



**Technology Transfer of New Turtle Excluder
Device Modifications and Updated Bycatch
Reduction Device Information to the
Southeastern Shrimp Industry**

Final Report

March 2005

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I. Report Title, Author, Organization, Grant Number, Date:

**Technology Transfer of New Turtle Excluder Device Modifications and
Updated Bycatch Reduction Device Information
To the Southeastern Shrimp Industry**

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II. Abstract:

New regulations regarding changes to turtle excluder devices (TEDs) for shrimp trawls were announced by the National Marine Fisheries Service (NMFS) on February 21, 2003. Due to confusion and misinformation surrounding TEDs within the shrimp fishery of the Gulf of Mexico and South Atlantic, Gulf & South Atlantic Fisheries Foundation (Foundation) Regional Coordinators convened both formal and informal workshops to assist industry. Although formal workshops proved to be an efficient method of reaching industry members throughout the region (~405 individuals contacted), informal dockside workshops proved more efficient and provided a vehicle for individual problems to be assuaged (>933 individuals contacted). Efforts were also taken to distribute TED materials (multilingual videos and brochures) to net shops and fishing gear manufacturers. To allow fishermen to individually assess the various regulation TEDs, demonstration TEDs were purchased and placed aboard key vessels within the Gulf of Mexico for evaluation. In addition to providing TED information to commercial fishermen, updates on the status of bycatch reduction devices was disseminated.

III. Executive Summary:

New regulations regarding changes to turtle excluder devices for shrimp trawls prompted the Foundation's Regional Coordinators to engage the commercial shrimp fishing industry with the timely transfer of TED technology. In addition to providing assistance with TEDs, new information regarding BRDs was shared with industry members during field efforts. The specific goals of this project were to: (1) Provide the shrimp industry with clear description of new TED regulations, (2) provide information and assistance with newly mandated TED modifications, (3) provide information of new BRD designs, exchange ideas regarding status of prototype gears being tested, and assist individuals with problems that they are encountering, (4) share experiences of fishermen with BRDs and TEDs in one area with industry members in another so that heuristic experiences can be used as an asset.

Formal and informal workshops and meetings were the methods most often used to engage industry members. These efforts were augmented through the dissemination of handout materials to net shops and TED/grid manufacturers. The purpose of formal workshops was to educate fishermen about new TED designs and related construction techniques. Although these workshops were an efficient method for contacting fishermen, it was not the most effective; individual problems were hard to assess and rectify. It was found that informal dockside meetings were most effective, and allowed individuals problems to be resolved. Approximately 100 ports were visited during informal dockside visits with >900 fishermen contacted. During all field efforts TED and BRD information was distributed, including: printed copies of the final TED regulations as published in the Federal Register, multilingual printed TED construction handouts, multilingual TED construction videos, and underwater videos of BRD testing. Additionally, the phenomenon of knot orientation was discussed and results of improper flap installation.

To further the heuristic experiences of this project, TED demonstrations were conducted onboard several vessels operating within the Gulf of Mexico. Vessel captains relayed the results of their individual TED demonstrations to the Foundation's Regional Coordinators, who then shared these experiences with fishermen from other areas within the Gulf. The results of these test indicated that the short flap of the Double Cover TED could become fouled and increase shrimp loss. This information assisted NOAA Fisheries/NMFS in providing temporary permits to fishermen for the allowance of an extended flap on the Double Cover TED until operational field trials proved that the configuration would pass TED testing protocols.

This project was successful in identifying reliable and effective methods to transfer fishing gear technology and educational information to fishermen throughout the southeastern United States. Due to the dynamic nature of fishing regulations and the fishing industry, future educational and outreach efforts of this type will likely be needed to increase regulatory compliance and ensure that industry is conscious of the results of research pertaining to fishing gear technology.

