

**DEVELOPMENT AND EVALUATION OF EDUCATION TECHNIQUES
TO ELIMINATE AT-SEA DISPOSAL OF PLASTICS**

Prepared for:

**National Marine Fisheries Service
Saltonstall/Kennedy Program
National Oceanic and Atmospheric Administration
Northwest and Alaska Fisheries Center
Seattle, WA**

**Center for Marine Conservation
Washington, DC**



**Kearney/Centaur Division
A.T. Kearney, Inc
Alexandria, VA**

April 1990

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Prepared for:

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Cooperative Agreement No. NA89AA-H-SK0007

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Preface

This report was prepared for the National Marine Fisheries Service, Saltonstall/Kennedy Program (S/K) under Cooperative Agreement No. NA89AA-H-SK0007. The report presents the results of a study to develop and evaluate education techniques to eliminate at-sea disposal of plastics. It was prepared in response to a national priority identified by the S/K program to develop cost effective methods to comply with the prohibition of at-sea disposal of plastics and other wastes. The study was undertaken by the Center for Marine Conservation (CMC) and the Kearney/Centaur Division of A.T. Kearney, Inc. Kathryn O'Hara (CMC) and Barbara Wallace (Kearney/Centaur) were the principal investigators.

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Executive Summary

Background

This project was designed to develop, test, and evaluate marine debris education for commercial fishermen and recreational boaters as part of an effort to develop cost effective methods to comply with the prohibition of at-sea disposal of plastics and other wastes. It was funded by a Saltonstall/Kennedy grant from the National Marine Fisheries Service.

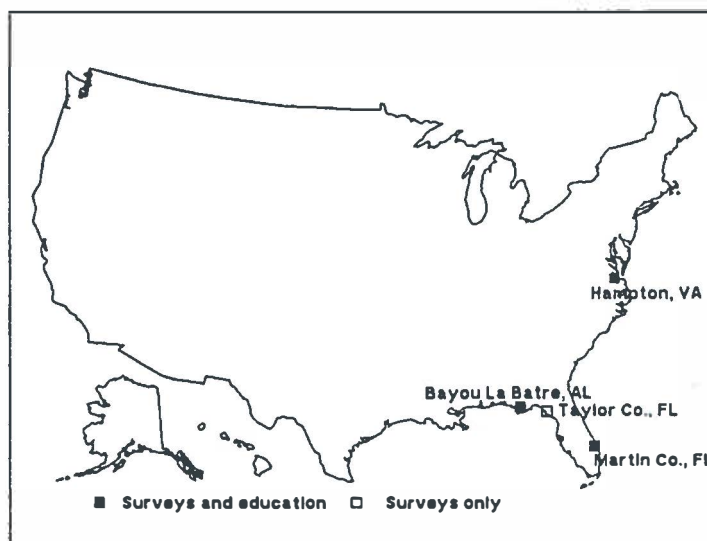
The objectives of the study were:

- o To assess the current level of understanding of the marine debris problem among commercial fishermen and recreational boaters;
- o To inform commercial fishermen and recreational boaters about the marine debris problem, increase awareness about Federal regulations on at-sea dumping of plastics and other trash, and encourage compliance with these regulations; and
- o To evaluate the role of education in increasing the awareness of commercial fishermen and recreational boaters about the marine debris issue and in encouraging compliance with Federal regulations on vessel generated garbage disposal.

Methodology

The project was structured in three phases: 1) a baseline survey of commercial fishermen and recreational boaters on their garbage disposal practices and perceptions of the problems of marine debris and entanglement; 2) a targeted marine debris education program for the survey groups at three of four project sites; 3) and a reassessment survey of the groups surveyed in the baseline on their garbage disposal practices and perceptions of the problems of marine debris after the education program.

The project was conducted at four sites: Bayou La Batre/Coden, Alabama (Bayou La Batre); Martin County, Florida; Hampton, Virginia; and Taylor County, Florida. Education activities took place at Bayou La Batre, Martin County, and Hampton. Taylor County was used as a control site and received both surveys but did not have a targeted education effort.



