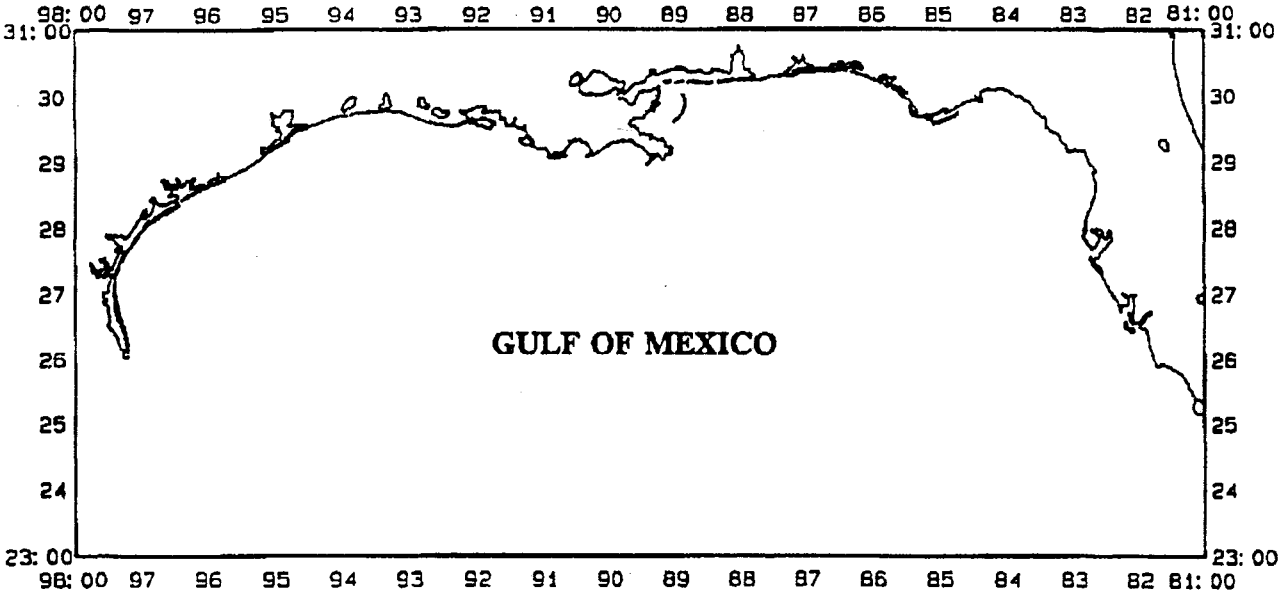
CRUISE RESULTS

Shrimp Trawl Bycatch Reduction

NOAA Ship *Oregon II* Cruise 92-05 (201)

09/04 - 29/92



U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Mississippi Laboratories
Pascagoula Facility
P.O. Drawer 1207
Pascagoula, MS 39568-1207

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Mississippi Laboratories
Pascagoula Facility
P.O. Drawer 1207
Pascagoula, MS 39568-1207

Shrimp Trawl Bycatch Reduction
NOAA Ship OREGON II Cruise OT92-05(201)
9/4/92 - 9/29/92

INTRODUCTION

A shrimp trawl bycatch reduction study was conducted aboard the NOAA Ship OREGON II September 4-29, 1992. The cruise was divided into four legs. The first three legs were spent evaluating various shrimp trawl finfish excluder designs. The fourth leg, a modification to the original cruise schedule, was used to complete ichthyoplankton sampling.

OBJECTIVES

1. Conduct diver evaluations of prototype shrimp trawl finfish excluder designs.

2. Conduct comparative evaluations of shrimp trawl finfish excluder designs.

3. Collect ichthyoplankton with bongo, neuston, and Tucker trawl gear for abundance and distribution of eggs, larvae, and small juvenile king and Spanish mackerel, clupeids, lutjanids, and sciaenids.