IV. Purpose:

A. Description of Problem

New regulations regarding changes to turtle excluder devices (TEDs) for shrimp trawls were announced by the National Marine Fisheries Service (NMFS) in the Federal Register on February 21, 2003. These regulations, implemented in the South Atlantic on April 15, 2003, and in the Gulf of Mexico on August 21, 2003, focused upon larger escape openings for loggerhead, adult green and leatherback sea turtles. These mandated changes regarding TED dimensions, both for grid sizes and escape holes, also affected construction parameters and grid designs. Problems were identified with various TED grid types, such as the Anthony Weedless, that may have impacted turtle mortality; these were either decertified or required modification. Additional regulations regarding shrimp trawling /sea turtles were enacted that related to shrimp trawl net deployment and new definitions of bait shrimp operations. The Gulf and South Atlantic Fisheries Foundation, Inc. (Foundation) responded to these needs through MARFIN funding support.

To enable an effective and efficient transition into the use of the new TED types, numerous fishermen were engaged through workshops and personal contacts. As the new TED regulations required somewhat drastic changes for Industry in certain parts of the region, especially the western Gulf of Mexico, and as confusion and misinformation existed in the shrimp industry, intensive outreach by gear experts was required to assuage these problems. A critical step was to provide demonstration TEDs to net shops which would be constructing the new gear or performing modifications on old excluders. Additional devices were placed aboard vessels for evaluation by key fishermen with follow-up advice or input relative to making the gear perform to its maximum capacity.

Gary Graham, Professor and Extension Marine Fisheries Specialist with the Texas A&M University Sea Grant Program and Capt. Lindsey Parker, Marine Fisheries Specialist with the University of Georgia Marine Extension Service acted as co-principal investigators on this project. Both individuals serve as Foundation Coordinators for the Gulf and South Atlantic Fisheries Foundation, Inc. Additionally, Richard Vendetti, Marine Fisheries Specialist with the University of Georgia Marine Extension Service, assisted with field work in the South Atlantic.

In addition to providing assistance with TED technology transfer, new information regarding bycatch reduction devices (BRDs) was shared with industry members during the proposed field efforts. With gear experts in the field to disseminate TED information, it was prudent the knowledge of updated BRD information also be transmitted to Industry. This project allowed dovetailing of BRD technology transfer with efforts to provide TED information to fishermen.

B. Project Goals and Objectives

The focus of this project was to provide TED and BRD information to members of the fishing industry throughout the Southeast Region (North Carolina to Texas). More specifically, the intentions were to:

- (1) Provide the shrimp industry with clear descriptions of new TED regulations.
- (2) Provide information and assistance with newly mandated TED modifications, i.e., demonstrate and teach construction changes needed in installing 71 inch escape hole; construction techniques for Double Cover TED.
- (3) Provide information of new BRD designs, exchange ideas regarding status of prototype gears being tested, and assist individuals with problems that they are encountering.
- (4) Share experiences of fishermen with BRDs and TEDs in one area (both positive and negative) with industry members in another so that heuristic experiences can be used as an asset.

V. Approach:

A. Approach

A number of approaches were used to accomplish TED and BRD outreach efforts. These activities varied considerably in scope and were based on heuristic experiences derived from previous technology transfer efforts conducted over the last three decades. Varieties of approaches were deemed to be most appropriate in engaging industry and directing effective outreach efforts. The following discussion focuses upon efforts and approaches associated with the successful execution of this project.

Handout Materials

Reference materials for TED and BRD users/manufacturers were distributed extensively through the South Atlantic and Gulf of Mexico. Construction instructions regarding the 71" leatherback TED, the double cover TED and the inshore TED were developed by NMFS-Pascagoula. Project funds produced numerous copies of these publications which were considered an important educational tool in training clientele with the new TED designs. Copies of the final rule as it appeared in the Federal Register were also reproduced and distributed to Industry. Important aspects regarding grid design changes, bait shrimp regulations as they related to TEDs, and try net requirements were highlighted so they could be aware of these changes. Additionally, NMFS-Pascagoula developed instructional videos for TED construction/modification. These were also extensively distributed. Importantly, these videos were multi-lingual and

served very well in educating members of the industry in the Hispanic and Asian-American communities.

