

APPENDIX 13. Cruise Announcement and Cruise Report Results, NMFS Vessel *R/V John N. Cobb*

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
National Marine Fisheries Service
Seattle, Washington

October 27, 1971

CRUISE ANNOUNCEMENT
Cruise No. 71-8
NMFS Vessel John N. Cobb

The National Marine Fisheries Service research vessel John N. Cobb will depart Seattle November 8, 1971 for a 14-day gear research cruise in Puget Sound.

Area of Operation: The principal area of operation will be in mid-Puget Sound. Operations will be conducted between Battle Point and Agate Pass and off Karkeek Park. If conditions require it, some operations may be conducted between Port Angeles and Dungeness Spit, near the south shore of Hoods Canal, or Saratoga Passage.

Objectives:

- 1) To determine the effects of a length differential in the towing cables on the overall performance of otter trawls.
- 2) To compare the performance of a NMFS modified 400-mesh eastern trawl to that of a standard 400-mesh eastern trawl. The trawls will be compared on the basis of working configuration, ability to tend bottom and relative drag.
- 3) To observe the performance of a BCF shrimp separator trawl with a newly designed separator panel. The performance of the trawl will be determined in relation to the overall configuration, variations in bridle length, ability to tend bottom, and relative drag.
- 4) To establish basic information on the technique of towing two trawls side by side from a single vessel, using three towing cables.

Equipment:

- 1) Trawls -- other than those trawls mentioned above, a Mark I Universal trawl, and a Gulf of Mexico shrimp trawl will be used on this cruise. Standard V-doors will be used with all nets.
- 2) Instrumentation -- Data will be taken using 2 Dillon dynamometers (0-20,000 lbs.), a Marine Advisors ducted flowmeter, depth telemetry and standard cable meters.
- 3) Computer -- A PDP-11 computer and teletype will be used to reduce data on board.

APPENDIX 13 (CONTINUED).

Method of Operation: All trawls will be towed (a) in mid-water; (b) in deep water on bottom, and (c) at diver depth on bottom. Diver observations of the gear will supplement data taken with instruments on each of the nets.

For further information contact: Dr. F. M. Fukuhara, Acting Director, Marine Fish, Shellfish, and Oceanography, National Marine Fisheries Service, 2725 Montlake Boulevard East, Seattle, Washington 98102 (Telephone: 442-7729).

APPENDIX 13 (CONTINUED).



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Center
2725 Montlake Blvd. E.
Seattle, Washington 98102

December 15, 1971

CRUISE REPORT
Cruise No. 71-8

NMFS Vessel John N. Cobb

The NMFS research vessel John N. Cobb completed a 16-day gear research cruise in Puget Sound on November 23, 1971.

OBJECTIVES

The major objectives of the cruise were to (1) study the effects of a trawl warp length differential on trawl-type gear and to determine whether or not tension in the trawl warps can be used as an accurate indication of relative warp lengths, (2) obtain warp load data and rigging data on a standard 400-mesh Eastern bottom trawl and a newly constructed modified 400-mesh Eastern, (3) obtain warp load data and rigging data on a 57' Gulf of Mexico shrimp trawl with separator panel and the ECF 10-53 shrimp separator, (4) obtain data and experience towing two trawls from a North Pacific trawl boat.

DESCRIPTION OF GEAR

The warp differential length studies were carried out on three different trawls, a standard 400-mesh Eastern, a Mark I Universal (midwater), and a 57-foot Gulf of Mexico shrimp trawl converted to a separator trawl. Trawl warps were measured using two pairs of cable meters calibrated in fathoms and tenths of fathoms. Tension measurements were taken using two dynamometers (0-20,000 lb.). The dynamometers were attached directly to the trawl warps using 5/8" "come alongs." A ducted flowmeter was used to measure velocity through the water. The flowmeter was suspended over the side of the vessel to a depth of approximately 50 feet. Relative tension between the two trawl warps was also measured by using a chain to deflect the warps inward and measuring the distance that the center of the chain deviated from the centerline of the vessel.

Scuba divers were used extensively to make evaluations and comparisons on the trawl gear where instrumentation would prove inadequate. Two sets of steel V-doors were used during the cruise. The 5'x7' V-doors weighed 820 lbs. each and the 6'x9' V-doors weighed 1,250 lbs. each.