Commercial Fishermen

The commercial fishermen survey groups were selected from the lists of commercial fishing licenses maintained by state agencies. All names on these lists were used for the sample. The baseline survey was designed to obtain information in the following five areas: 1) a profile of the respondents, 2) their current disposal practices for vessel generated garbage, 3) their experience with plastic marine debris, 4) their knowledge of laws on at-sea garbage disposal, and 5) their opinion on the best ways to encourage shoreside disposal of plastic wastes. The baseline survey was sent to every name on the commercial fishing list for Bayou La Batre, Martin County, Hampton, and Taylor County along with a cover letter and a self-addressed return envelope.

The baseline survey was sent to 1,045 commercial fishermen. Completed responses were received from 161 commercial fishermen. This represents about 16 percent of the potential respondents. The percentage of completed surveys from commercial fishermen in each area was: Bayou La Batre – 8 percent; Martin County – 24 percent; Hampton – 17 percent; and Taylor County – 17 percent.

The reassessment survey was also designed to obtain information in five areas: 1) a profile of the respondents, 2) their current disposal practices for vessel generated garbage, 3) their knowledge of laws on at-sea trash disposal, 4) their opinion on the problems of marine debris, and 5) their recent exposure to marine debris educational materials and activities. The reassessment survey was sent to the survey group of commercial fishermen at the four project sites, along with a cover letter and a self-addressed return envelope.

The reassessment survey was sent to 1,017 commercial fishermen. Completed surveys were returned by 138 commercial fishermen at the four sites, or about 14 percent of the potential respondents. The percentage of completed surveys in each area was: Bayou La Batre – 9 percent; Martin County – 17 percent; and Hampton – 17 percent; Taylor County – 15 percent.

Recreational Boaters

The recreational boater survey groups were selected from the lists of recreational boat registrations maintained by state agencies. A sample of individuals with registered motor boats used for pleasure was selected using a systematic sampling technique.

The baseline survey was essentially the same as that for the commercial fishermen. It was designed to obtain comparable information in the following five areas: 1) a profile of the respondents, 2) their current disposal practices for vessel generated garbage, 3) their experience with plastic marine debris, 4) their knowledge of laws on at-sea garbage disposal, and 5) their opinion on the best ways to encourage shoreside disposal of plastic wastes. The baseline survey was sent to 1,407 recreational boaters in Bayou La Batre, Martin County, Hampton, and Taylor County along with a cover letter and a self-addressed return envelope.

Completed responses to the baseline survey were received from 257 recreational boaters, about 20 percent of the potential respondents. The percentage of completed surveys from recreational boaters was: Bayou La Batre – 7 percent; Martin County – 22 percent; Hampton – 27 percent; and Taylor County – 24 percent.

The reassessment survey was also comparable to the survey used for commercial fishermen. It was designed to obtain information in the same five areas: 1) a profile of the respondents, 2) their current disposal practices for vessel generated garbage, 3) their knowledge of laws on at-sea disposal, 4) their opinion on the problems of marine debris, and 5) their recent exposure to marine debris educational materials and activities. The reassessment survey was sent to the survey group of recreational boaters, along with a

cover letter and a self-addressed return envelope.

The reassessment survey was sent to 1,313 recreational boaters. Completed surveys were returned by 230 recreational boaters at the four sites, or about 20 percent of the potential respondents. The number of completed surveys was: Bayou La Batre – 9 percent; Martin County – 22 percent; Hampton – 28 percent; and Taylor County – 18 percent.

Marine Debris Education Program

Five types of education activities were conducted in the three project sites which received marine debris education: 1) presentations; 2) participation in special events; 3) mailings of educational materials to the survey groups; 4) distribution of educational materials to docks and marinas; and 5) media coverage. The education activities by site are presented in exhibit 2-5.

Education activities were conducted, where possible, using existing outlets and events for the dissemination of information. Most of the education activities were designed to use existing marine debris educational materials. These included: brochures, posters, a large banner, a publication entitled "A Citizens Guide to Plastics in the Ocean", and a seven-minute video entitled "Trashing the Oceans."

New materials developed included a sticker which summarizes the MARPOL Annex V regulations. This sticker was translated and printed in Vietnamese, and distributed to the Vietnamese community in Bayou La Batre. Other new educational materials developed in the course of this project were site-specific. These included: 1) a bumper sticker for commercial fishermen and recreational boaters in Bayou La Batre; 2) a public service advertisement for commercial fishermen and recreational boaters in Bayou La Batre; 3) a metal sign for docks and marinas in Martin County; and 4) a sticker for docks, marinas, and workboats in Hampton. Several flyers, announcements, and other educational materials were also developed for specific education activities.