Additionally, underwater videos of BRDs which were produced from a previous MARFIN grant were disseminated to the fishing industry. Lindsey Parker, a Co-PI on this project, also developed DVDs of underwater interactions of sea turtles with the new TED devices and these were shown to various interested parties throughout the southeast. Copies of these DVDs were sent to people who expressed interest in studying underwater footage of the TEDs. Toward the end of the project, NMFS-Pascagoula produced laminated instructional sheets in different languages which were also distributed to Industry.

Collaboration with NMFS-Pascagoula

Throughout this project, there was incredibly close coordination between the Foundation and NOAA Fisheries. Several meetings were held to discuss planning and execution of this project and sometimes gear experts with NMFS-Pascagoula accompanied the Foundation team while conducting TED/BRD technology transfer. During this project, frequent conferences were held to exchange information and ideas relative to achieving an efficient and effective transition into the adaptation of the new TEDs.

Net Shops, Grid and TED Manufacturers

Net shops and TED manufacturers were an important group needing immediate assistance in this project. During this MARFIN effort, 43 net shops in the Gulf of Mexico received assistance and information. An additional 13 net shops in the South Atlantic received benefit through this project. Handouts relating to TEDs and BRDs were regularly left at net shops for reference and dissemination to fishermen. Follow-up was conducted with many of these net shops through the course of this project.

Special attention was directed toward net shops for a variety of reasons. As these businesses produce TEDs for many of the fishermen, they are often the gathering places for crews and boat owners who acquire information at these businesses. Much of the information regarding gear and related laws is disseminated to industry from contact with net builders. New TED designs, often provided by NMFS, were taken during visits to the various net shops. Construction and modification techniques were discussed in length with the various net builders. During the intermediate stages of this project, TEDs being constructed or modified were inspected for adherence to proper construction mandates.

After initial contacts, the Principal Investigators (PIs) of this project regularly received inquiries from net shops that were visited. These questions were often fielded or directed to NMFS gear experts in Pascagoula, MS.

Knot Orientation

Several years prior to this project, the phenomenon of knot orientation was brought to the attention of the shrimp industry. It was discovered that water pressure against knots in the webbing greatly influence the direction that netting would take in relationship to water flow. The orientation of the knots was deemed extremely important in TED flaps. It was determined that if knots in the flap were installed in the incorrect direction, the water pressure might keep the flap open and result in potential loss of shrimp. Conversely, if the flap were installed with the knots oriented correctly, then the flap would have more of a tendency to remain closed and retain the catch.

An important mistake was rapidly discovered with the construction of TEDs, both the older designs which were being decertified and the newly-mandated devices. The flaps covering the escape hole were commonly being installed with the orientation of the webbing pointed in the wrong direction. This was an extremely common problem and apparently was either not understood well by Industry or simply overlooked. Special emphasis was placed on inspecting TEDs in net shops and aboard vessels. It was disconcerting to see that this mistake was being made so extensively throughout the southeast. It is believed that this problem ultimately was ameliorated through educational efforts conducted through this project.

Workshops vs. Personal Contacts

As a result of working with Industry since the introduction of TEDs and BRDs, knowledge has been gained regarding outreach mechanisms used to disseminate information. Through experience, it has been established that smaller, more informal workshops are more effective than traditional workshops where large numbers of fishermen are assembled. Smaller, more personal assemblies are less likely to result in expressions of volatility. Furthermore, the opportunity to share more effective one-on-one assistance with TED or BRD modifications can be achieved with smaller groups. From a time-management perspective, small meeting groups are less efficient; however, experience dictates that the dissemination of information that is of such an emotional nature to the shrimp industry can be achieved much more effectively through small, but more numerous, workshops or gatherings with fishermen.

Emphasis in this project was directed toward contacting small groups of fishermen and providing technology transfer. Formal workshops were conducted in certain areas often at the request of Sea Grant or fishery associations. The majority of outreach work was conducted at the waterfront in small group meetings and was deemed very effective.

