast and on top of the cabin. The reel with three miles of cable weighed too much to be mounted to the cabin overhead. A pipe support system was installed, to which the reel was bolted. Materials for the pipe-rigging support cost $600.

d. Hydraulic drive system: A Vickery 12-gal./min. pump was connected to the power takeoff system with double 9-inch pulleys and twin V-belts. An angle-iron frame was constructed to hold the pump, and a turn-buckle arrangement was used to tighten the belts, similar to the way an alternator is tightened. Cost was $190.

e. Hydraulic connections: The most economical way to connect motors and pumps was to use 3/4-inch black iron pipe with weld-on fittings. Approximately 60 ft. of pipe were used. To eliminate vibration problems, the winch and main pump were hooked to a flexible 3/4-inch hydraulic hose with clamp-on fittings. Some 6 ft. of this hose were used. The return line from the main pump to the 30-gal. holding tank was 1.25-inch pipe. Total cost for connecting the hydraulic system was $4,550.

f. Control valve: A Gresen "flow control" valve with "center check" was the best suited for bottom-longlining operations. This type of valve allows gradual forward- and reverse-reel movement, with faster movement as the valve is opened more. When the valve is released from a full-on position (forward or reverse), it

gradually stops the bottom-longline reel. This type valve reduces the sudden jerking stops which can result from a "standard open control" valve type. Cost of the valve was $120.

g. Bottom-longline cable: About four miles of used 7/32-inch galvanized electrode cable was purchased from Dawson Pipe and Cable Company, Portland, Texas. The cost of the cable with shipping was $710.

h. Branch lines or snoods: Approximately 900 snoods, similar to those used by other fishermen, were borrowed (Figure 2). If purchased, these would have cost approximately $990.

i. Miscellaneous: An open-face lobster block, wire-guide blocks, davit, brackets, extra hydraulic parts, and lumber for constructing a baiting table, gutting table, and chilling box cost $500.

j. Total conversion costs were $8,960.

4. Conversion expenses for the M/V MISTY DAWN

a. Longline reel: Captain Arnsdorf constructed the bottom-longline reel. The reel was 36 inches long and made from 6-inch schedule-40 pipe, with 36-inch diameter, 3/8-inch plate-steel ends. A 2.5-inch solid steel rod was used as an axle, supported on two 2.5-inch pillar block bearings. The frame for the reel was constructed from 4-inch channel line. Frame cross supports and support for the level-wind were constructed from 3-inch angle iron. The level-wind was fabricated from a 50:1 reduction gear box and 80-gauge chain. A swivel was welded to one link of the chain to move the cable back and forth. Sprockets with 15 teeth each and 50-gauge chain were used from the spool to the reduction gear of the level-wind.

Total cost for materials was $1,060, and 24 hours of labor were required to build the reel.

b. Hydraulic drive system: The main hydraulic pump was mounted directly to the transmission of the port engine and was continuously engaged. The pump was a 16-gal./min. Gresen TC. The reel was driven by a Char-Lynn 5P-W4 HP motor, 2,000 psi, 20-gal./min. pump, which was connected to the reel by a Lovejoy coupling and heavy-duty teflon bushing.

The plumbing of the pressure-side hydraulic fluid was done through 3/4-inch black iron pipe. A 3-ft. section of flexible high-pressure hose was used to connect the motor, pump, and control valve to the black iron pipe. This was done to eliminate vibration. Return line to the 40-gal. holding tank was 1.25-inch, low-pressure, flexible hosing. A filter system was installed between the main pump and holding tank, with a cutoff valve between the filter and tank.

The control valve used was a DX2-50 free-flow type. This allowed gradual starts and stops of the reel. It was necessary to use this type of valve because sudden stopping or starting of the reel caused the shaft to snap. The complete system was installed at a cost of $1,147.

c. Bottom-longline cable: Some 20,000 ft. of 7/32-inch used oil-field cable were purchased from Dawson Pipe and Cable Company at a cost of $700, including shipping.

d. Snoods: Captain Arnsdorf borrowed 900 snoods, similar to those used by the M/V GEORGIA BULLDOG (Figure 2). If purchased, they would cost $990.

e. Miscellaneous: Lumber to construct a baiting table, snood-holding trays, gutting table, and chilling tank cost $90.

f. Total conversion expenses: Bottom-longlining conversion costs came to $3,987.

5. Conversion expenses for the M/V KINGFISHER II

a. Longline reel: The vessel was purchased with a surface-longline reel used for swordfishing. This reel was modified by reducing the gearing to obtain more power and less speed. This was accomplished by gearing down the reel two times more than the original setting for surface longlining. This gave the reel more power and slower retrieval speed. In addition, the level-wind speed had to be reduced. A 19-toothed sprocket running to a 119-toothed sprocket sufficiently accomplished the desired results. Ideally, for every complete rotation of the winch drum, the level-wind system should guide the cable over the width of the cable.

b. Hydraulic drive system: The setup of the hydraulic system for the surface longline worked nicely for bottom longlining, too. A Gresen 15-gal./min. pump drove the system off the main engine through a Klutch Master with manual engagement. A Gresen Flow Master control valve was used. A Gresen motor drove the longline reel.

c. Bottom-longline cable: The bottom-longlining cable was purchased from Jacksonville Fishermen's Supply. About 20,000 ft. of new 1/8-inch diameter cable was purchased at a cost of $700, including shipping.

d. Snoods: Materials to construct 1,200 snoods (Figure 2) were purchased from S and L Corporation. The materials cost $1,375.

e. Miscellaneous: Miscellaneous expenses included: extra hydraulic filters, materials for gutting trays (Figure 3), spare chain links, seals for hydraulic motors, materials for hook racks, and a spare open-face block. Total cost was $200.

f. Total conversion costs: Conversion from a standard surface-longline system over to bottom longlining was estimated to cost $2,275.

