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Coastal Zone Management Program

MARINA HURRICANE EVACUATION STUDY

DADE COUNTY, FLORIDA

COASTAL ZONE
INFORMATION CENTER

Prepared for the

Dade County Planning Department

and the

Office of Emergency Management

by

The Boating Research Center
Rosenstiel School of Marine and Atmospheric Science
University of Miami

December 14, 1990
Revised December 18, 1990
Revised December 27, 1990

Funds for this project were provided
by the Department of Environmental Regulation,
Office of Coastal Management using funds made available through
the National Oceanic and Atmospheric Administration under the
Coastal Zone Management Act of 1972, as amended.

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1990

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Executive Summary

This study was undertaken as a cooperative effort of the Metro-Dade Office of Emergency Management (OEM), the Metro-Dade Planning Department (PD), and the University of Miami Boating Research Center (BRC) for the purpose of generating primary data on the potential hurricane evacuation plans of berthed boat owners in Dade County, Florida. A mail survey questionnaire was designed not only to survey the evacuation plans of berthed boat owners, but also to determine the extent of advance preparation that could be expected from those boat owners in the event of a hurricane. Of the 1000 survey questionnaires mailed, 323 legible responses were received. Additionally, potential hurricane evacuation patterns of the respondents were analyzed in order to evaluate alternative evacuation programs and policies.

The findings of this study may be briefly stated:

* The respondents to this study were found to be generally responsible and concerned with regard to the safety of their craft in the event of a hurricane.

* The majority of respondents have insurance for damage to their boat and for the damage that their boat may cause to others.

* The majority of respondents wished to have more information concerning the appropriate actions to be taken in the event of a hurricane.

* The respondents were generally not aware of the legality and practicality of occupying their indicated hurricane destination.

* The sufficiency of physical space for hurricane destinations in Dade County is unknown.

In response to the findings of this study, the following recommendations are made:

* The County, in cooperation with marine agencies, should continue its efforts to provide educational information to all boat owners with regard to hurricane preparedness.

* The procedures for locating a hurricane refuge and securing a vessel should be made available to all owners facing mandatory evacuation from their marina.

* Berthed boat owners should secure contractual mooring agreements.

* Marinas that require evacuation of berthed boats in the

event of a hurricane, should make every effort to inform each owner of this intention and of the consequences should they not comply with this policy.

* All marinas, regardless of their evacuation policy, should require a hurricane plan from each wet slip lessee as a prerequisite for wet slip rental.

* Marinas that require evacuation of berthed boats in the event of a hurricane, should require the boat owner's hurricane plan to specify the intended hurricane destination, and include a statement from the owner that certifies that a trial run has been made within the past year.

* The County should use the results of this study to assist in evaluating the efficacy of mandatory berthed boat evacuation in County marinas.

Subsequent marine hurricane preparedness studies should be conducted to address, at least, the following two specific issues:

* The location and capacities of potential hurricane refuge sites must be accurately determined. Current data on the location, accessibility, and capacity of hurricane refuge sites is very limited. Additional field work in this area is essential to determine the viability of mandatory marina evacuation.

* Marine evacuation clearance times should be studied in more detail. An appropriate model for this type of study would be computer simulation. In a simulation model, each boat could be tracked through the marine network over time. This would allow vessel characteristics such as size, speed, and maneuverability to be studied as they affect each boat's ability to perform a safe evacuation in congested waterways under adverse weather conditions.

1.0 Introduction

The purpose of this study was the generation of primary data on the potential hurricane evacuation plans of berthed boat owners in Dade County, Florida. The study was designed not only to survey the evacuation plans of berthed boat owners, but also to determine the extent of advance preparation that could be expected from those boat owners in the event of a hurricane. Additionally, potential berthed boat hurricane evacuation patterns were analyzed in order to evaluate alternative evacuation programs and policies.

This study was a cooperative effort of the Metro-Dade Office of Emergency Management (OEM), the Metro-Dade Planning Department (PD), and the University of Miami Boating Research Center (BRC). Data collection was done through a mail survey of berthed boat owners in marinas in Dade County, Florida. The analysis of these data will be used to provide information to the Office of Emergency Management for the purpose of updating the County's Hurricane Evacuation Plan.

The survey methods and the analyses of berthed boat evacuation patterns used in this study are described in detail in this report. This final report will be made available to the Florida Departments of Community Affairs, Environmental Regulation, and Natural Resources. The report will also be made available to other local governments throughout the State of Florida to assist them in analyzing the magnitude and scope of problems associated with marine hurricane evacuation patterns and plans in their area.