At-Sea Education

Time and resources incorporated through this project did not permit going to sea with fishermen and solving problems encountered with TEDs or BRDs. A 48-hour trip aboard an inshore vessel was made out of Bayou Caddy in Mississippi to introduce the double cover TED installed in mid-sized grids. Once we were ferried to the boat by another fisherman, we learned that the captain was pulling different style nets which greatly inhibited our opportunity to perform comparative tows. Results from the demonstration varied extensively. Tremendous clogging of derelict crab traps and other debris in the Mississippi Sound substantially impacted our ability to assess the performance of this TED. This effort did provide an opportunity to conduct extensive training to the captain and crew of the vessel.

TED/BRD Formal Workshops

Thirteen formal workshops were conducted in four states during this project. The majority of these workshops were conducted in Texas at the request of Sea Grant. The following workshop locations received Foundation attention:

- Brownsville, Tex. - sponsored by Sea Grant
- Port Isabel, Tex. - sponsored by Sea Grant
- Aranas Pass, Tex. - sponsored by Sea Grant
- Port O'Connor, Tex. - sponsored by Sea Grant
- Palacios, Tex. – sponsored by Sea Grant
- San Leon, Tex. - sponsored by PISCES
- Port Arthur, Tex. - sponsored by Sea Grant
- Apalachicola, Fla. - sponsored by Sea Grant
- Key West, Fla. - sponsored by Sea Grant
- Brunswick, Ga. - sponsored by Georgia Shrimp Association
- Yulee, Fla. – sponsored by OFF
- Lafitte, La. – requested by industry

These formal workshops were attended by approximately 405 people. During this time, fishermen were educated on the new TED designs and related construction techniques. It should be noted that attendees at the San Leon and Port O'Connor workshops were primarily inshore TED users. Most participants in the other workshops were fishermen who spent the majority of their time shrimping offshore. A Spanish interpreter was utilized during the Palacios workshop because of several non-English speaking participants.

Several less formal workshops were also conducted. Industry organized a small workshop in Ft. Myers Beach, Florida where eight net makers and industry members attended. Industry also organized an on-boat workshop in Tampa and we trained 11 fishermen at the docks. Additional efforts were conducted in collaboration with NMFS-Pascagoula. A one-day workshop convened in Port Isabel and Brownsville where South Texas game wardens were instructed on proper TED installation and requirements. The

Foundation also collaborated with the U.S. Coast Guard Safety Office in Galveston and conducted a two day at-dock activity where TEDs were displayed and information disseminated to forty-four primarily Asian American fishermen.

Personal Contacts/One-on-One

Technology transfer through small groups and one-on-one contacts was perhaps the most valuable contribution from this project. In addition to conferring with net makers, industry was contacted, mostly on the waterfront, from North Carolina to Texas. During these activities, participants were shown demonstration TEDs and given various handout information. Construction and modification of TEDs was discussed with individuals. Often, we went aboard vessels that were at various docks and examined existing TEDs. Discussions focused upon modifying existing devices to meet new TED mandates. In the middle and latter portions of this project, numerous contacts were made and newly mandated TEDs examined for correct construction and or modification. It was not uncommon to field numerous questions regarding TEDs and BRDs. Interested Industry members were shown DVDs played on a laptop computer of TEDs in operation excluding wild sea turtles during trawling conditions. These videos were helpful in illustrating how different styles of flaps closed after sea turtle or other objects were ejected from the TEDs. Fishermen were also interest in viewing how well the flaps covered the escape holes.

One of the important elements of this project related to disseminating information received in one area of the region and passing it on to another. Fishermen often disclosed problems or solutions they had experienced with TEDs in the past. In many cases we were able to use this information and pass it on as suggestions to fishermen in other areas. This was a tremendous benefit not only to us, but to the clientele that we were assisting.

During the middle portion of this project, some changes were seen as desirable for the double cover TED. The flaps of the double cover device may have been too short for application in some areas of the region. As a result, NMFS extended permits to vessels which allowed them to lengthen the flaps on the device. During contacts with industry, we assisted a number of fishermen in acquiring permits to lengthen the flaps. This topic will be discussed in later portions of this report.

