

FINAL REPORT

PROJECT TITLE: "Gear Development to Reduce Bycatch in the North Carolina Trawl Fisheries"

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GULF & SOUTH ATLANTIC FISHERIES DEVELOPMENT FOUNDATION, INC.
COOPERATIVE AGREEMENT NO. NA90AA-H-SK052
CONTRACT NO. 43-01-92134/28172 (YR I) and 43-03-95718/29978 (YR II)
AWARD PERIOD 08/01/90 THROUGH 10/31/92



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43-03-95718/29978 (YR II)

Amount of Grant: Federal \$205,188 Match \$58,150 Total \$263,338

Project Title: Gear Development to Reduce Bycatch in the North Carolina Trawl Fisheries

Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc.

Subcontractor: North Carolina Department of Environment, Health, and Natural Resources, Division of Marine Fisheries.

Award Period: 08/01/90 to 10/31/92 (Amended)

Budget Period: 08/01/90 to 10/31/92

Period Covered by this report: 08/01/90 to 10/31/92

Under this Award, two contracts were initiated with the North Carolina Division of Marine Fisheries. The original Cooperative Agreement dates were August 1, 1990 through July 31, 1991. The project period was to include a second year, contingent upon the availability of funds and meeting first year objectives. Three amendments were executed during the course of this award. Amendment #1, executed September 15, 1990, deleted special award conditions #1 and #4. Amendment #2, executed August 1, 1991, provided a no-cost extension through October 1991. Amendment #3, executed November 1, 1991, provided a second year of funding for the approved two year project period. Budget period for the second year was November 1, 1991 through October 31, 1992. The Foundation staff performed a desk audit on this project, with results indicating compliance with award conditions.

I. Executive Summary

Reduction of finfish bycatch in the shrimp fishery is ecologically and economically beneficial. It will reduce effort and cost to the industry, lessen environmental impact on the marine environment, and may increase available stocks of fishes for other recreational and commercial fisheries. This is of especial importance in the North Carolina area as much of the effort is concentrated in inshore waters used by juvenile fish as a nursery ground.

During 1990-1992, the North Carolina Division of Marine Fisheries (NCDMF) examined methods to reduce finfish bycatch in the local shrimp fisheries. This included examining several devices such as Florida fish excluders (FFE's), accelerator funnels, mesh sizes in otter trawls and ocean flynets, and contributions to exclusion gained from the use of turtle-excluder-devices (TED's).

FINAL REPORT

Grant No. NA90AA-H-SK052

Grant Period: 08/01/90 - 10/31/92

Page 2

Results indicated that FFE's reduced finfish catch by as much as 70% with shrimp catch rates ranging from -18% to +9%. Increased mesh sizes in trawl tailbags did not significantly alter finfish retention, but fish sizes were affected in the flynet fishery. Subsequent to these studies, the NCDMF required the use of 76mm square mesh codends in the flynet fishery, and use of a functional FFE in the shrimp fishery.

II. Introduction

The North Carolina fishing industry contributes substantially to the local and state economy; however there are many current problems concerning the various targeted and non-targeted resources. A substantial amount of unwanted by-catch occurs in the inshore shrimp fisheries, and development of methods to reduce this bycatch would alleviate problems in resource allocation among the various constituency groups. Recent regulations have been placed on landings, fishing areas, etc.; however, gear modifications are also needed to maintain viable fisheries throughout the region.

This report summarized conclusions of a detailed experimental project that addressed the bycatch issue. Portions of this report update information provided at the conclusion of the Year I funding cycle; the remainder includes findings reached during the Year II period. These results and conclusions are provided in detail in the sub-contractor's final report (see attachment), and are only summarized here.

III Purpose

This project worked to solve managerial problems associated with maintaining viable fishery resources for the state of North Carolina with the goal of addressing conservation of resource, maintaining and improving available fish stocks, and alleviating conflicts among user- and interest-groups. This goal was addressed by the following objectives:

- 1) Work with fishermen and gear manufacturers to determine the optimum mechanisms for gear that would be more efficient and more selective for target species;
- 2) Develop gear that would reduce bycatch, conserve fish stocks, and contribute to better management of fish stocks and their environment;
- 3) Build a capacity within the Division of Marine Fisheries to develop more effective gear through applied research by working within and with the industry, and to implement better gear into the industry; and
- 4) Contribute to a more effective mechanism for allocation of stocks among commercial and recreational fishing interests.

FINAL REPORT

Grant No. NA90AA-H-SK052

Grant Period: 08/01/90 - 10/31/92

Page 3

IV. APPROACH

To address the objectives, an industry advisory committee was established to overview the design and testing phase of the study, and two fisheries were examined: the inshore shrimp fishery and the offshore flynet fishery. During the first year, initial field work consisted of gear development for the inshore fishery, and identified gears were then commercially tested during the second year. In the flynet fishery, gears were tested during both years.