Although Dade County has not been hit by a major hurricane since 1965, the number of boats berthed in both county- and privately-owned marinas has increased substantially during the past few years. Under the current policy, when a hurricane warning is issued, most public marinas, and some private marinas, require boat owners to remove their boats. By the time the evacuation order is issued during the hurricane warning period, it is generally considered unsafe to be on the water. As the hurricane approaches, sea, wind, and other conditions may inhibit or prohibit boat movements. For example, when sustained winds reach 35 miles per hour, bascule bridges are locked in the down position preventing many sailboats from entering certain waterways.

An additional concern among boat owners is how to identify and locate areas for refuge in a hurricane. Areas well known by the public may not be available in time of emergency. The County's best known hurricane destination, the Miami River, is no longer considered to be a good hurricane refuge because the United States Coast Guard will no longer provide traffic control at the mouth of the River and the South Florida Water Management District has embarked a campaign to educate boaters on the risks of anchoring on the river.

The problems associated with marine hurricane preparedness include the increasing number of wet stored boats in Dade County, the fact that a substantial number of boats in wet storage are owned by non-Dade County residents, and the lack of hurricane experience among boat owners. The lack of time for preparation and the possible unavailability of space for safe haven could be catastrophic if a major hurricane were to strike the area.

As a first step in addressing these concerns, the Metro Dade Planning Department, the Office of Emergency Management, and the University of Miami Boating Research Center have obtained a Coastal Zone Management Grant in the amount of $50,000 to obtain primary data on the hurricane evacuation plans and experiences of the berthed boat owners in Dade County, Florida. The data were generated by mail survey. Responses from the survey were validated and analyzed by the Boating Research Center to provide information to the Metro Dade Office of Emergency Management. Specifically, the study investigated the intentions of boat owners in public and private marinas in Dade County in the event of a hurricane, identified areas of potential problems or conflicts, and suggested appropriate solutions.

To accomplish these goals, four tasks were undertaken. The first was the formulation of a sampling plan, i.e. the selection of the boats and marinas to be included in the study, and the validation of the berthed boats' registration information by cross-tabulation with the State of Florida vessel registration files. Once the sampling plan was formulated, the second task was the development and validation of the survey questionnaire. This task included holding a public meeting to discuss the proposed survey and questionnaire design as well as conducting a pilot study. Using this information , the third task was the actual collection of the survey data and the entry of the primary survey data into a machine readable database. Finally, the fourth task involved the analysis of the survey data and the preparation of the project report.

The remainder of this report is devoted to the discussion of the project tasks described above. Each of the project tasks is detailed below in a separate section of this report. An attempt is made to describe the methods and results in sufficient detail so that this study may be useful to other coastal localities that may need to evaluate the marine aspects of their hurricane emergency management plans. A final section of this report discusses the conclusions that may be drawn from the results of this study and makes several recommendations with regard to emergency planning and possible extensions of this work that may be of future interest.

2.0 Formulation of the Sampling Plan and Validation of Berthed Boat Registration Information

2.1 Identification of Marinas to be Included in the Study

The Dade County Planning Department provided the Boating Research Center with an inventory of marinas with ten or more berths and a list of berthed boat owners in those marinas. The inventory included 88 public and private marinas. The list included the names of 3007 berthed boat owners. The inventory of marinas included in this study is shown in Exhibit 1.

2.2 Validation of Berthed Boat Registrations

The Boating Research Center verified the list of berthed boat owners in the marina inventory provided by the County by cross-tabulating the number of wet slips in the marinas, number of berthed boats in each marina, and the number of names of berthed boat owners in each marina. The Center then merged the file of owners of berthed boats in county marinas with the 1989 Florida vessel registration file. The merging was done to validate the boat characteristics and the names and addresses of boat owners in the inventory. Exhibits 1 and 2 show the results of the cross-verification and the merging of these files.

As can be seen in the exhibits, cross-verification of the inventory was necessary to check the consistency of the individual data records. In Exhibit 2, for example, the total number of names and addresses in the inventory is 294 less than the actual number of berthed boats in the marina. In some marinas, the total number of berthed boats in the inventory exceeded the actual number of boats present in the wet slips. It was discovered that this anomaly was due to the erroneous addition of boats in dry storage to the berthed boat inventory.

At this initial stage of the study, it was felt that boat characteristics and the geographic location of the berthed boats would affect the survey responses to questions probing evacuation plans. Consequently, it was necessary to stratify the sample used for the pilot survey. Stratification of the pilot survey would allow the determination of any significant differences by geographic region or by boat type within the population. In order to obtain boat characteristics, it was necessary to match the berthed boat owner's name and address with a record in the Florida Vessel registration file. In the final analysis, the merging of the files resulted in a total of 1760 records with names, addresses and boat characteristics that could be used in the sampling frame for the pilot study.

3.0 Development and Validation of the Survey Questionnaire

3.1 Questionnaire Survey Design

Using standard survey design methodology, the Boating Research Center developed a preliminary questionnaire for the mail survey. The questionnaire was then given to the Office of Emergency Management and Dade County Planning Office for comments and suggestions. The changes proposed by these offices were discussed and considered and incorporated into the questionnaire for presentation at the Hurricane Preparedness Workshop.