The marine debris education activities undertaken for this project often involved the cooperation and support of other groups. These groups included: 11 government agencies, 4 industry groups, 7 fishing organizations, 66 private groups, 7 newspapers, 3 radio stations, 3 television stations, and 3 newsletters. Information about the marine debris problem was provided to these groups in addition to the commercial fishermen and recreational boaters.

Overview of Project Results

Commercial Fishermen

Bayou La Batre

The following points summarize the project at this site:

- o About 330 individuals directly received information on the marine debris problem and MARPOL Annex V. There were opportunities for other fishermen to receive information about the marine debris problem during education activities conducted at this site.

- o Marine debris education activities included a community meeting and presentation; dissemination of educational materials at the Blessing of the Fleet, an annual event involving the commercial shrimp fishermen; a mailing of educational materials to commercial fishermen in the survey group; distribution of posters to major docks and seafood processing plants; development of a public service advertisement; and meetings with local press.

- o Several state government agencies, a professional fishermen's group, an industry group (Sears donated a trash compactor), and a social service organization contributed to the project activities.

- o Bayou La Batre was a unique setting for educational efforts on marine debris. The commercial fishermen are primarily shrimpers. The Center for Marine Conservation (CMC), responsible for the education portion of this project, is a leading proponent of Trawling Efficiency Devices (TEDs). Shrimpers are opposed to the use of TEDs. Once the connection was made between the CMC's role in the marine debris education activities at this site and its position on TEDs, it was difficult to get shrimp fishermen to participate in any of the educational efforts sponsored by CMC.

- o A sticker summarizing the MARPOL Annex V requirements was translated and printed in Vietnamese and distributed to the Vietnamese community in Bayou La Batre.

- o Not enough information was collected through the survey responses to measure change in behavior in over-the-side trash disposal practices.

- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter. There was little change between the responses to the two surveys.

- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the baseline and reassessment surveys. However, the increase in awareness was not statistically significant.

- o Reading a newspaper article was the most common type of marine debris education activity undertaken by commercial fishermen surveyed after the education program in Bayou La Batre. Other commonly cited types of activities were reading a brochure, and conversations with family, friends, or colleagues.

Martin County

The following points summarize the project at this site:

- o About 250 commercial fishermen directly received information on the marine debris problem and MARPOL Annex V. There were opportunities for others to receive information about the marine debris problem during education activities that were conducted at this site.

- o Marine debris education activities included a meeting with commercial fishermen at a local fishhouse; involvement of fishermen in the production and installation of metal signs for docks and marinas; a mailing of educational materials to commercial fishermen in the survey group; distribution of posters to docks and marinas; meetings with local newspapers; and distribution of a press release.

- o With funding from the Florida Department of Environmental Regulation (DER), 39 metal signs using the Popeye marine debris theme were produced and permanently installed at Martin County docks and marinas.

- o Not enough information was collected through the survey responses to measure change in behavior in over-the-side trash disposal practices.

- o The respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.

- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the two surveys. The change in awareness was statistically significant; awareness of the law increased from 46 percent on the baseline to 81 percent of the respondents on the reassessment survey.

- o Reading a newspaper article was the most common type of marine debris education activity undertaken by commercial fishermen surveyed after the education program in Martin County. Other commonly cited activities were conversations with family, friends, or colleagues, reading a magazine article, seeing a television program, and reading a brochure.

Hampton

The following points summarize the project at this site:

- o About 200 commercial fishermen directly received information on the marine debris problem and MARPOL Annex V. There were also opportunities for others to receive information about the marine debris problem during education activities that were not restricted to the survey group.

- o This was the only study site with a project team member on-site throughout the project. The presence of a team member facilitated coordination with the Working Waterman's Association, which sponsored or organized many of the activities at this site. These activities included: two port and dock cleanups, a resolution developed and passed by the membership on the marine debris problem, production of a sticker, and a display on marine debris at the largest commercial fishing trade show in the Chesapeake Bay area.