Individual contacts/informal workshops were made in the following ports throughout the Southeast Region:

Beaufort, S.C.	Mt. Pleasant, S.C.	McClellanville, S.C.
Frogmore, S.C.	Georgetown, S.C.	Port Royal, S.C.
St. Helena Is., S.C.	Edisto Beach, S.C.	Rockville, S.C.
Stumpy Point, N.C.	Engelhard, N.C.	Calabash, N.C.
Atlantic, N.C.	Salter Path, N.C.	Supply, N.C.
Moorehead City, N.C.	Beaufort, N.C.	Oriental, N.C.
Vandemere, N.C.	Bayboro, N.C.	Hobucken, N.C.

Wanchese, N.C.	Swan Quarter, N.C.	Swansboro, N.C.
Sneads Ferry, N.C.	Shallotte, N.C.	Jekyll Island, Ga.
Savannah, Ga.	Richmond Hill, Ga.	Brunswick, Ga.
Darien, Ga.	Thunderbolt, Ga.	St. Mary's, Ga.
Valona, Ga.	Bellville, Ga.	Cape Canaveral, Fla.
Fernandina Beach, Fla.	Mayport, Fla.	Yulee, Fla.
Port Orange, Fla.	St. Augustine, Fla.	Jacksonville, Fla.
Key West, Fla.	Fort Myers, Fla.	New Port Richey, Fla.
Tampa, Fla.	Tarpon Springs, Fla.	St.Petersburg, Fla.
Carrabelle, Fla.	Apalachicola, Fla.	Panama City, Fla.
Port St. Joe, Fla.	East Point, Fla.	Bon Secour, Ala.
Southpoint, Fla.	Pensacola, Fla.	Pascagoula, Miss.
Bayou La Batre, Ala.	Biloxi, Miss.	Harvey, La.
Lakeshore, Miss,	New Orleans, La.	Empire, La.
Chalmette, La.	Lafitte, La.	Galliano, La.
Venice, La.	Cutoff, La.	Port Fouchan, La.
Golden Meadow, La.	Leeville, La.	Dulac, La.
Grand Isle, La.	Chauvin, La.	Delcambre, La.
Houma, La.	Morgan City, La.	Cameron, La.
Intracoastal City, La.	Port Arthur, Tex.	Kemah, Tex.
Crystal Beach, Tex.	Bolivar, Tex.	Sabine Pass, Tex.
San Leon, Tex.	Galveston, Tex.	Freeport, Tex.
Matagorda, Tex.	Sargeant, Tex.	Palacios, Tex.
Port Lavaca, Tex.	Port O'Connor, Tex.	Seadrift, Tex.
Fulton, Tex.	Rockport, Tex.	Aransas Pass, Tex.
Port Aransas, Tex.	Port Isabel, Tex.	Brownsville, Tex.

It is difficult to break down a precise number of contacts from this project. Records indicate that the Foundation team interacted with 933 individual fishermen at the docks or at other places. This is in addition to participants who attended formal workshops.

TED Demonstrations

During the initial stage of this project, demonstration TEDs were purchased through this grant and placed aboard key vessels in the Gulf of Mexico for evaluation by the crew. The Foundation purchased TEDs for vessels assessment purposes in:

Key West, Fla.	Ft. Myers, Fla.
Brownsville, Tex. – three boats	Aransas Pass, Tex. – three boats
Palacios, Tex. – two boats	Chauvin, La.
Cameron, La.	Morgan City, La. – two boats
Galliano, La. – two boats	Violet, La.

These TEDs were constructed by Parrish Net Shop in Supply, N.C.; a net shop under contract with NMFS-Pascagoula to build a number of TEDs. Several other TEDs

were later purchased from Domini Net Shop in Palacios. It was the intention of this project to get some of the newly-mandated TEDs aboard vessels for evaluation before the new TED requirement came into effect. Industry was very cooperative in providing evaluations of these devices. This effort produced important information to decision makers on the national and regional level regarding TEDs. This was especially true with the newly-introduced double cover TED. The Foundation received very good reports from Florida regarding the double cover device. Vessels that evaluated the double cover TED from Fort Myers and Tampa indicated that they worked satisfactorily. The Key West cooperator indicated some trouble with the short flap that originally was required on the TED, encountering some shrimp loss. He did extend this flap and later stated that his production came up to normal harvest levels.