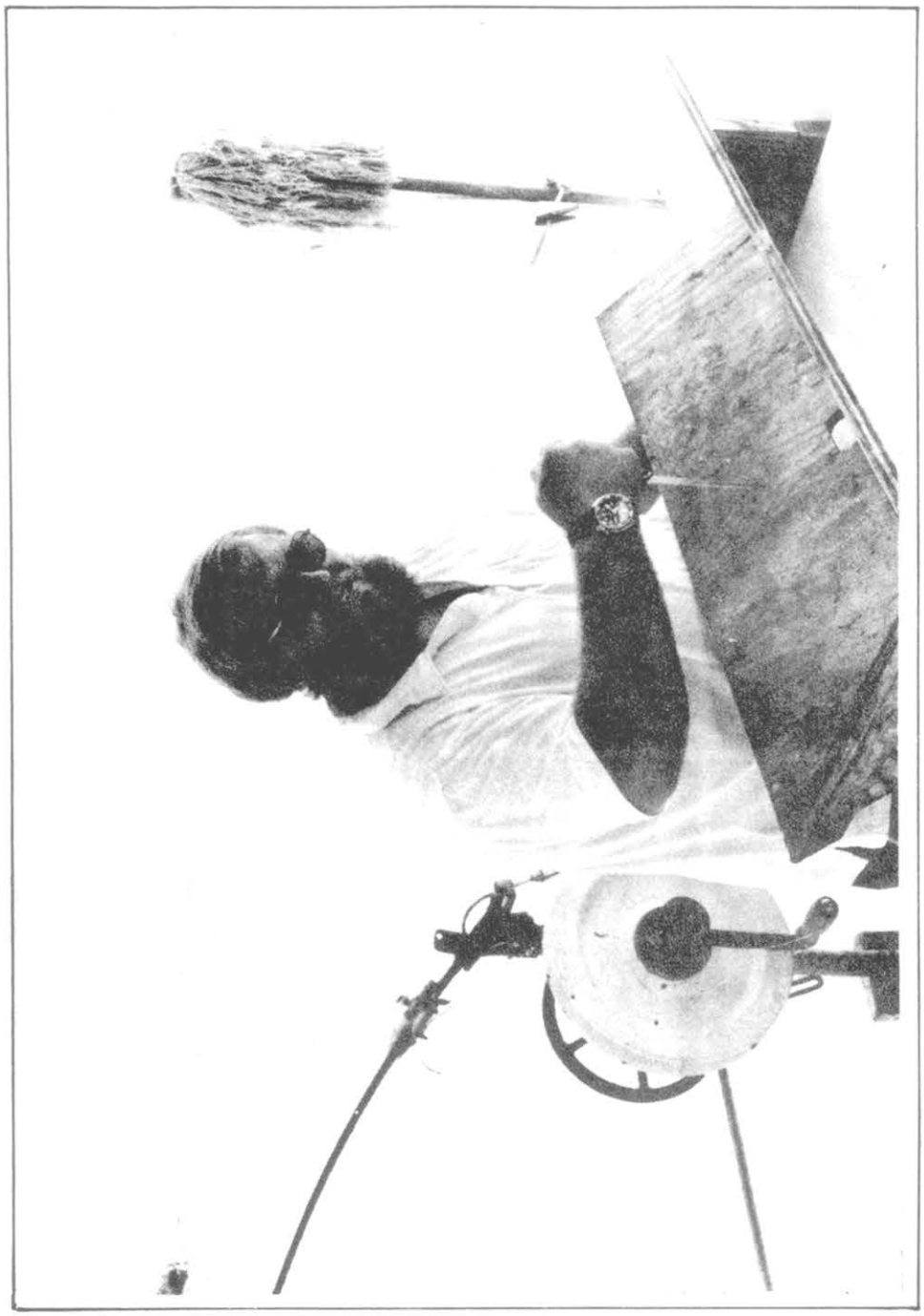


Figure 3. Captain Dennis Cox and gutting tray

B. Description and methods of gear deployment

The three A-frame-rigged shrimp boats (SEA WALKER, MR. MAGOO, MISTY DAWN) modified their vessels similar to the way in which 1983 cooperative project participant Captain Charlie Phillips changed his vessel, the M/V BLACKBEARD, (Christian and Harrington, 1985). They mounted their reels directly above the main winch, and fairleaded cable to the stern ladder, then to the outrigger. Methods of gear deployment were also similar.

The M/V GREY GHOST had its bottom-longline reel mounted on a pipe frame support on top of the cabin. Methods of gear deployment and reel setup are essentially the same as the research vessel M/V GEORGIA BULLDOG, which also is a vessel with a center mast. Christian et al. (1985) wrote specific information on this type of bottom-longline arrangement.

The M/V KINGFISHER II is a Thompson Trawler with the wheelhouse and cabin mounted aft. The forward position of the vessel is equipped with four 12-volt DC electric "bandit reels", four 2,500-lb. fish boxes, and a small chilling box. The bottom-longlining reel was mounted on top of the cabin at an angle to facilitate proper cable fairleading. As the cable left the reel, it passed through a wire block attached to a davit mounted 4 ft. forward of the stern. Here is where the crew clipped on the baited snoods. Hook racks and baiting table were also mounted on the cabin roof.

C. Bait information

The primary bait used each trip was frozen squid, because of its good catch effectiveness and ease of storage and usage. In addition, the bait was readily available from the Seafood Center, Jacksonville, Florida, in 20-lb. boxes. Most captains preferred medium-sized squid (6-7 inches in total length). The cost of using frozen squid was high (averaging $0.70/lb.). Other baits were tried, such as fresh-caught shark cut into chunks, frozen male shad, frozen Boston mackerel, and fresh-caught scrap fish from shrimping by-catch. The shrimping by-catch consisted mostly of Atlantic croaker and spot. Each bait used was evaluated against squid. Shark was favored over the others. Fresh bait had much better hook retention than frozen.

Soaking the bait in a brine solution helped toughen the flesh, improving hook retention and prolonging storage life.

D. Bottom-longlining problems

Each captain experienced problems, and none was without clever and original solutions. A common problem on most of the vessels was the improper installation of the hydraulics that ran the bottom-longline reel. Three of the vessels installed a simple control valve to operate the reel. A full-forward, off, and full-reverse valve was used. This caused the reel to start and stop abruptly. Eventually, the shaft from the motor to the reel broke, and the motor was damaged. Many parts had to be replaced. Finally, the problem was solved by replacing the old valve with a variable speed valve. A variable speed valve gradually starts and stops the reel, eliminating jerky operations. Other hydraulic problems were: the over-heating of the system and an inadequate or nonexistent filter system. Each was easily corrected.

Improper cable guides, such as fat-boy blocks, caused problems because the cable would slip down between the sheave and block housing. This caused the cable to jam, which led to breakage of the cable or of the fairleading systems. Proper cable blocks were used after initial problems arose. Fat-boy blocks can be modified by welding a lip on the block housing and eliminating a place for the cable to slip into.

E. Trip information for bottom-longline boats

The five boats involved in bottom longlining produced 26,861 lbs. of fish, predominantly snowy grouper, golden tilefish, and grey tilefish. Income produced from the sales of these fish was $43,843. The average trip length was five days, and the average number of days fished per trip was three. The average number of hooks deployed per set was 362, with a range from 158 to 700. The average number of sets per day was three. Catch per hook in pounds over all sets ranged from 0 to 0.46, and averaged 0.25. Average catch per trip was 839 lbs., with a range from 0 to 4,180 lbs.

Price structures received by the boat (ex-vessel) for the fish sold showed differences with regard to species and size. Snowy grouper commanded the best

ex-vessel prices averaging $1.64, with a range from $1.10 to $2.00. Golden tilefish ranged from $0.70 to $1.65 and averaged $1.19. Grey tilefish averaged $0.87.

With each species above, larger fish commanded better prices than smaller ones.

Itemized trip expenses and income generated for each vessel are presented by trip in Appendix A. The number of days fished, trip dates, number of sets, number of hooks set, number of fish caught, pounds of fish caught, and catch per hook rate in pounds is summarized by trip for each vessel in Appendix B. Appendix C contains marketing summaries by trip for each vessel.

II. Fish Trawling

A. Conversion expenses

The MISTY DAWN, mentioned previously, also was rigged for fish trawling. The CAPT. MERRITT was involved in the 1983 project, and again included in this project. The CAPT. MERRITT's conversion expenses and methods are summarized in Christian and Harrington (1985).

1. Rock-hopper trawling conversions for the MISTY DAWN

   a. The addition of an extra staywire was needed on the port outrigger and a padeye was welded mid-length, to which the tow block was attached. The net was pulled from this block. The cost of the above additions was $93.

   b. Net: A 72-ft. mongoose fish trawl (Figure 4) was rigged with rock hoppers (Figure 5). The net was borrowed and estimated to be worth $3,500.

   c. Bridles: A set of 300-ft., 1/2-inch bridles was attached from the main tow cable to the doors. The cost of these cables, if purchased, would be $230.