- o Other marine debris education activities included a mailing of educational materials to commercial fishermen in the survey group; distribution of posters to docks and marinas; and dissemination of information on the marine debris activities to the press and media.

- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.

- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound, or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.

- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the two surveys. The change in awareness was statistically significant; awareness increased from 68 percent on the baseline survey to 82 percent on the reassessment survey.

o Reading a newspaper article was the most common type of marine debris education activity undertaken by commercial fishermen surveyed after the education program in Hampton. Other commonly cited activities were seeing a television program, reading a brochure, conversations with family, friends, or colleagues, and reading a magazine article.

Taylor County

The following points summarize the project at this site:

- o No marine debris education activities were undertaken by the project at this site.
- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.
- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.
- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the baseline and reassessment surveys. However, the increase in awareness was not statistically significant.
- o Few respondents to the reassessment survey indicated that they had read a brochure, or seen a sticker or a presentation on the marine debris related problems as compared to the three other study sites where these materials were used during educational activities.

Summary of Project Results for Commercial Fishermen

About 780 commercial fishermen received information about the marine debris problem and MARPOL Annex V as a result of this project. There were many opportunities for others to receive information on marine debris in the education activities not restricted to the survey groups.

- o Disposal Practices for Vessel Generated Garbage. Not enough information was collected from the survey responses to measure change in trash and gear disposal practices before and after the education program. The low number of commercial fishermen who admitted to disposing of plastic trash and gear in the marine environment suggests that a self selection process played a role in those who responded to the survey. While so few of the commercial fishermen at the four sites indicated that they dispose of plastics at-sea, it seems more likely that those who dispose of plastic trash and gear in the marine environment chose not to respond to the survey.
- o Experience with Marine Debris. Almost all of the commercial fishermen indicated that they had some experience with plastic marine debris. The most frequently cited experience at each of the four project sites was seeing plastic debris floating in the ocean. At least some of the fishermen at each site had personal experience with plastic debris affecting their vessel or gear. Previously, information on the personal experience of fishermen with plastic marine debris had been anecdotal. The baseline survey provided information on the extent of the personal experience of fishermen at the four sites.
- o Opinions on the Problem of Plastics in the Marine Environment. In general, respondents to both surveys indicated they thought plastic trash causes problems in the marine environment. There was no statistical difference between the two surveys at any of the sites. This is not surprising since the respondents, in general, tended to be

environmentally sensitive as shown by the few who admitted to throwing plastic trash into the marine environment.

o Knowledge of Laws on At-Sea Garbage Disposal. Awareness of the Federal law prohibiting at-sea disposal of plastics from vessels increased at all sites between the two surveys. However, the increase in awareness was statistically significant only in Martin County and in Hampton. Both of these sites received a targeted marine debris education program. The increase in awareness was not statistically significant in Bayou La Batre, which received a targeted marine debris education program and in Taylor County, which received no education program and where a statistically significant change in awareness was not expected.

o Opinions on the Best Ways to Encourage Shoreside Disposal of Plastic Wastes. The following rank the survey responses at the four sites on the best ways to encourage commercial fishermen to return plastic trash to shore for disposal:

Best Ways to Encourage Shoreside Disposal
Commercial Fishermen
(Ranked 1-7, with 1 being most frequent response)

	<u>Bayou La Batre</u>	<u>Martin County</u>	<u>Hampton</u>	<u>Taylor County</u>
Fines/Penalties	3	1	2	1
Dockside Disposal Facilities	1	2	1	2
Posters	2	4	3	3
Brochures	5	6	4	6
Word of Mouth	6	3	5	4
Magazine/Newspaper Articles	4	5	6	5
Presentations	7	7	7	7

o Exposure to Marine Debris Educational Materials and Activities. The reassessment survey asked respondents to indicate which of ten marine debris materials or activities they had read or done in the last six months. The time frame corresponded with the education phase of the project. Respondents were asked to choose from a list of project and non-project materials and activities. Responses at the four sites are listed below:

Exposure to Marine Debris Education
Commercial Fishermen
(Ranked 1-10, with 1 being most frequent response)