4. Collect water samples from surface, mid-depth, and maximum depth for dissolved oxygen and salinity determinations.

5. Measure environmental parameters using the CTD.

6. Collect reference salinity samples once a day for CTD calibration.

7. Collect chlorophyll samples from surface waters.

8. Record marine mammal sightings/identifications along the cruise track.

9. Collect red drum/snapper larvae in coordination with the GCRL red drum project.

10. Collect larval fish in coordination with the GCRL MARFIN snapper project.

11. Collect tar/debris encountered during neuston sampling at SEAMAP stations.

GEAR DESCRIPTION AND METHODS

For shrimp trawl bycatch reduction work, the NOAA Ship OREGON II was double rigged with 55-ft Mongoose trawls, 8-ft x 40-in trawl doors and 40-fm bridles. Tickler chains were set 42 inches shorter than the trawl footrope, and the headrope was floated at the bib apex with two 10-in CEIS floats. Towing speeds ranged from 2.5 to 3.0 knots.

Three basic finfish excluder designs; an excluder funnel, a turtle excluder device (TED) with side openings, and a fisheye excluder; were evaluated. The excluder funnel was evaluated ahead of, as a modification to the TED accelerator funnel, and behind a super shooter TED. It was modified from previous testing by attaching a small mesh skirt around the large mesh escape section (Figure 1). The purpose of the skirt was to reduce water flow through the large mesh openings to enhance small fish escapement. The side opening excluder was incorporated into a weedless TED design (Figure 2) and the fisheye was attached to the top of the net just ahead of the codend (Figure 3). In addition to being evaluated by divers, the latter two excluder designs were also tested using comparative towing methods.

Diver evaluations, using standard trawl diving procedures, were conducted on the trawls and the various excluder devices. Water flow measurements, using a diver operated Oceanic current meter, were made to study trawl and excluder device performance characteristics. Divers also observed fish behavior in relation to the different excluder designs.

Comparative fishing tests over commercial shrimp fishing grounds were conducted after diver evaluations were completed. For comparative testing, the test net was equipped with a super shooter TED and finfish excluder or TED/finfish excluder combination, and the control net was equipped with a standard super shooter TED. Twenty 1-h tows were conducted with each test design. After the first ten tows were completed, the extensions containing the control TED and the test TED/finfish excluder combinations were switched to reduce possible net or towing side biases.

Catches made during comparative testing were weighed and sampled after each tow. Samples were sorted and weighed. Select species, including snapper and mackerel, were separated from the total catch, counted, measured, and weighed.

For ichthyoplaknton samplings standard SEAMAP cruise operations began offshore of central Florida, station 73, and terminated off the northwest Florida coast, station 100. When cruise operations reached the Alabama-NW Florida shelf, Tucker trawl samples were collected to meet the requirements of the 22 station GCRL MARFIN snapper project.

RESULTS

Water flow measurements made on the standard Mongoose trawl (Figure 4) showed a slight increase in flow where the trawl tapered into the intermediate and reduced water flow in the codend. In the wings and belly of the trawl water flow was reduced from the inside to the outside of the trawl webbing.

Modifications to adjust water flow were made to the skirted excluder funnel and the modified TED with side openings to optimize small fish exclusion. Divers observed that fish 60 to 90 mm in length were able to escape at water flow speeds of .2 to .5 m/sec. These fish could not escape at speeds much over .5 m/sec and would not leave the trawl when water flow dropped below .2 m/sec.

Comparative towing test results (Table 1) show a finfish reduction rate of 46.2 percent with the weedless TED with side openings and only 7.6 percent with the fisheye. A shrimp loss of 7.8 percent was indicated with the side opening modification.

After the assignment of SEAMAP numbers to SEAMAP samples, left bongos were deposited with Mr. Ken Stuck at GCRL, for processing, analysis, and storage (Table 2). Also, substitute left and right bongo samples, taken for the GCRL effort, along with Tucker trawl collections were deposited with Mr. Bruce Comyns at GCRL. The right bongo and single neuston SEAMAP samples were shipped to SZIOP, Szczecin, Poland for sorting.