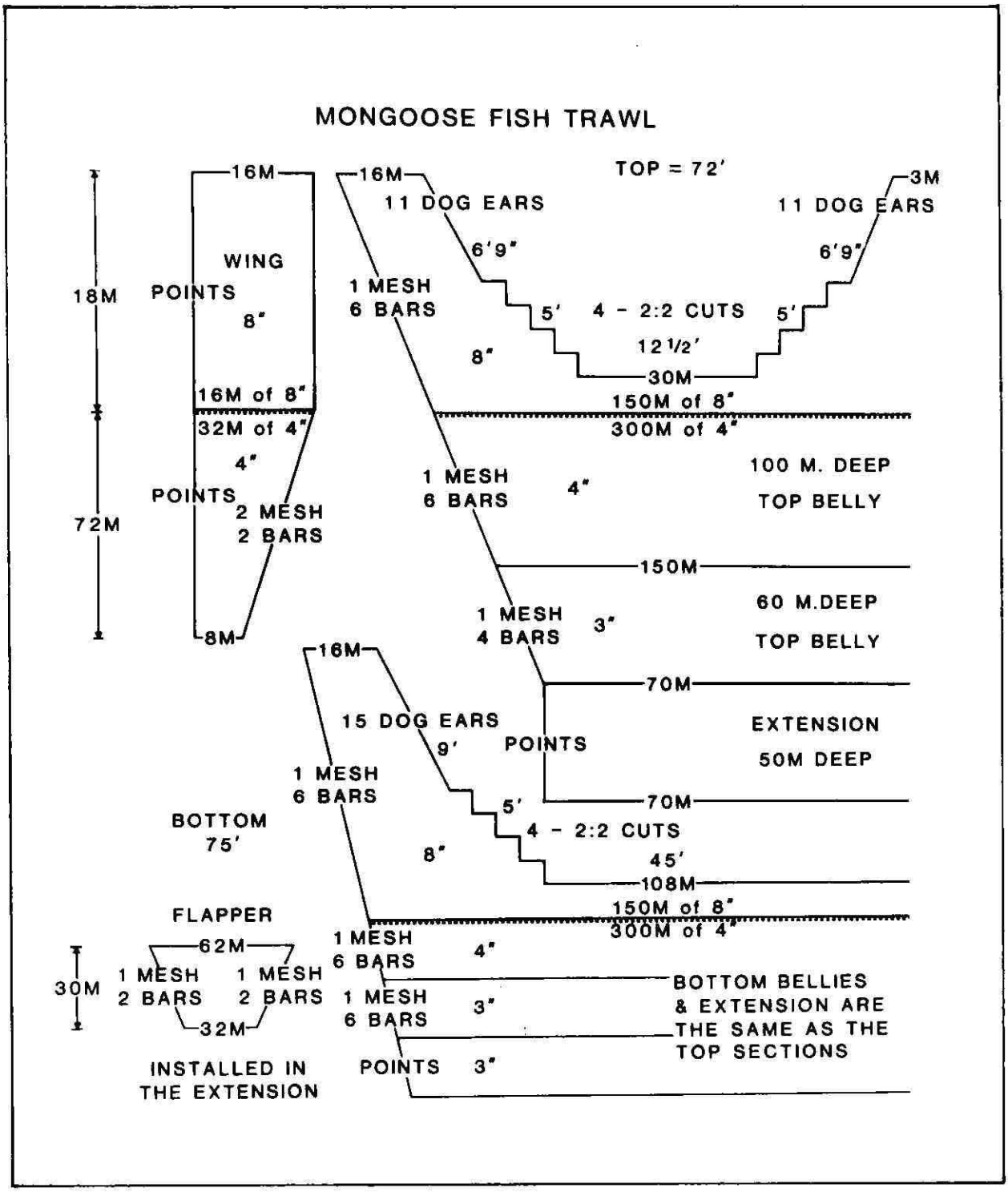
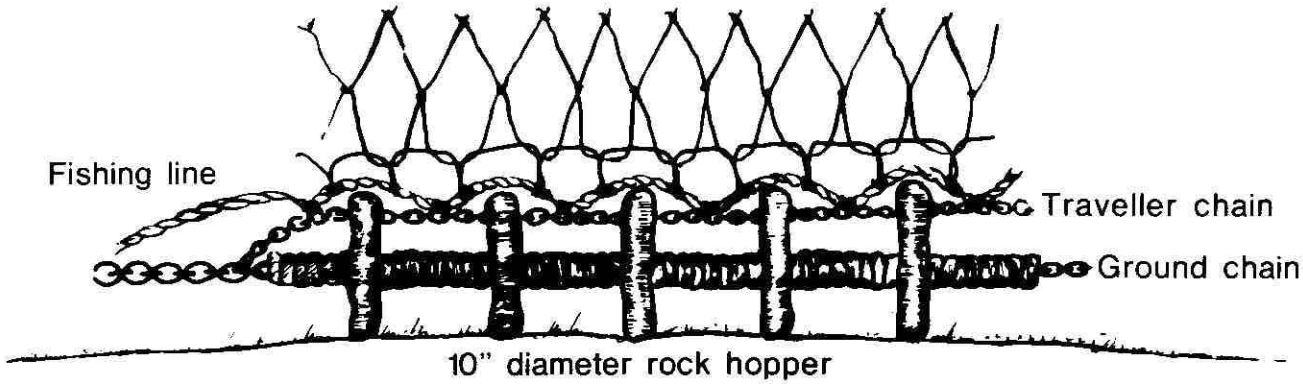


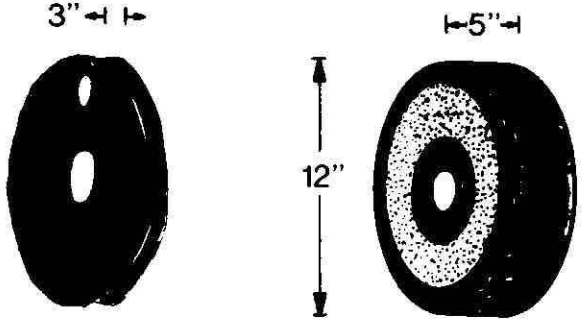
Figure 4. Diagram of a mongoose fish trawl

ROCK HOPPER TRAWLING GEAR



12" diameter rock hopper disc

Top hole: 1-3/4" diameter
Center hole: 2-1/4" diameter



12" diameter solid moulded rubber roller of roller-rigged sweep

Roller chain hole: 2-1/2" diameter

Not to scale

Figure 5. Diagram of a rock-hopper-rigged net

d. Doors: A set of 8-ft., 40-inch standard wooden shrimp doors was used to pull the net. Chain settings were reinforced by the addition of steel plates on the back of the door. Total cost for the doors with their modifications was $560.

e. Leglines: A set of 40-ft. leglines with 4-inch cookies was run from each door to the net. The cost of the leglines was $300.

f. Miscellaneous: Various shackles, lines, and blocks were purchased at a cost of $296.

g. Total conversion expenses: Captain Arnsdorf's expenses for rock-hopper fish trawling would total $4,979 if materials were purchased new.

B. Description and methods of gear deployment

Captain Arnsdorf did not have a cut-out stern or gallows on his boat. The procedure for getting the net from the boat into the water was accomplished simply. The crew piled the rock-hopper gear on the stern caprail. While the vessel slowly steamed forward (about 4 knots), the crew threw the codend overboard. The water pressure on the net helped pull the rest of the gear into the water, including the rock hoppers. The net in the water is attached directly to the trawl doors by the leglines. The trawl doors are suspended by the bridles. The bridles and main towing cable run through a block located midway the length of the port outrigger. Once the gear is in the water, setting the net, hauling back, and dumping the bag are accomplished essentially the same as shrimping. The only modification needed was to lengthen the lazy line sufficiently to accommodate the addition of the 40-ft. leglines.

1. Towing the net: While towing one net at a time from a towing block mounted on the midsection of the port outrigger, steering problems arose. This was eliminated by attaching a fat-boy block to the starboard outrigger and running the towing cable through the block. Once the net had been set out, the winchman takes up slack cable on the starboard winch drum, pulling the port cable toward the center of the vessel. The winch was then secured with the towing cable in the center of the vessel. Just

prior to hauling back, the starboard winch drum was loosened, which allowed the towing cable to fall back to the port side. This procedure is similar to a trolly block arrangement (Harrington et al., 1972) sometimes used to help deck a twin trawl's doors and sled.

C. Fish-trawling problems

Few problems were encountered with the equipment or methods of deployment by either vessel. Adverse weather conditions seemed to hamper fishing more than anything else.