A public workshop on the proposed hurricane survey was held on March 2, 1990. The purpose of the workshop was to hear the ideas and suggestions of the boating community about the hurricane study. Exhibit 3 shows the sample letter inviting members of the boating community to the workshop and the names and affiliations of the invitees.

A diverse group of people attended the workshop and a number of recommendations for improving the survey were given. Exhibit 4 shows the suggestions for the survey questionnaire which were brought up during the workshop. Based on these suggestions, the Boating Research Center, the Office of Emergency Management, and the Planning Department finalized the survey questionnaire to be used for the pilot survey. Exhibit 5 shows the cover letter and the survey questionnaire for the pilot study.

3.2 The Pilot Survey

The pilot study was conducted by the Boating Research Center. The pilot study was designed to estimate the response rate of the questionnaire, to measure significant variances in the survey responses, to assess the ambiguities in the prepared questionnaire, and to examine the necessity of stratifying the sampling frame according to geographical location and type of boat.

The pilot survey population consisted of berthed boat owners in Dade County for which name, address, and boat characteristic data were available. The sampling frame was the list of berthed boat owners in marinas/condo/etc. in Dade county with 10 or more slips provided by the Dade County Planning Department. The list contained 2965 useable names, addresses, and/or registration numbers of berthed boat owners. This list was merged with the Florida Vessel Registration File to determine the type of boats berthed in the marinas. 1760 names with corresponding boat characteristics were extracted from the registration file.

The 1760 names were stratified according to geographical location of the marina (North, Central, and South Dade) and the boat type. (Exhibit 6 shows the distribution of the names according to geographical location and boat type). From this list,

128 names were chosen for the pilot study.

To avoid any possibility of bias (i.e. including only the boat owners found in the registration file) a sample of 30 was also taken from the pool of boat owners not found in the registration file. Most of these boats were documented vessels and the majority of these were not documented in Florida.

3.3 Pilot Survey Results

The pilot survey was mailed and a 34 % response rate was realized. Exhibits 7 and 8 present the results and analysis of the pilot survey. Briefly, several points were noted. First, the chi square tests showed that stratification by geographic region was needed as hurricane refuge sites are found to be dependent upon marina location. Second, it was found that stratification of the sample by boat type was not required. The survey indicated that other population characteristics were independent of the type of boat considered. Third, ambiguities were found to exist in several questions of the pilot survey questionnaire. In question 11, for example, ambiguities arose from the inclusion of boats in dry storage in the sampling frame. In question 25, insurance coverage and damages were found not to be sufficiently specific. Question 27 revealed the inability of respondents to match correctly the names and years of occurrence of various hurricanes. These points were used to refine both the final questionnaire design and the sampling plan. These issues are discussed in greater detail in the next section.

4.0 Data Collection and Entry of Response Data into a Computerized Database

4.1 Development of the Final Survey Questionnaire

Based on the results of the pilot survey, several changes were recommended and incorporated into the final survey. First, the BRC recommended that the list of boat owners should be improved by the Metro-Dade Planning Department to eliminate the names of boat owners with boats in dry storage at the marinas. Due to time and personnel limitations, however, the Planning Department was not able to improve the list. To correct the error of including boats in dry storage in the final survey, the possible responses for question 11 were augmented to include the possibility that the boat may be in dry storage. Second, questions 25 and 26 of the survey were clarified to ask specifically for insurance coverage and damages incurred. Finally, question 27 was simplified to requesting the year of the incident hurricane rather than the name. The final survey questionnaire is shown in Exhibit 9.

4.2 Selection of sample size

The sample size required for the final survey may be determined using standard statistical methodology. The data obtained from the survey are nominal in nature, hence we are interested in estimating the proportion of responses in the various response categories. Given a total population of finite size, a tolerable error amount, and an allowable risk level of making that tolerable error, the required sample size, may be calculated using the following statistical formula:

$$n = \frac{N z^2 p q}{(N-1) e^2 + z^2 p q}$$

where n is the required sample size,
N is the size of the finite population,
z is the normal random variate associated with the specified risk level,
p is the estimated population proportion of interest,
q is equal to 1-p, and
e is the tolerable error level.

For the above formula, the required values are obtained from the sampling frame, estimated from the pilot survey, or specified by the researchers. The size of the finite population, N, used in this determination was 2754. The value of the random normal variate, z, associated with a 95% risk (confidence) level may be found in a statistical table and is equal to 1.96. The population proportions, p, being surveyed are estimated at the conservative value of .5. Note that p=q=.5 maximizes the value of p*q and hence maximizes the sample size. The tolerable error level, e, was

assumed to be .05. Using these values the required sample was calculated to be 337.2. This sample size was rounded up to 338 responses. Hence 338 sample responses were needed to insure a confidence of 95 % of being within +/- .05 of any population proportion estimated.