Test data from the two 800 m CTD profiles, chlorophyll samples, and all remaining data were returned to NMFS Mississippi Laboratories for analysis, comparison, and archiving (Table 3). The results of the chlorophyll samples taken at GCRL sampling sites, will be provided to GCRL as soon as the analysis are complete.

CRUISE PARTICIPANTS

Leg 1 September 4-14, 1992

Ian Workman, Field Party Chief, NMFS, Pascagoula, MS
John W. Watson, Branch Chief, NMFS, Pascagoula, MS
Dan Foster, Fishery Biologist, NMFS, Pascagoula, MS
Charles Taylor, FMES, NMFS, Pascagoula, MS
Dale Stevens, FMES, NMFS, Pascagoula, MS
Kendall Falana, FMES, NMFS, Pascagoula, MS

Leg 2 September 15-17, 1992

Ian Workman, Field Party Chief, NMFS, Pascagoula MS
John Mitchell, Research Fishery Biologist, NMFS, Pascagoula, MS
Dan Foster, Fishery Biologist, NMFS, Pascagoula, MS
Dominy Hataway, Fishery Biologist, NMFS, Pascagoula, MS
Charles Taylor, FMES, NMFS, Pascagoula, MS
Kendall Falana, FMES, NMFS, Pascagoula, MS

Leg 3 September 18-22, 1992

Ian Workman, Field Party Chief, NMFS, Pascagoula MS
Dan Foster, Fishery Biologist, NMFS, Pascagoula, MS
Dominy Hataway, Fishery Biologist, NMFS, Pascagoula, MS
Charles Taylor, FMES, NMFS, Pascagoula, MS
Kendall Falana, FMES, NMFS, Pascagoula, MS

Leg 4 September 23-29, 1992

Alonzo N. Hamilton, Jr., Field Party Chief, NMFS, Pascagoula, MS
Perry Thompson, Fishery Biologist, NMFS, Pascagoula, MS
Lisa Mills, Fishery Biologist, NMFS, Pascagoula, MS
Teresa Rotunno, Bio. Tech., NMFS, Pascagoula, MS
Eva Kargard, Bio. Tech., NMFS, Pascagoula, MS
Jon Petersen, Bio. Tech., NMFS, Pascagoula, MS

Submitted by:

Ian Workman
Field Party Chief
Legs 1, 2, & 3

Alonzo Hamilton
Field Party Chief
Leg 4

Approved by:

Dr. Scott Nichols, Director
Mississippi Laboratories

Dr. Bradford E. Brown
Acting Director
Southeast Fisheries Science Center

Table 1. Day-night comparison of finfish and shrimp reduction rates between standard TED equipped trawls and TED equipped trawls with finfish excluder modifications.

Finfish Excluder	Percent Reduction Rates Finfish	Shrimp
Modified weedless TED with side openings.	46.2	7.8
Standard super shooter TED with fisheye excluder.	7.6	+2.7

Table 2. Summary of Ichthyoplankton effort.

SAMPLE TYPE	NUMBER OF SAMPLES
BONGOS:	
SEAMAP LEFT	27
SEAMAP RIGHT	27
GCRL LEFT	0
GCRL RIGHT	0
TUCKER TRAWLS:	
GCRL RED DRUM	0
GCRL MARFIN	21
NEUSTONS;	
SEAMAP SINGLE	25

Table 3. Summary of Environmental data.