For the inshore shrimp fishery, two initial designs were tested: the Florida fish excluder (FFE) and an accelerator funnel. Additionally, the contribution of TED's towards bycatch reduction was documented. During Year II, testing concentrated on areas known to have commercially viable quantities of shrimp. For the flynet fishery, different mesh types - square and diamond - in the codend were tested over a two year period. Initial tests of gear designs were carried out aboard research vessels under limited tow times. Once the more promising devices were identified, they were tested under actual commercial fishing conditions.

This project was monitored by the Gulf and South Atlantic Fisheries Development Foundation, Inc. to insure compliance with all OMB guidelines and that there was timely submission of all periodic Financial and Programmatic reports. Work on the project was carried out by personnel at the North Carolina Division of Marine Fisheries, with cooperative efforts by the University of North Carolina Sea Grant Program and the North Carolina Fisheries Association.

V. Findings

Inshore shrimp fishery- Initial tests were conducted on accelerator funnels and FFE's. The funnels did not appear to work well in the local area, and further examination of this device was not done. Several configurations of FFE's were tested in estuarine areas, with varying success results. The most successful reductions were 32% with a 6% shrimp loss. Using larger nets and longer tow times improved results to around 50-60% finfish reductions with < 10% shrimp loss.

Tests of four different TED's against a non-TED net also showed varying success in fish loss and shrimp retention. In general, shrimp loss was less than 10%, and some TED's, such as the mini-super shooter, had substantial fish loss. Combinations of TED/BRD designs had an overall bycatch reduction of 39% with a 7% shrimp loss.

Ocean Flynet fishery- A total of 52 experimental tows and 42 control tows were made. There were definite differences in the size of fish retained between square-mesh codends and control nets.

VI. Evaluations

The project goals, objectives and benefits are outlined above, and each of the objectives were met with varying success.

Objective #1 -- work with industry to determine efficient gears

The development of an industry gear advisory panel provided the necessary input to develop a strategy for testing gears, and initially identifying gears with the most potential.

Objective #2 -- develop gear to reduce bycatch

Inshore shrimp fishery-- Initial sampling design was modified to a paired tow method because of its greater flexibility for modification of design. Results from the various tests and positive feedback from commercial fishermen voluntarily using the gears led to fishery regulations requiring the use of FFE in the inshore shrimp fishery.

Ocean Flynets fishery-- Testing of various sizes of codend meshings indicated that it was possible to reduce the catch of small fish by using square mesh of larger size. Larger sizes may cause problems with entanglement (gilling) of larger fish, but this was not considered a frequent occurrence. Additionally, there was a concern with mesh stretching that allowed too much escapement, although test gear did not show significant amounts of stretching.

Objective #3 -- develop NCDMF capacity to implement better design by cooperative efforts

Overall, there was general support for the project among industry, although there has been some skepticism commented. Project staff gained valuable insight in ways to approach dealing with industry, and provided information transfer opportunities from DMF to industry through press releases, newspaper articles, and workshops.

Objective #4 -- contribute to more effective stock management

Two regulations were enacted: use of an FFE in the inshore fishery, and use of larger mesh in the flynet fishery. The biological and economic impact of these requirements must be measured on a long-term basis.

Presentations of results to the Atlantic States Marine Fisheries Commission, NC

FINAL REPORT

Grant No. NA90AA-H-SK052

Grant Period: 08/01/90 - 10/31/92

Page 5

Legislators, and other interested groups provided better understanding of the program. Workshops for industry demonstrated construction and installation techniques, provided information concerning the gear's success, and certain gears were provided, at no-cost, to fishermen.

VII. Conclusions

Fishermen found direct benefit from using FFE's in reduced culling time, higher product quality, fuel savings, and in some cases, increased shrimp catches either through reduced time required for culling or increased catch per effort.

Although the devices have been shown to work, there is still room for improvement, and one suggested approach is recording the behavior of fish in the net through the use of underwater video equipment.

Reductions in bycatch were achieved using larger mesh in the flynet fishery, and the potential mesh-stretching problems can be alleviated with proper care.

The overriding conclusion of this study is that significant reductions in bycatch are possible, with minimal loss or increased shrimp catch, which serves not only to directly benefit the industry economically, but provides for less impact on the marine environment, and may promote available stock size of other recreationally and commercially important fish species.

July 2 Jamison
Signature of Principal Investigator

11/31/93
Date

[Signature]
Signature of Project Director

11/31/93
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