Because of the rough weather, sediment in the fuel tanks became suspended and severely clogged the filter. Several filter changes and the installation of a sediment trap solved the problem.

D. Trip information for fish-trawling boats

The two boats involved in fish trawling produced 5,405 lbs. of fish, predominantly vermilion snapper, red snapper, pink porgy, and white porgy. Income produced from the sale of these fish was $6,331. The average trip length was four days, with three days fished per trip. The average number of tows made per day was five. Catch rates in pounds per hour ranged from 68 to 211, with an average of 154. Average catch in pounds per trip was 1,822, with a range of 422 to 2,993.

Itemized trip expenses and income generated for each trip are presented in Appendix A. The number of days fished, trip dates, number of sets, total catch, and average catch per tow are given in Appendix B. Appendix C contains marketing summaries by trip for each vessel.

III. Rock Shrimping

A. Conversion expenses

The MISTY DAWN and the STEPHANIE LYNN were rigged for rock shrimping. No conversions were necessary; each boat used standard shrimping gear and methods. The most successful gear and methods of rigging are similar to those used to catch brown shrimp. Twin trawls

(Harrington et al., 1972) were used by both vessels for all rock-shrimping tows.

B. Description and methods of gear deployment

Both captains fished for rock shrimp during the night, in waters from 115- to 130-ft. deep. Average tow time was 3 hrs., and most tows were made against the current.

C. Rock-shrimping problems

As expected, inclement weather caused its share of problems, but nothing major occurred with either vessel.

D. Trip information for rock-shrimping boats

The two boats involved in rock shrimping produced 57,038 lbs. (heads off). Income produced from the catch was $40,782. The average trip length was eight days, with six days fished per trip. The average number of tows made per day was three. Catch rates in pounds per tow ranged from 198 to 613, with an average of 385. Average catch in pounds per trip was 8,148, with a range of 2,558 to 22,689.

Itemized trip expenses and income produced per trip are presented in Appendix A. Appendix B summarizes trip information such as: number of days fished, trip dates, number of sets, total catch, and average catch per tow. Marketing information is presented in Appendix C.

IV. Royal Red Shrimping

A. Conversion expenses

Only one vessel, the STEPHANIE LYNN was involved in royal red shrimping. Modifications made to the vessel are as follows:

1. Towing support: Trawling in deep water (100-200 fms) for royal red shrimp necessitated the towing of only one set of nets. The principal problem of towing two trawling warps in the Gulf Stream current was twisting and fouling of the doors, net, and wires during setting operations (Bullis, 1956). Therefore, an "A"-frame with a towing block and staywires was mounted on the stern of the vessel (Figure 6). Total cost of materials was $500.

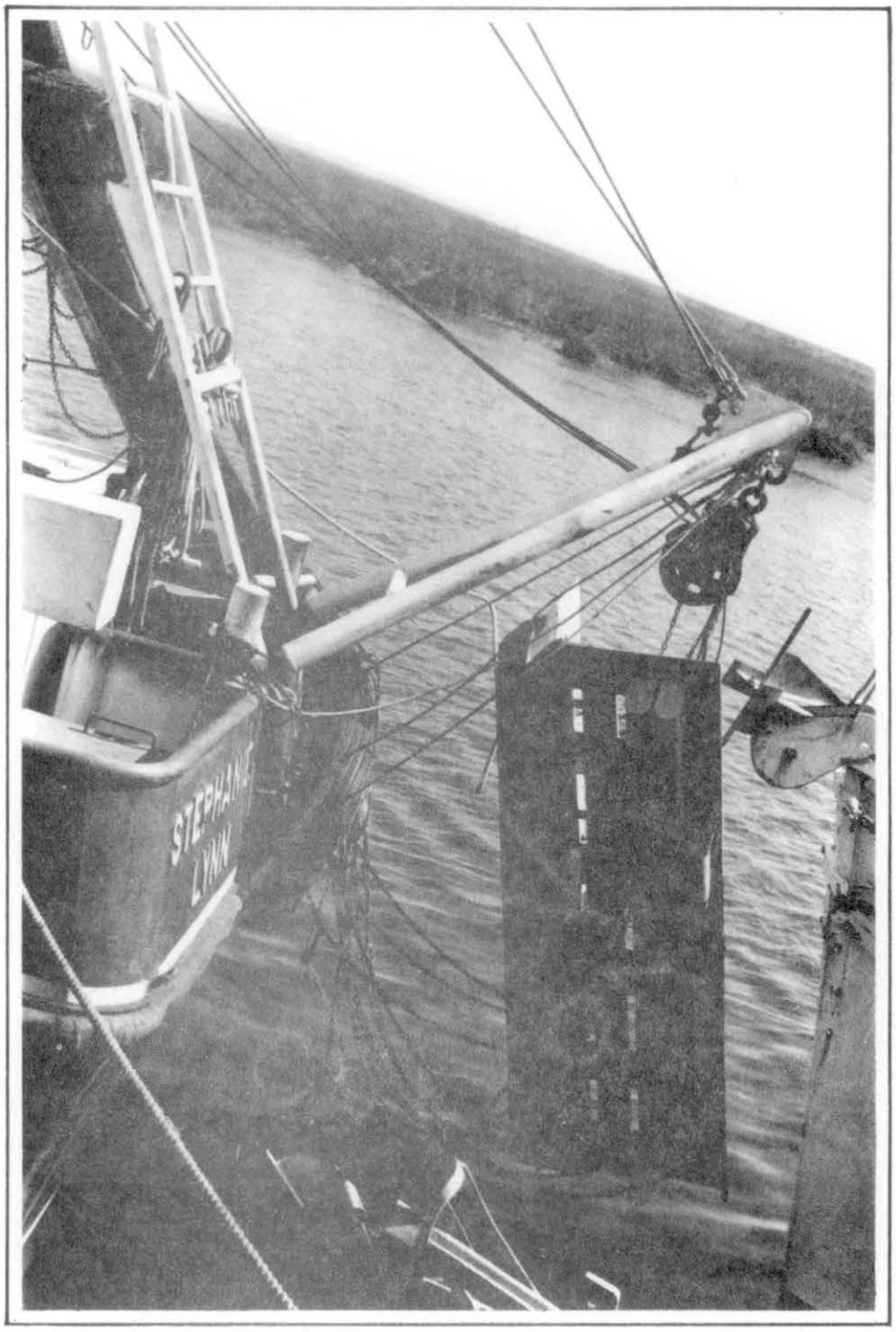


Figure 6. Trawling arrangement used for royal red shrimping

2. Trawl doors: A set of aluminum 9-ft. by 40-inch trawl doors (Figure 6) were purchased for use in royal red shrimping. From past experiences (Bullis and Rathjen, 1959), it was found that standard chain-rigged, wooden, trawl doors did not perform well in deep water. It was thought by Captain Moore that aluminum would be an ideal material, because it is not affected by the deep-water pressure. The doors were purchased from Freeport Welding and Fabrication, Inc., Freeport, Texas, and cost approximately $1,200.

3. Nets: A pair of standard 65-ft. flat nets were towed with a bullet, similar to the way twin trawls are deployed (Harrington et al., 1972).

4. Tow cable: Trawling in deep water requires about 600 fathoms of 5/8-inch tow cable.

5. Trawl winch: Captain Moore was fortunate to have a large capacity winch. For those who do not have such an arrangement, a connection of one drum's cable to another is possible (Cummins and Rivers, 1962).

6. Total conversion expenses: Total conversion expenses to go royal red shrimping amounted to $1,700.

B. Description and methods of gear deployment for royal red shrimping

The gear and methods used in the deep-water fishery for royal red shrimp differ little from those used in the inshore shrimp fishery. The differences are mainly those associated with the use of longer warps, fishing in strong offshore currents, and fishing within strict and narrow depth limits. Great care must be taken with trawl speed and depth control than in the inshore fishery. Captain Moore discovered that towing against the current at ground speeds of 2.5 to 3.5 knots yielded better catches than those made towing at a minimum speed of 4 to 4.5 knots with the current. Trawling duration (time net was fishing on bottom) averaged 2 hrs.