GEAR TYPE	NUMBER OF READINGS
CHLOROPHYLLS:	
SEAMAP	27
GCRL RED DRUM	0
GCRL MARGIN	22
YSI OXYGEN:	
SURFACE	27
MID-DEPTH	25
MAXIMUM	26
SALINITY:*	
(Reference)	
surface	5
mid-depth	4
maximum depth	5
(Water Bottle)	
surface	0
mid-depth	0
maximum depth	0
HYDROCASTS:	49
CTD PROFILES:**	49
THERMOMETER	
SURFACE	0
MID-DEPTH	0
MAXIMUM	0
MARINE MAMMAL SIGHTINGS	9

*Represents reference samples for CTD calibration and water samples collected for salinity when the CTD malfunctioned.

**Does not contain 800 m profile test readings.

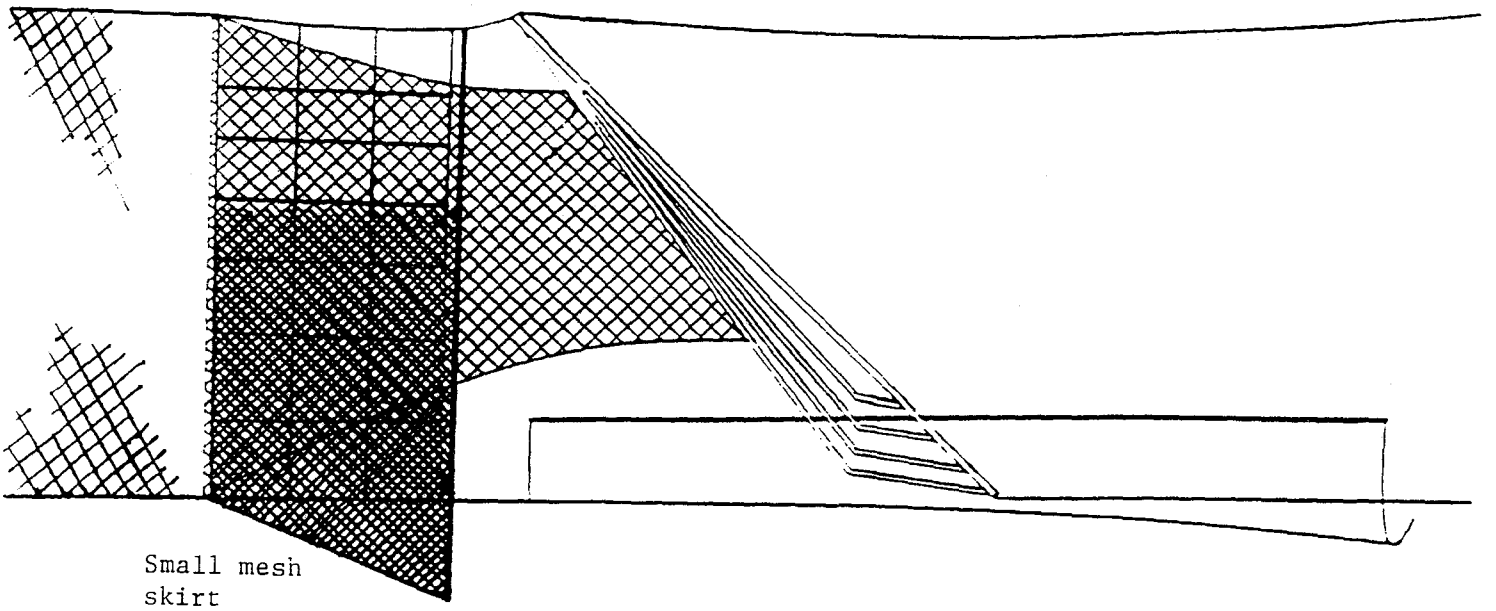


Figure 1. Excluder funnel with small mesh skirt installed ahead of a super shooter TED.