	<u>Bayou La Batre</u>	<u>Martin County</u>	<u>Hampton</u>	<u>Taylor County</u>
Read a Newspaper Article	1	1	1	2
Read a Brochure	2a	5	3	6
Talked About the Problem	2b	2	4	1
Saw a Television Program	4	4	2	4
Saw a Public Service Advertisement	5a	7	7	8
Read a Magazine Article	5b	3	5	3
Saw a Sticker	7	9	8	9
Saw a Poster	8	6	6	5
Heard a Radio Program	10	8	9	7
Attended a Presentation	9	10	10	10

Recreational Boaters

Bayou La Batre

The following points summarize the project at this site:

- o About 350 recreational boaters directly received information on the marine debris problem and MARPOL Annex V. There were also opportunities for others outside the survey group to receive information about the marine debris problem during several educational activities.
- o Marine debris education activities included a community meeting and presentation; participation in the Dauphin Island Deep Sea Fishing Rodeo; a mailing of educational materials to recreational boaters in the survey group; distribution of posters to major docks; development of a public service advertisement; and meetings with local press.
- o State government agencies and private groups helped disseminate marine debris information.
- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.
- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.
- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the baseline and reassessment surveys. The change in awareness was statistically significant; awareness of the law increased from 50 percent on the baseline survey to 75 percent on the reassessment survey.
- o Reading a newspaper article was the most common type of marine debris education activity undertaken by recreational boaters surveyed after the education program in Bayou La Batre. Other commonly cited types of activities were seeing a television program, conversations with family, friends, or colleagues.

Martin County

The following points summarize the project at this site:

- o About 300 recreational boaters directly received information on the marine debris problem and MARPOL Annex V. There were also opportunities for others outside the survey group to receive information about the marine debris problem during several educational activities.
- o Marine debris education activities included a presentation to representatives of fishing clubs; participation in two fishing tournaments and the Salt Water Sports Fishing Exposition; a mailing of educational materials to recreational boaters in the survey group; distribution of posters to docks and marinas; meetings with local newspapers and distribution of a press release.
- o The Martin County Tax Assessor's Office distributed information on marine debris to about one quarter of the county's residents.

- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.

- o The respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.

- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the baseline and reassessment surveys. The change in awareness was statistically significant; awareness of the law increased from 24 percent on the baseline survey to 52 percent on the reassessment survey.

- o Reading a newspaper article was the most common type of marine debris education activity undertaken by recreational boaters surveyed after the education program in Martin County. Other commonly cited types of activities were seeing a television program, conversations with family, friends, or colleagues, and reading a magazine article.

Hampton

The following points summarize the project at this site:

- o About 360 recreational boaters directly received information on the marine debris problem and MARPOL Annex V. There were opportunities for others to receive information about the marine debris problem in several activities not restricted to the survey group.

- o There was a project staff member on-site throughout the project. This was the only site where this occurred. The on-site staff presence facilitated coordination of activities with other groups.

- o Marine debris education activities were tied to five special events and two beach cleanups. Local and state government, local marinas, Boy Scouts, and other local groups helped organize, sponsor, and participated in these events. One of the beach cleanups received a 1989 Virginia Take Pride in America Award.

- o Other marine debris education activities included presentations to local groups that could help in education efforts; a mailing of educational materials to recreational boaters in the survey group; distribution of posters to docks and marinas; and liaison work with the local press.

- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.

- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound, or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.

- o Awareness about the Federal law prohibiting disposal of plastic trash from vessels increased between the baseline and reassessment surveys. The change in awareness was statistically significant; awareness of the law increased from 44 percent on the baseline survey to 80 percent on the reassessment survey.

- o Reading a newspaper article was the most common type of marine debris education activity undertaken by recreational boaters surveyed after the education program in Hampton. Other commonly cited types of activities were seeing a television program, reading a brochure, reading a magazine article, and seeing a poster at a dock or marina.

Taylor County

The following points summarize the project at this site:

- o No project related marine debris education activities took place at this site.
- o Not enough information was collected from the survey responses to measure change in behavior in over-the-side trash disposal practices.
- o In general, the respondents to both the baseline and reassessment surveys thought plastic trash in the ocean, sound, or bay can kill marine animals, create safety hazards for mariners, and wash ashore as beach litter.
- o Awareness about the Federal law prohibiting at-sea disposal of plastics from vessels increased between the baseline and reassessment surveys. However, the increase in awareness was not statistically significant.
- o Watching a television program was the most frequently cited marine debris education activity undertaken by recreational boaters in the reassessment survey in Taylor County. Other commonly cited types of information were a newspaper article, and a conversation with family, friends, or colleagues.