C. Royal red shrimping problems

Captain Carl Moore had considerable problems towing in the Gulf Stream. The only successful method was to set the net out into the current, tow for a couple of hours, then take it up. By the time the crew had cleaned up the deck and were ready to set the net out again, the vessel was almost back at the original starting spot of the previous tow. The Gulf Stream had drifted the vessel over the original grounds previously fished.

Loss of gear is a major problem in royal red shrimping. Much of the bottom consists of sand, but occasional limestone outcroppings and concentrations of coral and sea fans occur making trawling difficult or impossible (Bullis and Rathjen, 1959). Complete rigs (doors, nets, and bridles) were lost twice. Direct expenses attributed to lost gear were $7,600.

D. Trip information for royal red shrimping

Captain Carol Moore made five fishing trips for royal red shrimp, producing 12,080 lbs. (heads off), generating $40,188 income. The average trip length was eight days, with five days fished per trip. The average number of tows made per day was four. Catch rates in pounds per tow ranged from 77 to 191, and averaged 128. Average catch per trip was 2,416 lbs. with a range of 1,216 to 4,133 lbs.

SUMMARY

The efforts of each of the captains and crew must be highly commended. Gear modifications were undertaken with engineering genius and originality. The efforts of these commercial vessels provided several pieces of valuable information, and indicated several points of importance for any future alternative fishery development.

Total income generated was $134,370 (Table 1). Total trip expenses were $76,763, of which fuel was the largest single component averaging 60%, with a range of 35% to 67%.

Table 1. Trip expenses, income generated, and percent of total trip expense for the cooperative vessels (rounded to the nearest dollar)

Vessel Name	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
SEA WALKER	$ 5,179 (67%)	$ 645 (8%)	$1,988 (25%)	Crew Pays	None	$ 7,812	$ 13,271	(+)$ 5,459
MR. MAGOO	5,213 (64%)	950 (12%)	1,933 (24%)	Crew Pays	None	8,096	18,837	(+) 10,741
GREY GHOST	2,686 (56%)	335 (7%)	624 (13%)	$1,020 (21%)	$ 151 (3%)	4,816	1,240	(-) 3,576
KINGFISHER II	1,807 (35%)	790 (15%)	1,321 (26%)	1,204 (24%)	None	5,122	9,104	(+) 3,982
MISTY DAWN	4,702 (54%)	1,046 (12%)	817 (9%)	1,317 (15%)	833 (10%)	8,715	9,646	(+) 931
CAPT. MERRITT	2,040 (54%)	395 (10%)	N/A	350 (9%)	1,046 (27%)	3,831	5,931	(+) 2,100
STEPHANIE LYNN	24,174 (63%)	N/A	N/A	2,732 (7%)	11,465 (30%)	38,371	76,341	(+) 37,970
TOTALS	$45,801 (60%)	$4,161 (5%)	$6,683 (9%)	$6,623 (9%)	$13,495 (17%)	$76,763	$134,370	(+)$57,607

a. before fixed expenses, repairs, and crew share

REFERENCES

Bullis, H. R., Jr. 1956. Royal red shrimp - A new south Atlantic resource. pp. 56-60. in Proceedings of the Gulf and Caribbean Fisheries Institute, Ninth Annual Session, November, 1956.

Bullis, H. R., Jr., and W. F. Rathjen. 1959. Shrimp explorations off the Southeastern coast of the United States (1956-1958). Commer. Fish. Rev. 21(6):1-20.

Christian, P. A. and D. L. Harrington. 1985. Finfishing with Shrimp Boats - A Summary of Georgia's Cooperative Finfish Development and Fishing Demonstration Project for 1983. Technical Report Series 85-2. Georgia Sea Grant College Program, University of Georgia, Athens, GA. 100 p.

Christian, P. A., M. V. Rawson, D. L. Harrington, and L. G. Parker. 1985. Bottom longlining off the southeastern U. S. coast. Marine Extension Bulletin No. 7. Georgia Sea Grant College Program, University of Georgia, Athens, GA. 17 p.

Cummins, R., Jr. and J. B. Rivers. 1962. New deep water shrimp fishery developed off Florida's east coast. Fish Boat Magazine 7(12):19-23, 33-34.

Harrington, D. L., M. R. Bartlett, and J. Higgins. 1972. Shrimp fishing with twin trawls. Marine Extension Bulletin No. 1. Georgia Sea Grant College Program, University of Georgia, Athens, GA. 10 p.

Prytherch, H. F. 1983. A descriptive survey of the bottom longline fishery in the Gulf of Mexico. NOAA Technical Memorandum NMFS-SEFC-122. Southeast Fisheries Center, Miami, FL. 33 p.

APPENDICES

Appendix A

Cooperating Vessel Trip Expenses and Income Generated by Trip

Appendix A. Trip expenses and income generated for the M/V SEA WALKER from bottom longlining (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
1	$1,266	$125	$ 275	Crew pays	None	$1,666	$ 2,080	$(+) 414
2	653	50	550	Crew pays	None	1,253	486	(−) 767
3	None taken on	70	165	Crew pays	None	235	845	(+) 610
4	612	75	550	Crew pays	None	1,237	4,402	(+)3,165
5	612	125	112	Crew pays	None	849	1,682	(+) 833
6	850	75	336	Crew pays	None	1,261	1,756	(+) 495
7	1,186	125	0	Crew pays	None	1,311	2,020	(+) 709
Totals	$5,179	$645	$1,988	-	-	$7,812	$13,271	$(+)5,459

a. before fixed expenses, repairs, and crew share

Appendix A (cont'd). Trip expenses and income generated for the M/V MR. MAGOO from bottom longlining (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
1	$ 558	$100	$ 495	Crew pays	None	$1,153	$ 1,985	$(+) 832
2	558	100	495	Crew pays	None	1,153	837	(-) 316
3	890	175	275	Crew pays	None	1,340	2,955	(+) 1,615
4	890	175	385	Crew pays	None	1,450	7,689	(+) 6,239
5	458	100	0	Crew pays	None	558	2,660	(+) 2,102
6	458	100	0	Crew pays	None	558	104	(-) 454
7	682	100	173	Crew pays	None	955	1,032	(+) 77
8	719	100	110	Crew pays	None	929	1,575	(+) 646
Totals	$5,213	$950	$1,933	-	-	$8,096	$18,837	$(+)10,741

a. before fixed expenses, repairs, and crew share

Appendix A (cont'd). Trip expenses and income generated for the M/V GREY GHOST (rounded to the nearest dollar)

Trip No.	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
1	$ 612	$140	$ 0	$ 225	$ 0	$ 977	$ 0	$(-) 977
2	697	0	0	180	85	962	534	(-) 428
3	0	143	0	200	16	359	108	(-) 251
4	628	0	344	215	42	1,229	479	(-) 750
5	749	52	280	200	8	1,289	119	(-)1,170
Total	$2,686	$335	$624	$1,020	$151	$4,816	$1,240	$(-)3,576

a. before fixed expenses, repairs, and crew share

Appendix A (cont'd). Trip expenses and income generated for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
1	$ 282	$180	$ 173	$ 200	None	$ 835	$2,673[c]	$(+)1,838
2	242	99	176	134	None	651	877[c]	(+) 226
3	236	138	270	150	None	794	430[d]	(-) 364
4	134	110	82	175[b]	None	501	972[d]	(+) 471
5	360	98	170	185[b]	None	813	700[d]	(-) 113
6	243	55	80	175[b]	None	553	1,241[e]	(+) 688
7	310	110	370	185[b]	None	975	2,211[d]	(+)1,236
Totals	$1,807	$790	$1,321	$1,204	-	$5,122	$9,104	$(+)3,982

a. before fixed expenses, repairs, and crew share
b. estimated
c. caught bottom longlining only
d. caught using "bandit reels" and bottom longline
e. caught using "bandit reels" only