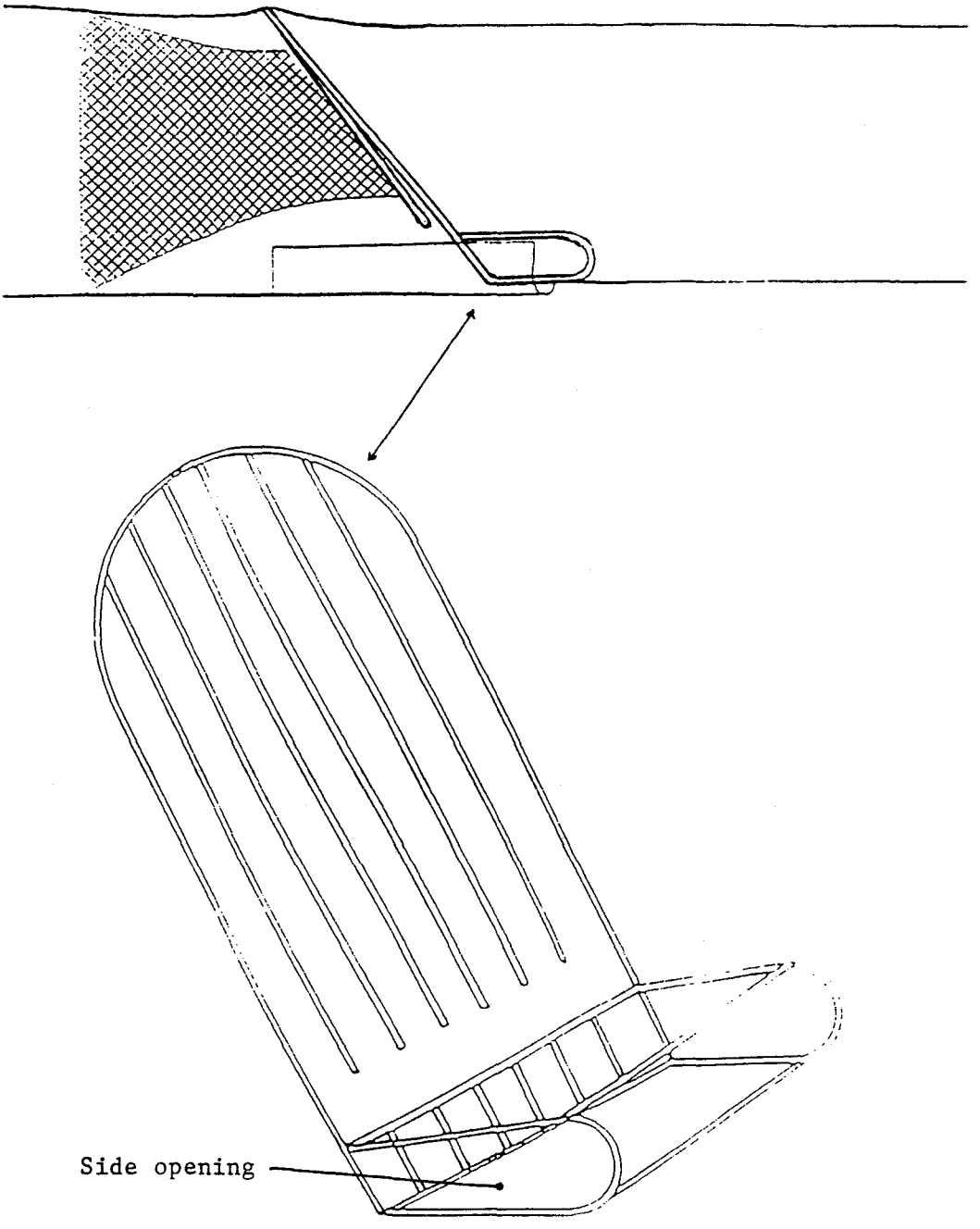


Figure 2. Weedless TED with side openings.