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RESULTS

Warp Length Differential Studies: Relative calibration of the cable meters showed these meters to give readings that are generally less than 0.2 F (fathoms) different for warp lengths of 200 F. The relative meter readings were tested for and proven to be independent of warp velocity and winch-induced shock loads.

Measurements of warp loads were taken for warp length differentials of 0 to 10 F and are shown in Figures 1 and 2. All measurements were taken in mid-water with the rudder set on center. Measurements of relative warp load were taken using chain to deflect the warps inward. The difference in deflection of each warp is shown in Figure 3.

To observe the effects of a warp length differential on the performance of a trawl, four dives were made on a 400-mesh Eastern. On each dive the relative warp lengths were changed using differentials of 0, 3, 5, and 10 F. Designating the 0 F condition as the standard, changes in the shape of the net occurred for each differential tested. As the length differential was increased, the mouth opening appeared to become smaller and at 10 F differential 50% of the footrope was off bottom. On each of the four dives bottom debris was observed to enter the net even though the net was not functioning properly.

Comparison of a Standard 400-Mesh Eastern Trawl and the NMFS Modified 400-Mesh Eastern Trawl

Warp load measurements on both nets were completed in mid-water, as shown in Figure 4. Diving observations on both nets were made to compare the overall configuration, load distribution on the webbing, positioning of the footrope relative to the bottom, and to obtain dimensions of the mouth opening. Although both nets are very similar, the design changes made in the NMFS 400-mesh Eastern produced a measured mouth opening of 38'x10' as opposed to a mouth opening of 34'x4' for the standard 400-mesh Eastern. When the NMFS 400-mesh Eastern was towed using 6'x9' V-doors, a mouth opening of 46'x8' was measured.

Rigging experiments with diving observations were recorded on the NMFS 400-mesh Eastern. Under the conditions of the experiments, diver observations showed that the bottom bridle on each wingtip should be lengthened by one foot to make the footrope tend bottom properly.

During a tow where all the headrope floats were removed, diving observations revealed that the NMFS 400-mesh Eastern was completely collapsed vertically, showing no tendency to open itself due to water pressure.

APPENDIX 13 (CONTINUED).

Observations of Shrimp Separator Trawls: Midwater warp load measurements were recorded for two shrimp separator trawls. The results are shown in Figure 5. 10 F bridles were used on each net. Eighteen-inch extensions were added first to the top bridle and in turn to the bottom bridle. Under the conditions of the experiment the 57' Gulf of Mexico separator trawl tended to fly off bottom when the extensions were added to the top bridles and showed a tendency to remain tighter on bottom with the extensions added to the bottom bridles. The ECF 10-53 (10 ft. vertical opening and 53-ft. footrope) separator trawl showed exactly the opposite response to the bridle extensions.

After a series of diving observations on the ECF 10-53, it became apparent that the midline and riblines were too short and should be redesigned. All other aspects of the ECF 10-53 appeared to perform properly, including the trash chute.

Multiple Net Harvesting System: A technique for rigging and setting two bottom trawls was developed. The only change to the rigging of the vessel was the addition of a third towing wire (300 F) onto the net reel. Two 400-mesh Eastern trawls were shackled together along the two common breastlines. The doors were attached as normal on the two remaining wings, using 10 F bridles. A 100- to 150-pound weight was attached to the end of the third wire, which in turn was fastened to a third pair of 10 F bridles shackled to the common breastlines. Figure 6 describes the rigging technique used.

Midwater warp load measurements were made on the double net system as shown in Figure 7. Diving observations showed that these two nets operated independently of each other and together covered over twice as much area as a single trawl towed at an equivalent speed.

Personnel Assignments: Gary F. Loverich, Field Party Chief Nov. 8-23, 1971
Jerry Jurkovich, Fishery Biologist Nov. 8-23, 1971

Diving Personnel: Gary F. Loverich, Ocean Engineer
William L. High, Fishery Biologist
Daniel J. Twchig, Electronics Technician
Ian Ellis, Fishery Biologist
Larry D. Lusz, Engineer
Jo Ann Duffy, Fishery Graduate Student, U. of W.

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