Appendix A (cont'd). Trip expenses and income generated for the M/V MISTY DAWN from bottom longlining, fish trawling, and rock shrimping (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses					Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Bait	Groceries	Packing/Freight			
1	$ 714	$ 162	$ 0	$ 180	$ 16	$1,072	$ 187	$(-) 885
2	679	130	129	200[b]	212	1,350	1,261	(-) 89
3	630	162	258	200[b]	206	1,456	1,420	(-) 36
4	582	130	258	200[b]	112	1,282	877	(-) 405
5	776	162	172	200[b]	287	1,597	2,044	(+) 447
6	793	150[b]	0	187	0	1,130	2,284	(+)1,154
7	528	150[b]	0	150	0	828	1,573	(+) 745
Totals	$4,702	$1,046	$817	$1,317	$833	$8,715	$9,646	$(+) 931

a. before fixed expenses, repairs, and crew share
b. estimated

Appendix A (cont'd). Trip expenses and income generated for the M/V CAPT. MERRITT from fish trawling (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses				Total trip expenses	Gross income from sales	Net trip recovery[a]
	Fuel/Oil	Ice	Groceries	Packing/Freight			
1	$1,020	$195	$175[b]	$616	$2,006	$2,545	$(+) 539
2	1,020	200	175[b]	430	1,825	3,386	(+)1,561
Totals	$2,040	$395	$350	$1,046	$3,831	$5,931	$(+)2,100

a. before fixed expenses, repairs, and crew share
b. estimated

Appendix A (cont'd). Trip expenses and income generated for the M/V STEPHANIE LYNN from royal red and rock shrimping (rounded to nearest dollar)

Trip No.	Itemized Trip Expenses				Total trip expenses	Gross income from sales	Net Trip recovery[a]
	Fuel/Oil	Ice	Groceries	Packing/Freight			
1	$ 2,850	None	$ 326	$ 278	$ 3,454	$ 4,667	$(+) 1,213
2	2,880	None	305	536	3,721	9,373	(+) 5,652
3	4,080	None	235	524	4,839	9,249	(+) 4,410
4	2,040	None	359	811	3,210	14,767	(+)11,557
5	981	None	287	243	1,511	3,201	(+) 1,690
6	4,075	None	293	752	5,120	4,223	(−) 897
7	2,910	None	316	483	3,709	3,430	(−) 279
8	2,500	None	295	3,300	6,095	11,549	(+) 5,454
9	1,858	None	316	4,538	6,712	15,882	(+) 9,170
Totals	$24,174	-	$2,732	$11,465	$38,371	$76,341	$(+)37,970

a. before fixed expenses, repairs, and crew share

Appendix B

Cooperating Vessel Summaries by Trip

Appendix B. Trip summary for the M/V SEA WALKER
(bottom longlining)

Trip No.	No. of days fished	Trip dates	No. of sets	No. of hooks set	No. of fish caught[a]	Pounds of fish caught[b]	Catch per hook (lbs.)
1	6	Feb. 9 - 20	28	7,800	152	1,364	0.17
2	2	Feb. 23 - 27	9	3,100	36	412	0.13
3	3	Feb. 28 - Mar. 4	15	4,137	97	718	0.17
4	6	Mar. 13 - 20	29	9,395	288	2,929	0.31
5	2	Mar. 25 - 28	6	3,376	160	995	0.29
6	1	Apr. 3 - 5	3	2,257	130	914	0.40
7	4	Apr. 15 - 20	13	7,965	230	1,625	0.20
Totals	24		103	38,030	1,093	8,957	

a. commercial species only
b. calculated from the amount of gutted fish sent to market

Appendix B (cont'd). Trip summary for the M/V MR. MAGOO (bottom longlining)

Trip No.	No. of days fished	Trip dates	No. of sets	No. of hooks set	No. of fish caught[a]	Pounds of fish caught[b]	Catch per hook (lbs.)
1	4	Feb. 14 - 19	16	4,852	157	1,209	0.25
2	4	Feb. 24 - Mar. 4	22	5,050	69	665	0.13
3	6	Mar. 9 - 17	28	8,211	220	2,121	0.26
4	6	Mar. 20 - 28	30	9,156	356	4,180	0.46
5	4	April 1 - 5	10	4,537	125	1,400	0.31
6	1	April 7 - 9	3	920	10	61	0.07
7	4	April 14 - 20	12	5,012	60	652	0.13
8	4	April 24 - 30	15	8,015	111	1,095	0.14
Totals	33		136	45,753	1,108	11,383	

a. commercial species only
b. calculated from the amount of gutted fish sent to market

Appendix B (cont'd). Trip summary for the M/V GREY GHOST (bottom longlining)

Trip No.	No. of days fished	Trip dates	No. of sets	No. of hooks set	No. of fish caught[a]	Pounds of fish caught[b]	Catch per hook (lbs.)
1	2	Mar. 2 - 5	2	1,400	0	0	0
2	3	Mar. 8 - 13	8	1,575	68	425	0.27
3	1	Mar. 17 - 19	2	600	18	135	0.23
4	2	Apr. 2 - 7	5	1,050	42	351	0.33
5	2	Apr. 8 - 11	6	950	6	70	0.07
Totals	10		23	5,575	134	981	

a. commercial species only
b. calculated from the amount of gutted fish sent to market

Appendix B (cont'd). Trip summary for the M/V KINGFISHER II (bottom longlining and bandit-rig fishing)[a]

Trip No.	No. of days fished	Trip dates	No. of sets	No. of hooks set	No. of fish caught[b]	Pounds of fish caught[c]	Catch per hook (lbs.)
1	5	July 26 - Aug. 2	14	7,442	284	2,089	0.28
2	11	Aug. 13 - 25	14	6,958	128	649	0.09
3	3	Oct. 26 - Nov. 1	3	1,150	0	0	0.00
4	1	Nov. 11 - 15	1	700	1	9	0.01
5	3	Nov. 28 - Dec. 3	2	600	2	19	0.03
6	5	Dec. 11 - 17	0	0	0	0	0
7	4	Dec. 28, 1984 - Jan. 3, 1985	6	3,200	32	385	0.12
Totals	32		40	20,050	447	3,151	

a. only bottom-longline data is presented
b. commercial species only
c. calculated from the amount of gutted fish sent to market

Appendix B (cont'd). Trip summary for the M/V MISTY DAWN (bottom longlining, fish trawling, and rock shrimping)

Trip No.	No. of days fished	Trip dates	No. of sets	No. of hooks set	No. of fish caught[a]	Pounds of fish/shrimp caught[b]	Catch per hook/tow (lbs.)
1	2	Mar. 2 - 5	2[c]	1,200	15	150/0.00	0.13/0.00
2	3	Apr. 26 - 30	2[d]	-	N/A	422/0.00	0.00/211
			8[c]	2,143	-	576/0.00	0.27/0.00
3	3	May 7 - 10	10[c]	2,593	-	983/0.00	0.38/0.00
4	2	May 15 - 18	5[c]	1,659	-	534/0.00	0.32/0.00
5	4	May 23 - 28	1[c]	350	22	146/0.00	0.42/0.00
			9[e]	-	-	0.00/2,558	0.00/284.2
6	8	May 30 - June 9	23[e]	-	-	18/4,545	0.00/198.4
7	2	June 10 - 12	7[e]	-	-	65/3,765	0.00/547.1
Totals	24		67	7,945		2,894/10,868	

a. commercial species only
b. calculated from the amount of gutted fish or headless shrimp sent to market
c. bottom longlining
d. rock-hopper fish trawling
e. trawling for rock shrimp

Appendix B (cont'd). Trip summary for the M/V CAPT. MERRITT (fish trawling)