Summary of Project Results for Recreational Boaters

About 1,010 recreational boaters received information about the marine debris problem and MARPOL Annex V as a result of this project. There were many opportunities for others to receive marine debris information in the education activities that were not restricted to the survey groups.

- o Disposal Practices for Vessel Generated Garbage. Not enough information was collected from the survey responses to measure change in trash and gear disposal practices before and after the education program. Self selection seems to have played a role in those who responded to the survey. It is more likely that those who dispose of plastic trash in the marine environment chose not to respond to the survey, than that so few of the recreational boaters at the four project sites dispose of plastics at-sea.
- o Experience with Marine Debris. Almost all of the recreational boaters indicated that they had had some experience with plastic marine debris. The most frequently cited experience at each of the four project sites was seeing plastic debris floating in the ocean. At least some of the boaters at each site had had personal experience with plastic debris affecting their vessel. Previously, information on the personal experience of fishermen with plastic marine debris had been anecdotal. The baseline survey provided information on the extent of the personal experience of recreational boaters at the four sites.
- o Opinions on the Problem of Plastics in the Marine Environment. In general, respondents to both surveys indicated they thought plastic trash causes problems in the marine environment. There was no statistical difference between the two surveys. This is not surprising since the respondents, in general, tended to be environmentally sensitive as shown by the few who admitted to throwing plastic trash into the marine environment.
- o Knowledge of Laws on At-Sea Garbage Disposal. Awareness of the Federal law prohibiting at-sea disposal of plastics from vessels increased at all sites between the two surveys. The increase in awareness was statistically significant only in the sites that received a targeted marine debris education program (Bayou La Batre, Martin County, and Hampton). The increase in awareness was not statistically significant in Taylor County, which received no education program and where a statistically significant change in awareness was not expected.

o Opinions on the Best Ways to Encourage Shoreside Disposal of Plastic Wastes. The following ranks the survey responses at the four sites on the best ways to encourage recreational boaters to return plastic trash to shore for disposal:

**Best Ways to Encourage Shoreside Disposal
Recreational Boaters
(Ranked 1-7, with 1 being most frequent response)**

	<u>Bayou La Batre</u>	<u>Martin County</u>	<u>Hampton</u>	<u>Taylor County</u>
Fines/Penalties	1	1	1	1
Dockside Disposal Facilities	2	2	2	2
Posters	3	3	3	3
Brochures	5	5	5	6
Word of Mouth	6	6	6	4
Magazine/Newspaper Articles	4	4	4	5
Presentations	7	7	7	7

o Exposure to Marine Debris Educational materials and Activities. The reassessment survey asked respondents to indicate which of ten marine debris materials or activities they had read or done in the last six months. The time frame corresponded with the education phase of the project. The list the respondents were asked to choose from included project and non-project materials and activities. The responses at the four sites are listed below:

**Exposure to Marine Debris Education
Recreational Boaters
(Ranked 1-10, with 1 being most frequent response)**

	<u>Bayou La Batre</u>	<u>Martin County</u>	<u>Hampton</u>	<u>Taylor County</u>
Read a Newspaper Article	1	1	1	2a
Read a Brochure	5	6	3	5
Talked About the Problem	2	3	6a	2b
Saw a Television Program	3	2	2	1
Saw a Public Service Advertisement	10	5	6b	6
Read a Magazine Article	4	4	4	4
Saw a Sticker	7a	8	8	7a
Saw a Poster	7b	7	5	7b
Heard a Radio Program	6	9	9	9
Attended a Presentation	7c	10	10	10

Project Conclusions and Recommendations

In addition to the results presented above, several valuable lessons were learned through this project. These are highlighted below.

o Use of Surveys to Evaluate Marine Debris Education. The project had mixed results in evaluating marine debris education. This was in part due to the self selection process of potential respondents. Those who dispose of plastics in the marine environment are thought to have chosen not to respond to the surveys in far greater numbers than thought would happen before the project began.