Assuming a 34 % response rate as determined in the pilot study, the number of surveys required to be mailed to garner 338 returns is 994. As a matter of convenience, it was decided to mail 1000 surveys.

The survey mailing of 1000 names and addresses was selected from the 2754 names and addresses in the final sampling frame. The selections were stratified according to geographic location in proportion to the number of berthed boats in each region. The following is the distribution of samples according to the geographic location of the marina:

North:	95
South:	242
Central:	663

4.3 Data collection, data entry, and survey response

The Boating Research Center prepared a file in dBase format for data entry. This was given to the Metro-Dade Planning Department for the purpose of entering the responses from the mail survey. The Metro Dade Planning Department entered data from 330 responses in the file. The file was then given back to the BRC for analysis. Subsequently, the BRC received 20 additional responses from the mail survey. These were added to the file.

Of 1000 questionnaires mailed, a total of 350 responses were received. Fifteen of these questionnaires were disregarded because they were not completed by the respondent. Of the 335 remaining, only 323 were legible and consistent.

5.0 Data Analysis

5.1 Frequency analysis

A frequency analysis of the survey data is presented in Exhibits 10 and 11 . The typical respondent's boat is 30 to 40 feet in length with a 6 to 10 foot beam. The most likely draft is 3 feet. The typical height of the boat is 40 to 49 feet implying a sailboat. Indeed, 57 % of the respondents were sailboat owners. Almost 95 % of the boats were constructed of fiberglass. The typical boat of the respondents was of the 1970 to 1980 model vintage, and had been purchased within the last four years.

Over 65 % of the survey respondents in Dade County have been boat owners for more than five years. They have typically kept their boat in the marina in which it is currently berthed for more than five years.

Most of the berthed boats are not trailerable. Only 24 % of the respondents have trailerable boats. 68 % of those who can trailer their boats own a trailer. 12 % of the respondents indicated that they would trailer their boat in the event the threat of a hurricane required marina evacuation.

The respondents are generally aware whether or not their marina requires evacuation if a hurricane threatens. 73 % responded that their marina required evacuation and 67 % said they intended to move their boat. 64 % planned to move their boat more than 48 hours before the expected landfall of the storm. The time of the actual response indicated by the respondents, however, was much nearer the expected landfall of the storm, 24 to 48 hours before landfall. It is important to note that the hurricane experiences indicated in the responses were often inconsistent. There is no way to determine whether the respondents' hurricane experiences were gained in Dade County or elsewhere.

Although a high percentage of survey respondents plan to move their boats when a hurricane threatens, 39 % do not know where to move them. Of those respondents who specified a destination in their evacuation plan, 17.8 % chose the Miami River, 8 % chose the Coral Gables Waterway, 3.7 % specified inland canals, and 3 % indicated Biscayne Bay.

Only 10 % of those who intend to move their boats have a written contract for a hurricane mooring. 50 % of the respondents have arranged for pickup from their hurricane moorings and 59 % have conducted a dry run.

5.2 Cross-tabulation Analysis

The analysis of the cross-tabulations of the data from the

survey respondents' hurricane evacuation plans reveals several interesting results. First, as noted in the pilot study, there exist three distinct geographic areas with respect to berthed boats in Dade County. For the purposes of this study the three areas were denoted north, central, and south, The north region begins at the mouth of the Miami River and continues north to the Broward County line. The central region begins at the Miami River and continues south to southwest 88th street. The south region begins at southwest 88th street and continues south to the Monroe County line. Second, the three geographic regions in the County differ not only in the typical types of boats in their marinas, but also in the planning and preparation of their boat owners for hurricane evacuation. Finally, traits that are not significantly different across the various marinas include the length of boat ownership, the decision of when to move the boat if it is to be moved, and the acquisition of insurance coverage. Exhibit 12 shows the cross tabulation by geographic location. Exhibit 13 shows the cross-tabulation by marina.

The types of boats berthed in the marinas of the different geographic regions were found to be significantly different. In the northern region, which follows the intercostal waterway, most of the marinas are small privately owned facilities. The typical boat in this area is a power boat. In the central and southern regions, which have direct access to Biscayne Bay, the predominant mode of propulsion is sail. The sailboats tend to be taller, have less horsepower, and are not trailerable.

An examination of hurricane evacuation plans in the three geographic regions revealed several significant differences. First, with regard to whether or not the respondents planned to move their boats, the respondents in the central region, i.e. marinas in Key Biscayne and Coconut Grove, overwhelming said they would move their boats, while in the north and the south the majority of respondents said they would not. If fact, the majority of respondents in the northern region said that they were not required to move their boat. In the southern region, although respondents admitted that they were required to move their boats, the majority said that they did not intend to do so.