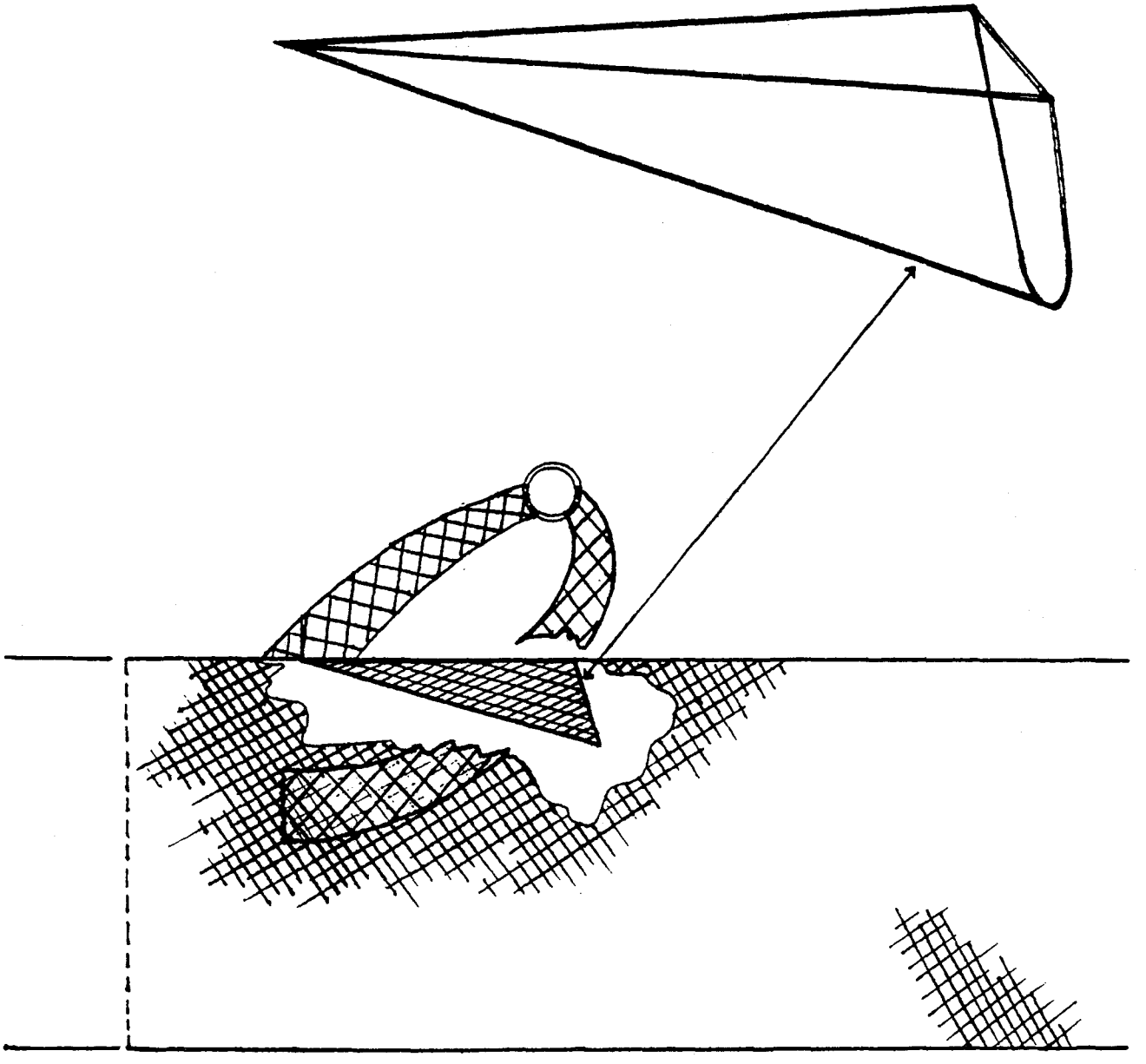


Figure 3. Fisheye excluder attached in top of net.