o Groups Do Not Like to Be Singled Out as Source of Marine Debris. It was apparent from the comments received on the surveys and from personal contact that the commercial fishermen and the recreational boaters thought their group was unfairly singled out as a source of marine debris. While acknowledging their group's contribution to the problem, they indicated that some other group was more responsible for the problem than they were.

o Presentations to Inform and Presentations to Persuade. Both commercial fishermen and recreational boaters ranked presentations last among the techniques to encourage shoreside disposal of trash. These are presentations to inform and are generally conducted before a general audience at club meetings or other gatherings. Another type of presentation is one to persuade. The presentation to persuade is made before a select group of leaders. The purpose of the presentation is to get the group to act. Much of the subsequent marine debris education activities at each site were the direct result of a presentation to persuade.

o Marine Debris Education Events for Commercial Fishermen and Recreational Boaters. It was easier to involve recreational boaters in hands on education activities than the commercial fishermen. Recreational boaters appeared to enjoy the "Stow It, Don't Throw It" activities at fishing tournaments. Further, tournament organizers seemed to like having such activities as part of their event.

o Securing Press/Media Coverage on Marine Debris Activities. It was easier to secure publicity for marine debris efforts conducted by commercial fishermen than it was for those conducted by recreational boaters. In addition, commercial fishermen participating in the marine debris activities wanted good press coverage because they wanted to promote a positive image of their industry.

o Importance of Personal Contact in Organizing Marine Debris Education Activities. Personal contact played a significant role in securing the cooperation and support of other groups needed to conduct some of the marine debris education activities. It was easier to maintain personal contact with those groups in Hampton because there was a project team member in the area throughout the project. This facilitated in-person contact. At the other sites, telephone contact and mail were used extensively to maintain and foster cooperation and support gained through initial meetings.

The project had mixed results. On the one hand it: 1) developed profiles of the understanding of the marine debris problem by commercial fishermen and recreational boaters at four sites; 2) provided information on the marine debris problem to at least 780 commercial fishermen and 1,010 recreational boaters who would not have received such information without this project; 3) developed several new educational materials which are now being used in other parts of the country; 4) developed several new types of educational activities which can be replicated for other groups; and 5) showed that awareness about the Federal law on at-sea disposal of vessel generated garbage increased following the marine debris education at all sites except commercial fishermen in Bayou La Batre who received an education program, and commercial fishermen and recreational boaters in Taylor County who received no marine debris education as part of this project.

On the other hand, the project was unable to measure any change in behavior in at-sea trash disposal practices following the education program. Not enough information was collected from the survey responses to measure a change. This was because not enough fishermen and boaters who dispose of plastic trash at-sea chose to answer the surveys.

Based on the experience of this project, the following recommendations are made:

o Continue to Evaluate Marine Debris Education as a Cost Effect Means of Encouraging Compliance with the Prohibition of At-Sea Disposal of Plastics and Other Wastes. This project established a positive linkage between marine debris education and awareness of

the law prohibiting at-sea disposal of plastics. However, more analyses are needed to determine the effectiveness of marine debris education in changing behavior.

- o Test Different Evaluation Techniques. Other evaluation techniques such as case studies as well as personal interviews should be used to evaluate marine debris education.

- o Establish a Two-Tiered Marine Debris Presentation Strategy. Marine debris educators need to be skilled in presentation techniques that persuade government, industry, and marine user groups to cooperate and support marine debris education efforts. They need to know how to make presentations on the marine debris problem. There are currently a limited number of marine debris educators and an almost unlimited number of groups for which informational presentations would be appropriate. To enlarge the group that can make effective informational presentations on the marine debris problem, establish a training program for volunteers. Use a "train the trainer" approach in which a select group, perhaps representing various organizations, is trained to make presentations. The group would be supplied with all materials needed to make an effective presentation. The initial group trained, in turn, would train others to make presentations to schools, fishing clubs, and others.

- o Establish and Maintain Contact with the Press and Media. The importance of the press and media was shown in both the survey results and in the marine debris education activities. These groups are an effective means through which to increase awareness about the problems of marine debris and the positive steps being taken to overcome them. Marine debris educators need to establish and maintain contact with the press and media. This means providing them with facts, news stories, study results, and pictures they can use. It also means being prompt with the response to their requests for information.