Thorough preparation for an evacuation prior to a hurricane includes a practice run to the refuge site and arranging for someone to pickup the boat captain and bring them to their home. The responses were again significantly different for these issues. Only in the central region did a majority of respondents indicate that they had made a dry run and that they had arranged a pickup. This was not true in the northern and southern regions.

Finally it was noted in the responses of the survey that the amount of information on hurricane evacuation available at the various marinas was perceived to be significantly different. The respondents in the central region believed that information was

generally available, while the respondents in the northern region were evenly split between available and not available. The respondents in the southern region indicated that hurricane evacuation information was not generally available.

5.3 Development of the Geographic Information System and Creation of the Marine Traffic Network Model

In an effort to use the data obtained in the survey of berthed boat owners to evaluate different hurricane evacuation plan scenarios, a marine traffic model was developed utilizing a geographic information system. The geographic information system for used for this study was the ARCINFO system developed by the Environmental Systems Research Laboratory (ESRI). ARCINFO is sophisticated software system that allows the creation and manipulation of various geographic and mapping data. The map of Dade County used in this study was obtained from the Dade County Planning Department. The map is designed in ARCINFO format and includes the latest location and attribute information for the marinas and hurricane destinations in this study.

The results of the hurricane evacuation survey of berthed boat owners allow origin/destination information for individual boat owners to be obtained. The survey results were then generalized for the remainder of the berthed boat owners in the marinas of the study. The destinations of the berthed boats were allocated proportionally to the destinations indicated in the survey.

The movement of boats from marinas to hurricane destinations in the model was accomplished through the use of a network flow model. In the network model, each marina becomes a source node supplying boats to the network. Each specified hurricane destination becomes a sink for boat traffic. Connecting the sources and destinations is a marine traffic network containing arcs that represent the legs of navigable marine routes. These marine routes were obtained through the use of National Oceanographic and Atmospheric Administration (NOAA) maps and depth charts and in consultation with a NOAA marine specialist.

The marine traffic network developed for this study included 88 marinas identified in the marina inventory as requiring evacuation. The total number of boats in these marinas is 2299. Additionally, there were 20 hurricane destination areas identified by survey respondents. A list of these hurricane destinations may be found in Exhibit 14. A map of the marine traffic network used in this study is shown in Exhibit 15.

5.4 Analysis of the Network Model Using the Netsolve Program

The determination of the movement or flow of boats through the marine network was accomplished through the use of programming package called Netsolve. Netsolve is an interactive software

package for network analysis developed by Upstate Resources, Inc. (URI). Netsolve uses optimization algorithms to determine minimum cost flow allocations in capacitated networks. Network models suitable for this type of optimization are characterized by nodes of three basic types: source nodes, sink nodes, and transshipment nodes. Source nodes are points from which flow into the network originates. In the marine traffic model of this study, the marinas are source nodes. The boats that evacuate the marinas as a hurricane approaches are the units of flow that are dispatched into the network. Sink nodes are points into which flow in the network terminates. The hurricane destinations represent the sink nodes in this application. Finally, the transshipment nodes are points at which flow is conserved. That is, the flow into the transshipment point is equal to the flow out of the point. The navigational way points of the evacuation routes are transshipment points of the model.

The results of the evacuation plan survey indicated that 30% of all the respondents did not have an evacuation plan. Based upon the assumption that if a boat owner was forced to evacuate the marina the owner would follow other owners who had a plan, the total number of boats from each marina allocated to a specific hurricane destination was adjusted to reflect the proportion of respondents from the marina who designated that hurricane destination. The model was then run to determine the marine traffic patterns that would disburse all the boats to hurricane destinations in a minimum total distance.

It is important to note that because reliable information on capacities was not available, the hurricane destinations in the marine traffic network were defined with unlimited capacities. The model was executed for each marina. The results were then combined to determine the total number of boats destined for a particular location and to determine where congestion may exist along the marine traffic network.

The results of the model execution are presented in Exhibit 16. Of the 2299 boats moving over the network, 859 are seeking refuge in the Miami River. The heaviest traffic intensity is over the link J to K between the Rickenbacker Causeway and the mouth of the Miami River. Over a period of 24 hours, 644 boats will traverse this link. The second most popular destination is the Coral Gables Waterway, which will have 250 boats. This would represent 11 % of the total boats moving over the network. At the present time, Coral Gables police intend to enforce a policy that would prohibit any boats entering the waterway without a signed mooring contract. Since only 6.5 % of the boat owners surveyed have such agreements, one could at best suspect that 149 boats would be allowed into the waterway leaving over a hundred boat owners to seek refuge elsewhere at the time of an impending hurricane landfall.