Captains fishing in the offshore western Gulf expressed concern with double cover TEDs after towing them for a period of time. Evaluations that were conducted to compare the catch rates of the double cover TED with traditional TEDs showed clear indication of shrimp loss. It should be stressed that fishermen conducting these evaluations were individuals that were considered very trustworthy. It was the opinion of the PIs on this project that the soft substrate in the offshore waters of the western Gulf may have contributed to this loss.

These independent evaluations were very important and were shared with NMFS-Pascagoula and the Regional Administrator. Through quick and efficient actions, NMFS reconsidered the short flaps on the double cover TEDs and enacted a permitting system to allow extension of the flaps. This seems to have ameliorated problems associated with this difficulty, thus avoiding a potentially volatile problem in the fishery. It should be noted that the extended flap on the double cover TED has been tested on sea turtles and found to be satisfactory for exclusion. The new modification to the double cover TED was incorporated into law in the Federal Register on April 16, 2004

Other result demonstrations yielded inconclusive information. The Foundation placed some very large grids aboard vessels to be evaluated against mid-sized frames, and reports received from industry were mixed. The same holds true with result demonstrations comparing double cover TEDs with the 71" TED opening.

It should be mentioned that the TEDs that were placed in the fishery by the Foundation were devices purchased through this project. At a later date, NMFS placed a large number of TEDs into the industry in an effort to allow industry to evaluate performance of properly constructed TEDs.

BRD Outreach

During the mid phase of this project, it was learned that the effectiveness of the fisheye BRD in reducing bycatch was less than previously indicated. The PIs of this project conferred with numerous industry members and informed them of this problem. This project presented an excellent forum for discussion and exchange of ideas regarding this concern. During the latter portion of this project an idea generated from NMFS-

Pascagoula regarding modification to the elephant ear array for enhanced fish exclusion led us to modify these retrieval components on a number of vessels. This change involved pulling the cod end of the trawl through the elephant ears, repositioning the elephant ears on the bottom. These modifications are currently being evaluated by Industry.

It was this MARFIN effort that allowed for efficient dovetailing of BRD information with TED outreach. A number of educational BRD videos were distributed during outreach efforts. Additionally, placements of fisheye BRDs were often examined in trawls and input was provided for correction of mistakes. Installation position of fisheye BRDs was identified as an area of misunderstanding during conferences with fishermen. There are various legally defined installation positions of the fisheye for Texas state waters, the west coast of Florida and the remainder of the Gulf. During our outreach efforts we had the opportunity to provide clarity regarding this matter.

B. Project Management:

Principal Investigator:

Ms. Judy Jamison	Executive Director, administrative supervision
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Co-Principal Investigators:

Mr. Gary Graham	Gulf of Mexico Regional Coordinator Texas A&M University Sea Grant
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Mr. Lindsey Parker	South Atlantic Regional Coordinator University of Georgia Marine Extension Service
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Mr. Richard Vendetti	South Atlantic Regional Coordinator University of Georgia Marine Extension Service
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Foundation Staff:

Mr. David Medici	Program Director, technical supervision
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Ms. Gwen Hughes	Program Specialist, contract administration
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Ms. Charlotte Irsch	Grants Specialist, contract administration
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Ms. Judy Jamison assumed quality control and quality assurance responsibilities for the overall project administration and coordination out of the Foundation's office in Tampa, Florida. The Foundation's Executive Director has ultimate responsibility for all administrative and programmatic Foundation activities, with oversight by the Foundation's Board of Trustees. She ensures timely progress of activities to meet project

objectives and confirms compliance of all activities consistent with NOAA/NMFS requirements.

The Program Director provided technical support and literature to the Regional Coordinators (Co-Principal Investigators) and assisted in the coordinated performance activities of all personnel. He also assisted in the preparation and editing of project performance reports, including progress and final reports.

The Grants Specialist was responsible for maintaining general financial accounting of all Foundation funds including all Cooperative Agreements and contracts, as well as communication with NOAA Grants Management personnel, and assisting auditors in their reviews. The Program Specialist was responsible for tracking programmatic activities, processing requests for reimbursement, generating supporting documentation, and communicating with NMFS program personnel.