Trip No.	No. of days fished	Trip dates	No. of sets	Catch (lbs.)[a]	Catch per tow (lbs.)
1	4	Jan. 24 - 29	16	2,933	183
2	5	Feb. 21 - 28	30	2,050	68
Totals	9		46	4,983	

a. calculated from the amount of gutted fish sent to market

Appendix B (cont'd). Trip summary for the M/V STEPHANIE LYNN (royal red and rock shrimping)

Trip No.	No. of days fished	Trip dates	No. of sets	Catch (lbs.)[a]	Catch per tow (lbs.)
1	5	Jan. 31 - Feb. 7	18	1,392[b]	77.3
2	4	Feb. 10 - 18	14	2,678[b]	191.3
3	4	Feb. 20 - 27	20	2,657[b]	132.9
4	8	Mar. 2 - 13	26	4,133[b]	158.9
5	4	Mar. 20 - 26	15	1,216[b]	81.1
6	4	Apr. 20 - 26	16	3,760[c]	235.0
7	6	July 23 - Aug 1	21	3,223[c]	153.5
8	9	Aug. 3 - 15	35	16,498[c]	471.4
9	10	Aug. 16 - 28	37	22,689[c]	613.2
Totals	54		202	58,246	

a. calculated from the amount of headless shrimp sent to market
b. royal red shrimping
c. rock shrimping

Appendix C

Cooperating Vessel Catch Summaries before Packing and Freight by Trip

Appendix C. Catch summary before packing and freight for the M/V SEA WALKER from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	765	$1.70	$1,300	Snowy grouper (over 16 lbs.)
	54	1.70	92	Snowy grouper (8–12 lbs.)
	139	1.60	222	Snowy grouper (4–8 lbs.)
	119	1.30	155	Golden tilefish (8–12 lbs.)
	237	1.10	261	Golden tilefish (4–8 lbs.)
	50	1.00	50	Grey tilefish
Totals	1,364		$2,080	
2	23	$0.60	$ 14	Grey tilefish
	46	1.00	46	Golden tilefish (8–12 lbs.)

Appendix C (cont'd). Catch summary before packing and freight for the M/V SEA WALKER from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	34	$0.70	$ 24	Golden tilefish (4-8 lbs.)
	309	1.30	402	Snowy grouper
Totals	412		$486	
3	230	$1.60	$368	Snowy grouper
	460	1.00	460	Golden tilefish
	28	0.60	17	Grey tilefish
Totals	718		$845	
4	422	$1.25	$ 52	Golden tilefish (8-12 lbs.)
	169	1.00	169	Golden tilefish (4-8 lbs.)
	171	0.75	128	Grey tilefish

Appendix C (cont'd). Catch summary before packing and freight for the M/V SEA WALKER from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
4	12	$1.75	$ 21	Cobia
	-	-	476	Credit from previous trip (price change)
	2,155	1.65	3,556	Snowy grouper
Totals	2,929		$4,402	
5	645	$1.85	$1,193	Snowy grouper
	184	1.50	276	Golden tilefish (over 8 lbs.)
	95	1.25	119	Golden tilefish (under 8 lbs.)
	60	1.25	75	Grey tilefish
	11	1.75	19	Bluefish
Totals	995		$1,682	
6	768	$1.90	$1,459	Snowy grouper
	37	1.90	70	Strawberry grouper

Appendix C (cont'd). Catch summary before packing and freight for the M/V SEA WALKER from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
6	71	$2.50	$ 178	Red snapper
	38	1.30	49	Grey tilefish
Totals	914		$1,756	
7	500	$1.60	$ 800	Snowy grouper
	84	1.60	134	Strawberry grouper
	22	2.90	64	Red snapper
	22	1.60	35	Gag grouper
	900	1.00	900	Golden tilefish (over 8 lbs.)
	78	0.90	70	Golden tilefish (under 8 lbs.)
	19	0.90	17	Grey tilefish
Totals	1,625		$2,020	

Appendix C (cont'd). Catch summary before packing and freight for the M/V MR. MAGOO from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	593	$1.70	$1,008	Snowy grouper (above 16 lbs.)
	165	1.70	281	Snowy grouper (8–12 lbs.)
	409	1.60	654	Snowy grouper (4–8 lbs.)
	42	1.00	42	Grey tilefish
Totals	1,209		$1,985	
2	407	$1.30	$ 529	Golden tilefish (8–12 lbs.)
	60	1.00	60	Golden tilefish (4–8 lbs.)
	29	0.70	20	Golden tilefish (under 4 lbs.)
	118	1.60	189	Snowy grouper (8–12 lbs.)

Appendix C (cont'd). Catch summary before packing and freight for the M/V MR. MAGOO from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	10	$1.40	$ 14	Snowy grouper (4-8 lbs.)
	41	0.60	25	Grey tilefish
Totals	665		$837	
3	889	$1.70	$1,511	Snowy grouper
	122	0.75	92	Grey tilefish
	143	1.00	143	Golden tilefish (4-8 lbs.)
	967	1.25	1,209	Golden tilefish
Totals	2,121		$2,955	
4	4,051	$1.85	$7,494	Snowy grouper
	130	1.50	195	Golden tilefish
Totals	4,181		$7,689	
5	1,400	$1.90	$2,660	Snowy grouper

Appendix C (cont'd). Catch summary before packing and freight for the M/V MR. MAGOO from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
6	61	$1.70	$ 104	Snowy grouper
7	444	$1.70	$ 755	Snowy grouper
	17	1.10	19	Grey tilefish
	167	1.40	234	Golden tilefish (Over 8 lbs.)
	24	1.20	28	Golden tilefish (Under 8 lbs.)
Totals	652		$1,036	
8	1,095	$1.00	$ 295	Golden tilefish
	800	1.60	1,280	Snowy grouper
Totals	1,895		$1,575	

Appendix C (cont'd). Catch summary before packing and freight for the M/V GREY GHOST from bottom longlining

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	351	$1.20	$421	Golden tilefish
	22	1.00	22	Grey tilefish
	52	1.75	91	Snowy grouper
Totals	425		$534	
3	135	$0.80	$108	Grey tilefish
4	66	$1.65	$109	Snowy grouper
	175	1.55	271	Golden tilefish
	110	0.90	99	Grey tilefish
Totals	351		$479	
5	70	$1.70	$119	Snowy grouper

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	1,380	$1.35	$1,863	Golden tilefish (8-12 lbs.)
	220	1.20	264	Golden tilefish (4-8 lbs.)
	14	1.00	14	Golden tilefish (under 4 lbs.)
	51	1.70	87	Yellowfin tuna
	64	1.35	86	Dolphin fish
	334	1.00	334	Grey tilefish (4-8 lbs.)
	20	0.80	16	Grey tilefish (under 4 lbs.)
	6	1.55	9	Snowy grouper
Totals	2,089		$2,673	
2	442	$1.40	$619	Golden tilefish (8-12 lbs.)