6.0 Conclusions and Recommendations

6.1 Overview

The survey of hurricane evacuation plans of berthed boat owners in Dade County, Florida revealed a number of points of interest to those responsible for emergency planning and management in the County. The results of this study showed that the intentions, plans, and preparations of the respondents differed significantly across the natural geographic strata of the County's water resources. Respondents north of the mouth of the Miami River occupying private slips did not intend to move their boats in the event of a hurricane. Respondents in the region from the Miami River south to southwest 88th street were generally aware of the requirement to move their boat, were prepared to move, and had made a practice evacuation run. Respondents in the county marinas south of southwest 88th street, however, generally knew of the requirement to evacuate their marina, but had no intention of doing so. Judging from the tone of the written comments on the survey forms, many of the southern region respondents felt that their marinas were safe refuge sites and that they could not improve their condition by evacuating.

In many cases, information, or the lack thereof, was an important factor. The survey results found that the respondents had significantly different perceptions of the availability of information concerning hurricane evacuation procedures. Only those respondents in the central region felt that they had been given adequate information. Many of the respondents asked for any additional information that may be available and even offered to pay for it. Exhibit 17 presents a tabulation of the respondent's comments and suggestions.

Finally, the study was unable to determine whether there is a shortage of space that would provide hurricane refuge to the berthed boats in Dade County. Additionally, it was generally found that the respondents had not made adequate preparation in securing mooring agreements, making practice evacuation runs, and arranging pickup at the destination site.

6.2 Conclusions

The findings of this study may be briefly stated:

* The respondents to this study were found to be generally responsible and concerned with regard to the safety of their craft in the event of a hurricane.

* The majority of respondents have insurance for damage to their boat and for the damage that their boat may cause to others.

* The majority of respondents wished to have more information concerning the appropriate actions to be taken in the event of a hurricane.

* The respondents were generally not aware of the legality and practicality of occupying their indicated hurricane destination.

* The sufficiency of physical space for hurricane destinations in Dade County is unknown.

6.3 Recommendations

In response to the findings of this study, the following recommendations are made:

* The County, in cooperation with marine agencies, should continue its efforts to provide educational information to all boat owners with regard to hurricane preparedness.

* The procedures for locating a hurricane refuge and securing a vessel should be made available to all owners facing mandatory evacuation from their marina.

* Berthed boat owners should secure contractual mooring agreements.

* Marinas that require evacuation of berthed boats in the event of a hurricane, should make every effort to inform each owner of this intention and of the consequences should they not comply with this policy.

* All marinas, regardless of their evacuation policy, should require a hurricane plan from each wet slip lessee as a prerequisite for wet slip rental.

* Marinas that require evacuation of berthed boats in the event of a hurricane, should require the boat owner's hurricane plan to specify the intended hurricane destination, and include a statement from the owner that certifies that a trial run has been made within the past year.

* The County should use the results of this study to assist in evaluating the efficacy of mandatory berthed boat evacuation in County marinas.

Subsequent marine hurricane preparedness studies should be conducted to address, at least, the following two specific issues:

* The location and capacities of potential hurricane refuge sites must be accurately determined. Current data on the

location, accessibility, and capacity of hurricane refuge sites is very limited. Additional field work in this area is essential to determine the viability of mandatory marina evacuation.

* Marine evacuation clearance times should be studied in more detail. An appropriate model for this type of study would be computer simulation. In a simulation model, each boat could be tracked through the marine network over time. This would allow vessel characteristics such as size, speed, and maneuverability to be studied as they affect each boat's ability to perform a safe evacuation in congested waterways under adverse weather conditions.

Exhibit 1

Marina	Total Number in the List	Number Matched with registration file
1. 1000 Building Marina	47	41
2. 5660 Collins Ave Condo	1	1
3. Adrien towers	7	4
4. Aidil Apts	4	2
5. Alabama Jack's	1	1
6. Anchor Marine	1	1
7. Banyan Bay Apts	14	10
8. Bimini Boat Yard	1	1
9. Biscayne Bay Yacht Club	28	22
10. Black Point Mrina	175	129
11. Blue Marlin Marina	6	4
12. Brickell Bay Village	8	7
13. Brickell Biscayne Condo	12	11
14. Brickell Mar Condo	1	1
15. Brickell Place Condo	29	25
16. C & F Marine	9	7
17. Carriage House Condo	8	7
18. Causeway Marina	8	7
19. Century Towers	6	2
20. Coastal Towers	25	15
21. Coconut Grove Sailing club	653	228
22. Commodore Towers	7	5
23. Coral Reef Yacht Club	34	29
24. Costa Brava	4	4
25. Crandon Park Marina	279	183
26. Del Prado on the Bay	10	7
27. Dinner Key Marina	414	159
28. Doral Hotel	2	2
29. Eden Roc Hotel	3	2
30. Esenada I Condo	9	6
31. FLa Harbor Yacht Club	6	6
32. Flamingo Marina	17	13
33. FPL	1	1
34. Fla Yacht Basin	5	4
35. Fountainbleau Hotel	1	1
36. Forte Towers	5	4
37. Grove Isle Yacht	42	30
38. Harbour West Yacht Club	2	2
39. Hardies Marina	16	11
40. Haulover Commercial Marina	12	10
41. Homestead AFB	1	1
42. Homestead Bayfront Marina	127	86
43. Imperial House Condo	1	1
44. Indian Creek Condo	2	1
45. Key Biscayne Yacht Club	154	107
46. King Cole Condo	2	2