The contracted personnel for this project have been associated with other, similar Foundation research projects and programs. Their continued involvement provided stability and allowed for a smooth progression into this project from both a management and performance perspective. Through years of experience, the Foundation has found that working with local Sea Grant and Marine Extension Service Personnel is an efficient and rapid method to achieve communication and cooperation with local fishermen. The three Co-Principal Investigators traveled the region conducting all technology transfer and educational efforts. Their continued dedication to the commercial shrimp fishing industry has led to the timely completion of this project and derived accomplishments.

VI. Findings:

A. Accomplishments and Findings

This MARFIN grant provided an opportunity for concerted outreach efforts throughout the Southeast Region. The importance of this work was magnified because of the very short time frame in which Industry was required to make changes to their TEDs. Extensive TED/BRD technology transfer was performed through educational workshops, personal contacts, educational materials and result demonstrations. Over 1300 fishermen and 56 net shops received training in TEDs and this enhanced the industry's ability to meet new legal mandates regarding TED laws. A high degree of collaboration between the Gulf and South Atlantic Fisheries Foundation, Inc. and NOAA Fisheries added to the success of this program.

Impacts of this project were seen in the western Gulf of Mexico where modifications to the double cover TED greatly reduced shrimp loss. This modification became even more important as the requirement of the new devices were implemented during the height of the shrimp season – a time of high production and elevated potential for drastic losses.

The wide-spread problem of improper knot orientation in TED flaps became immediately apparent at the onset of this project. A major contribution from this project was derived from educating Industry about this potential problem. It is unclear what the economical impact is from this single educational effort, but it is clearly significant.

This project provided an efficient opportunity for dovetailing BRD outreach work with TED technology transfer. Through our efforts, many fishermen were educated regarding BRDs and a forum was presented to discuss upcoming concerns with the fisheye BRD. During our project we examined numerous BRDs to determine correct installment positions and advised fishermen accordingly.

Introduction of the new gear through at-sea result demonstrations were considered an important element of this project. These early tests, performed by captains, allowed them to evaluate the new gear and provide input to the Foundation and NOAA Fisheries. These tests also assisted in identifying a problem with short flaps on the double cover TEDs. After this problem was solved, confidence was instilled into fishermen to accept the new TEDs.

This project is regarded as being very successful. As a result of Foundation and NMFS-Pascagoula efforts, the implementation of the new TED designs was adopted in an efficient and effective manner. Concerns still exist for shrimp loss in certain areas, i.e. inshore waters with much debris, but the overall impacts of this work enhanced the industry's ability to make rapid changes, meet federal mandates, and continue to operate with gear that was acceptable.

B. Problems Encountered

The most significant problem with this project was associated with the extremely short period required for fishermen to meet new TED standards. The limited timeframe required intensive fieldwork in order to educate Industry and assist them in achieving compliance with their TEDs. The short window for compliance required the PIs in this project to expend grueling hours toward contacting as many fishermen and net shop operators as possible.

An obstacle with compliance by Industry related to a regional-wide shortage of netting material used in constructing TEDs. A paucity of heat set, depth stretched poly webbing occurred which limited the ability for fishermen and net people to build flaps for TEDs. This problem was later resolved when this material became available, but this was after the date for compliance of the new TEDs.

Perhaps one of the most difficult factors in dissemination of TED information is the vastness of the Southeast Region. In order to physically contact fishermen in all ports, tremendous travel requirements are necessitated. There are numerous small ports in states like North Carolina and Louisiana which requires much driving time in order to visit these important ports. To my knowledge, every port received attention, but this necessitated tremendous effort and dedication.

The nature of the shrimp industry is such that many vessels remain offshore for extended periods of time. Because of this, vessels that require assistance are not in port during visits. The PIs on this project made attempts to revisit a number of ports so that additional captains could be contacted. In many cases, fishermen who were trained were depended upon to train other fishermen who were absent during educational efforts at the docks. This problem did not occur with net shops, as we were successful in contacting the majority of net shops throughout the southeast.