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	160	1.25	200	Golden tilefish (4–8 lbs.)
	38	1.20	45	Grey tilefish
	5	1.40	7	King mackerel
	4	1.40	6	Dolphin fish
Totals	649		$877	
3	85	$1.00	$ 85	Pink porgy
	90	0.80	72	Cobia
	28	2.70	76	Red snapper
	58	1.50	87	Snowy grouper
	28	1.30	37	Warsaw grouper
	16	1.60	26	Gag grouper
	9	1.70	15	Scamp grouper
	2	1.50	3	Black sea bass

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
3	2	1.00	2	Grey triggerfish
	27	1.00	27	B-liner (3/4-1 lb.)
Totals	345		$430	
4	159	$1.50	$238	Snowy grouper
	55	1.55	85	Scamp grouper
	15	0.90	13	King mackerel
	66	0.80	53	Pink porgy
	214	2.40	514	Red snapper
	20	1.00	20	B-liner (3/4-1 lb.)
	24	1.00	24	Dolphin fish

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
4	9	$1.20	$ 11	Golden tilefish
	7	0.25	2	Shark
	41	0.30	12	Black sea bass
Totals	610		$972	
5	191	$1.70	$325	Gag grouper
	10	1.65	17	Snowy grouper
	51	1.80	92	Scamp grouper
	61	2.70	165	Red snapper (over 12 lbs.)
	17	2.50	42	Mangrove snapper
	3	2.20	7	Red snapper (under 12 lbs.)
	9	1.40	13	Golden tilefish
	22	0.75	16	Black sea bass

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
5	19	$1.00	$ 19	Pink porgy
	3	1.45	4	B-liner
Totals	386		$700	
6	65	$0.45	$ 29	Black sea bass (small)
	37	1.00	37	Black sea bass (large)
	118	1.75	206	Gag grouper
	27	1.65	45	Snowy grouper
	24	1.25	30	Warsaw grouper
	301	2.75	828	Red snapper
	2	1.00	2	Grey triggerfish

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
6	2	$2.00	$ 2	Vermilion snapper
	77	0.80	62	Pink porgy
Totals	653		$1,241	
7	317	$1.50	$ 476	Golden tilefish (over 8 lbs.)
	55	1.25	69	Golden tilefish (under 8 lbs.)
	13	1.00	13	Grey tilefish
	337	1.50	506	Snowy grouper
	150	2.60	390	Red snapper (large)
	121	1.55	188	Gag grouper
	100	1.40	140	Strawberry grouper
	59	1.60	94	Scamp grouper

Appendix C (cont'd). Catch summary before packing and freight for the M/V KINGFISHER II from bottom longlining and bandit-rig fishing

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
7	53	$1.60	$ 85	Red snapper (small 2-4 lbs.)
	245	0.90	220	Pink porgy
	20	0.50	10	Grey triggerfish
	65	0.30	20	Greater amberjack
Totals	1,535		$2,211	

Appendix C (cont'd). Catch summary before packing and freight for the M/V MISTY DAWN from bottom longlining, fish trawling, and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	150	$1.25	$187	Golden tilefish
2	16	$0.40	$6	Barracuda
	244	0.25	61	Greater amberjack
	100	2.00	200	Large snowy grouper (over 8 lbs.)
	168	1.70	286	Small snowy grouper (under 8 lbs.)
	57	2.95	168	Red snapper
	14	0.85	12	Small pink snapper (3/4 - 1 1/2 lbs.)
	91	1.45	132	Warsaw grouper
	83	0.65	54	Shark

Appendix C (cont'd). Catch summary before packing and freight for the M/V MISTY DAWN from bottom longlining, fish trawling, and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	51	$2.00	$ 102	Yellowfin grouper
	102	1.65	168	Golden tilefish
	72	1.00	72	Grey tilefish
Totals	998		$1,261	
3	781	$1.65	$1,289	Snowy grouper
	182	0.65	118	Shark
	20	0.65	13	Grey tilefish
Totals	983		$1,420	
4	120	$2.75	$330	Red snapper
	93	0.70	65	Grey tilefish
	321	1.50	482	Snowy grouper
Totals	534		$877	

Appendix C (cont'd). Catch summary before packing and freight for the M/V MISTY DAWN from bottom longlining, fish trawling, and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
5	72	$0.60	$ 43	Grey tilefish
	19	1.10	21	Snowy grouper
	55	1.10	61	Dolphin fish
	2,558	0.75	1,919	Rock shrimp
Totals	2,704		$2,044	
6	4,545	$0.50	$2,273	Rock shrimp (36-40 tails)
	18	0.60	11	Flounder
Totals	4,563		$2,284	
7	3,765	$0.40	$1,506	Rock shrimp (36-40 tails)
	63	0.45	28	Squid
	65	0.60	39	Flounder
Totals	3,893		$1,573	

Appendix C (cont'd). Catch summary before packing and freight for the M/V CAPT. MERRITT from fish trawling

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	133	$1.75	$233	Gag grouper
	38	0.30	11	Big eye
	34	1.85	63	Snowy grouper
	85	0.30	26	Black sea bass
	23	2.50	58	Small red snapper (under 5 lbs.)
	167	2.75	459	Large red snapper (over 12 lbs.)
	31	0.50	16	Cobia
	100	0.35	35	Greater amberjack
	28	0.50	14	Squid
	21	1.25	26	B-liner (3/4 lb. and over)
	971	0.75	728	B-liner (under 3/4 lb.)

Appendix C (cont'd). Catch summary before packing and freight for the M/V CAPT. MERRITT from fish trawling

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	437	$0.85	$ 371	Large pink snapper (over 1 lb.)
	141	0.50	71	Small pink snapper (under 1 lb.)
	724	0.60	434	Silver snapper (mixed sizes)
Totals	2,933		$2,545	
2	185	$0.70	$130	Cobia
	310	1.70	527	Gag grouper
	85	2.00	170	Strawberry grouper
	100	2.00	200	Scamp grouper
	43	0.35	15	Blue angelfish
	18	1.10	20	King mackerel
	121	0.50	61	Big eye

Appendix C (cont'd). Catch summary before packing and freight for the M/V CAPT. MERRITT from fish trawling

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	73	$1.85	$135	Small B-liner (under 3/4 lb.)
	50	2.60	130	Medium B-liner (3/4 - 1-1/2 lbs.)
	8	2.35	19	Large B-liner (over 1-1/2 lbs.)
	295	3.35	988	Medium red snapper (2-8 lbs.)
	125	3.35	419	Large red snapper (over 8 lbs.)
	229	0.60	137	Large white snapper (over 2 lbs.)
	107	0.85	91	Small white snapper (under 2 lbs.)

Appendix C (cont'd). Catch summary before packing and freight for the M/V CAPT. MERRITT from fish trawling

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
2	49	$0.85	$ 42	Small pink snapper (under 1 lb.)
	252	1.20	302	Large pink snapper (over 1 lb.)
Totals	2,050		$3,386	

Appendix C (cont'd). Catch summary before packing and freight for the M/V STEPHANIE LYNN from royal red and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
1	1,065	$3.40	$3,621	Royal red shrimp (41-45 tails)
	327	3.20	1,046	Royal red shrimp (46-50 tails)
Totals	1,392		$4,667	
2	2,678	$3.50	$9,373	Royal red shrimp (40-50 tails)
3	2,618	$3.50	$9,163	Royal red shrimp (40-50 tails)
	39	2.20	86	*Geryon* and *Cancer* crab legs
Totals	2,657		$9,249	
4	4,056	$3.60	$14,598	Royal red shrimp (40-50 tails)
	77	2.20	169	*Geryon* and *Cancer* crab claws
Totals	4,133		$14,767	

Appendix C (cont'd). Catch summary before packing and freight for the M/V STEPHANIE LYNN from royal red and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
5	663	$3.60	$2,387	Royal red shrimp (40–50 tails)
	132	1.70	224	Cancer crab legs
	49	2.20	108	Geryon crab legs
	222	1.70	377	Geryon and Cancer crab claws
	150	0.70	105	Squid
Totals	1,216		$3,201	
6	3,690	$1.00	$3,690	Rock shrimp (26–30 tails)
	70	7.61	533	Brown shrimp (10–15 tails)
Totals	3,760		$4,223	

Appendix C (cont'd). Catch summary before packing and freight for the M/V STEPHANIE LYNN from royal red and rock shrimping

Trip No.	Catch (lbs.)	Price per pound	Total amount (rounded)	Species and grade
7	3,223	$1.10	$ 3,430	Rock shrimp (51-55 tails)
8	16,498	$0.70	$11,549	Rock shrimp (31-35 tails)
9	22,689	$0.70	$15,882	Rock shrimp (26-30 tails)

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