47.	Kings Bay Yacht Club	78	48
48.	Lewis Yacht Center	7	5
49.	Little River Marina	1	1
50.	Manhattan Club	4	1
51.	Marine Plaza Apts	9	5
52.	Mariner's Bay Condo	3	3
53.	Matheson Hammock	228	165
54.	Maule Lake Marina	76	58
55.	Merril Stevens	18	12
56.	Miami Beach Marina	13	12
57.	Miami Outboard Club	22	19
58.	Miami Yacht Club	22	20
59.	Monty Trainer's	44	36
60.	Morton Towers	6	4
61.	Nine Island Avenue	4	3
62.	Nuta's Boat Yard	37	26
63.	Ocean Neptune Marina	1	1
64.	Palm Bay Club	6	5
65.	Poinciana Island Yacht Club	26	22
66.	Point East Condo	1	1
67.	Poland Yacht Basin	1	1
68.	Rickenbacker Marina	46	28
69.	River Run Marina	24	18
70.	Royal Harbor Yacht Club	18	18
71.	Seacoast East Condo	1	1
72.	Seacoast Towers	13	10
73.	Snapper Creek Marina	15	10
74.	South Bay Club Condo	5	4
75.	South Gate Towers	6	6
76.	Sunst Harbour Marina	10	5
77.	Superior Marine Supply	5	4
78.	The Jockey Club	3	2
79.	Tony's Marine Service	10	9
80.	Towerhouse Condo	1	1
81.	Towers of Quayside	10	9
82.	Turnberry Isle	10	8
83.	Villa Regina Condo	8	6
84.	Virginia Key Marina	1	1
85.	Waterway Marina	1	1
86.	Watson Island Marina	1	1
87.	Williams Island	1	1
88.	No name (A Blank)	11	11
	Total	3007	1802
	Unuseable Records	42	42
	Total Records	2965	1760
	No. of records merged in the file		1760
	No. of records not merged but with complete name and address		994
	Total records used in the final survey		2754

Exhibit 2

Summary of Berthed Boat Owners File
Dade County

MARINA	No. of Wet Slips	No. of Boats	No. of Records	Percent Occu.	Mndtory Evac.
No Name			11		
1000 BUILDING MARINA	55	54	47	99	N
5660 COLLINS AVE. CONDO	10	0	1	0	Y
ADRIEN TOWERS	40	14	7	27	N
AIDIL APTS.	10	6	4	60	Y
ALABAMA JACK'S MARINA	12	0	1	0	?
ANCHOR MARINE MARINA	10	10	1	100	N
BANYAN BAY APTS.	30	15	14	50	?
BIMINI BOAT YARD	10	10	1	100	N
BISCAYNE BAY YACHT CLUB	45	44	28	99	Y
BLACK POINT MARINA	170	130	175	70	Y
BLUE MARLIN MARINA	10	6	6	60	N
BRICKELL BAY VILLAGE	14	7	8	50	Y
BRICKELL BISCAYNE CONDO ASSOC	14	12	12	94	Y
BRICKELL MAR CONDOMINIUM	10	0	1	0	?
BRICKELL PLACE CONDOMINIUM	67	36	29	50	Y
C & F MARINE	15	13	9	94	N
CARRIAGE HOUSE CONDO.	22	15	8	78	Y
CAUSEWAY MARINA	10	10	8	100	N
CENTURY TOWERS CONDO	15	7	3	50	N
CENTURY TOWERS CONDO.	15	7	3	50	N
COASTAL TOWERS MARINA	32	32	25	100	Y
COCONUT GROVE SAILING CLUB	272	272	653	100	Y
COMMODORE TOWERS\PLAZA	20	11	7	51	Y
CORAL REEF YACHT CLUB	98	74	34	85	Y
COSTA BRAVA	30	5	4	15	N
CRANDON PARK MARINA	280	224	279	80	Y
DEL PRADO ON THE BAY	60	10	10	6	N
DINNER KEY MARINA	444	444	414	100	Y
DORAL HOTEL	12	3	2	25	Y
EDEN ROC HOTEL & DOCK	17	7	3	40	Y
ESENADA I CONDO.	20	10	9	50	N
FAL HARBOR YACHT CLUB	37	9	6	26	Y
FLAMINGO MARINA	171	17	17	35	Y
FLORIDA POWER & LIGHT MARINA	11	10	1	99	Y
FLORIDA YACHT BASIN	50	25	5	50	N
FONTAINBLEAU HOTEL & DOCKS	12	0	1	0	?
FORTE TOWERS	12	6	5	50	N
GROVE ISLE YACHT & TENNIS CL.	85	42	42	50	Y
HABOUR WEST YACHT CLUB	21	12	2	51	N
HARDIES MARINA	125	80	16	78	N
HAULOVER COMMERCIAL MARINA	44	12	12	25	Y
HOMESTEAD AIR FORCE BASE	25	15	1	58	Y
HOMESTEAD BAYFRONT MARINA	173	129	127	75	Y
IMPERIAL HOUSE CONDO.	10	0	1	0	?
INDIAN CREEK CONDO.	12	4	2	33	?
KEY BISCAYNE YACHT CLUB	100	100	154	100	Y
KING COLE CONDO.	30	25	2	85	?
KINGS BAY YACHT &COUNTRY CLUB	120	78	78	74	Y
LEWIS YACHT CENTER	25	21	7	93	N
LITTLE RIVER MARINA	20	20	1	100	N
MANHATTAN CLUB	16	6	4	40	Y