Communication with ethnic groups in the shrimp fishery did, at times, pose problems. This was especially true within the Asian-American community. The Foundation often utilized bilingual Vietnamese fishermen to communicate with others. One of the team members was fluent enough with Spanish to communicate with Hispanic fishermen.

C. Need for Additional Work

The aim of this project was not to conduct new or innovative research concerning TEDs and BRDs, but to expand and augment current technology transfer and outreach programs in an effort to disseminate the most recent TED and BRD regulatory information to the commercial shrimp fishing industry of the Gulf of Mexico and South Atlantic. As a result, this project can be regarded as a success. Although successful, regulations and primary research concerning TEDs and BRDs is often dynamic and based upon the actions of the Regional Fishery Management Councils and funding.

Recent concerns have arisen about the efficiency of the Gulf Fisheye BRD at excluding finfish from shrimp trawl nets. These results have forced the Gulf of Mexico Fishery Management Council to consider the decertification of this device. Although other gear options exist within the fishery, they are more expensive and complex, thus increasing misinformation and the potential for non-compliance. Additionally, recent appropriations from the U.S. Congress have assisted the Foundation, in cooperation with the National Marine Fisheries Service, in conducting an innovative TED technology study aimed at minimizing shrimp loss and increasing efficiency, a concern to all shrimp fishermen. Future technology transfer efforts would focus on these important regulations and results derived from primary research.

Continued participation from the Foundation and its Regional Coordinators will ensure that the most recent regulatory and research information will be widely distributed to industry members. Historically, both the Foundation and NMFS have assisted industry through both formal workshops, informal meetings, *in situ* demonstrations of commercial fishing gear, and distribution of educational materials. Proposed budgets for the 2005-2006 fiscal years suggest that funding will limit the direct participation of NOAA Fisheries and NMFS with respect to technology transfer and industry education. Hence, there is a direct need to further augment outreach programs. For example, if the Regional Councils implement regulations decertifying the Gulf Fisheye BRD, efforts will be

needed to inform industry of these changes and demonstrate the proper use and installation of underutilized, certified BRDs, thus increasing industry's compliance. While demonstrating the proper use of regulated BRDs to industry members, these formal and informal meetings would allow the Foundation's Regional Coordinators to discuss the need for new and innovative fishing gears that will further reduce finfish bycatch from shrimp trawl nets. This will give fishermen the opportunity offer alternative, inventive gear ideas that could possibly be more "user friendly" to fishermen than currently certified BRDs. Additionally, continuation of industry meetings and technology transfer efforts will allow a vector for discussion of the Foundation's TED research project results. By disseminating this information throughout the commercial fishing industry, fishermen will likely increase shrimp retention and the potential revenue of the fishing operation. In light of economic hardships (foreign imports and increased fuel prices), increased revenues will likely allow more individuals to stay within the economically challenged fishery.

VII. Evaluation:

A. Extent to Which Goals were Obtained

All goals and objectives outlined within the original proposal were accomplished. To broaden the magnitude and significant of the outreach efforts, the Foundation found it necessary to extend the completion date of the project. This allowed the Regional Coordinators to expand the number of individual fishermen contacted and increase the effectiveness of the project.

The success of industry meeting mandates for the new TEDs designs was apparent through compliance demonstrated by adaptation of the gear. Although a very limited timeframe was available for conversion to new TEDs, industry used the information provided by the Foundation and performed necessary steps to meet the newly established legal requirements.

B. Dissemination of Project Results

Copies of this Final Report will be distributed to the various federal and state fishery agencies, university extension/Sea Grant offices, and industry associations to increase the knowledge of effective methods for disseminating information to the commercial fishing industry. Summary reports of the project's findings were published as part of the "Project Update" section of the "Gulf and South Atlantic News", the quarterly publication of the Gulf & South Atlantic Fisheries Foundation, Inc. This newsletter, along with an updated listing of available Final Reports, is disseminated to over 500 individuals and organizations throughout the Gulf of Mexico and South Atlantic Regions. An electronic version of this newsletter is also included in the regular updates to the Foundation's website (www.gulfsouthfoundation.org).