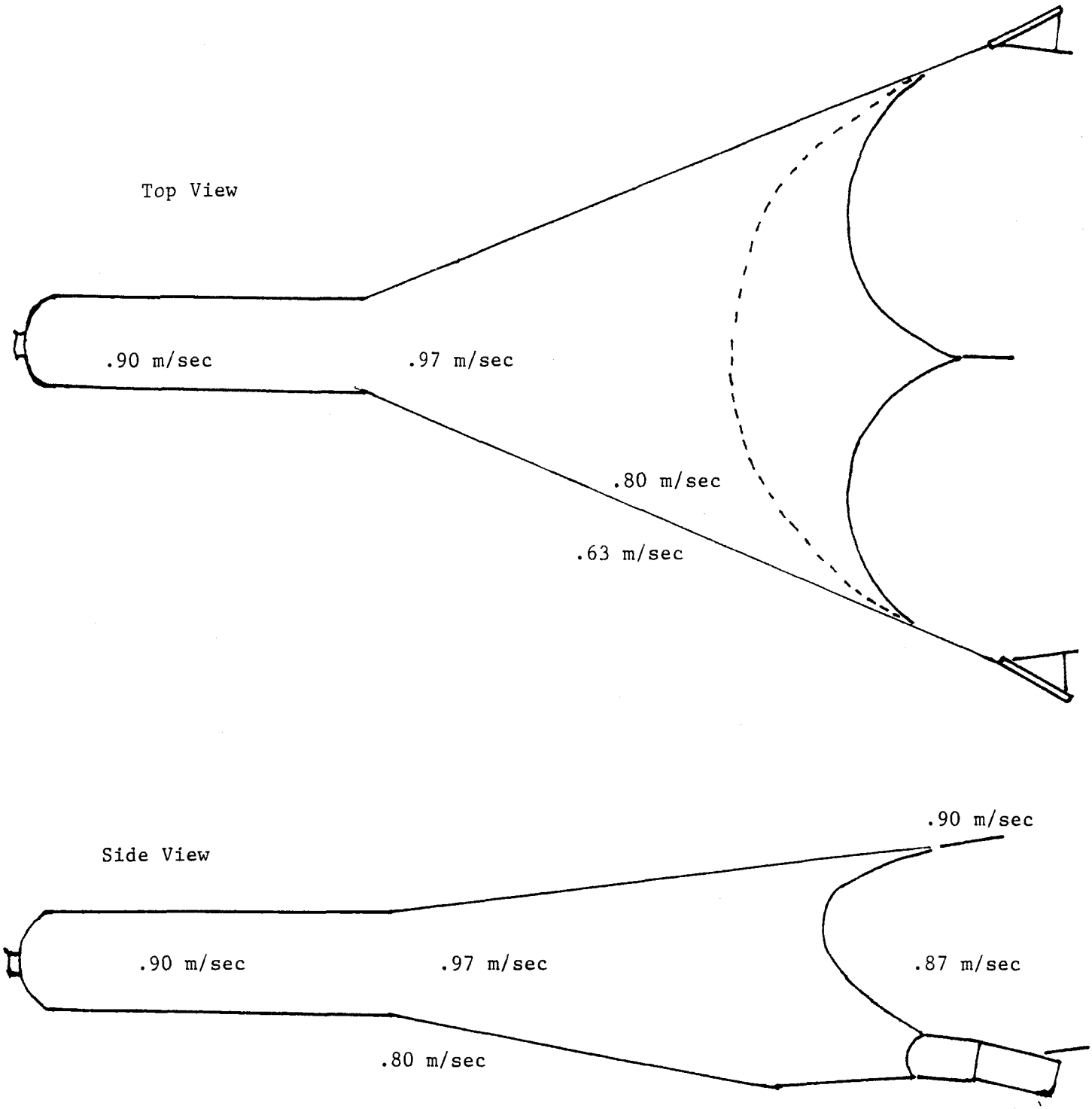


Figure 4. Water flow measurements in Mongoose trawl.