MARINE PLAZA APARTMENTS	20	15	9	75	N
MARINERS BAY CONDO.	29	13	3	46	N
MATHESON HAMMOCK MARINA	252	251	228	99	Y
MAULE LAKE MARINA	134	32	76	23	Y
MERRILL STEVENS DRY DOCK CO.	55	30	18	66	Y
MIAMI BEACH MARINA	396	139	13	33	Y
MIAMI OUTBOARD CLUB	50	26	20	52	Y
MIAMI YACHT CLUB	40	40	22	100	Y
MONTY TRAINER'S DOCK & BAR	155	63	44	35	Y
MORTON TOWERS	30	8	6	25	Y
NINE ISLAND AVENUE	36	7	4	20	Y
NUTA'S BOAT YARD	125	63	37	50	N
OCEAN NEPTUNE MARINA	0	0	1		N
PALM BAY CLUB	77	6	6	7	N
POINCIANA ISLAND YACHT CLUB	40	34	26	85	N
POINT EAST CONDO.	10	3	1	30	N
POLAND YACHT BASIN	30	20	1	66	N
RICKENBAKER MARINA	170	86	46	48	Y
RIVER RUN MARINA	50	48	24	98	N
ROYAL HARBOUR YACHT CLUB	51	27	18	50	?
SEACOAST EAST CONDO.	10	0	1	0	?
SEACOAST TOWERS	18	14	10	75	Y
SEACOAST TOWERS SOUTH	17	7	3	40	Y
SNAPPER CREEEK MARINA	31	19	15	67	N
SOUTH BAY CLUB CONDO.	17	5	5	30	Y
SOUTH GATE TOWERS CONDO	18	8	6	45	Y
SUNSET HARBOUR MARINA	125	29	10	28	Y
SUPERIOR MARINE SUPPLY	10	5	5	50	N
THE JOCKEY CLUB	39	13	3	28	Y
TONY'S MARINE SERVICE	13	12	10	99	N
TOWERHOUSE CONDO.	16	4	1	25	Y
TOWERS OF QUAYSIDE	63	10	10	6	Y
TURNBERRY ISLE YACHT CLUB	107	38	10	26	Y
VILLA REGINA CONDO.	20	13	8	60	Y
VIRGINIA KEY MARINA, INC.	0	0	1	0	N
WATERWAYS MARINA	35	20	1	68	N
WATSON ISLAND MARINA	45	45	1	99	Y
WILLIAMS ISLAND	90	36	1	40	Y
TOTAL	5392	3288	2994		

Number of records with owner's name and address	1990
Number of records without owner's name and address but with FLNUM	751
Number of records with owner's name and FLNUM but no address	188
Number of records without owner's name and address but with DOCNUM	9
Number of records with owner's name and DOCNUM but no address	36
Number without owner's name, address,FLNUM or DOCNUM	33
Total	3007

Exhibit 3

Sample Letter for the Workshop

February 22, 1990

Mr. Dick Briggs
Marine Council
615 SW 2 Avenue
Miami, FL 33130

Dear Mr. Briggs:

You are invited to attend a Workshop on Hurricane Marine Response at the University of Miami Rosenstiel School of Marine and Atmospheric Sciences Auditorium on March 2, 1990 from 1 to 2:30 PM. The purpose of the workshop is to discuss work that is about to begin on a survey of what owners of berthed boats in Dade County intend to do with their boats in the event of a hurricane. Before sending out the survey, staff from the UM Boating Research Center and the Dade County Office of Emergency Management and Planning Department want to hear your ideas and suggestions about this important study.

As you know, Dade County has not been hit by a major hurricane since 1965. However, the number of boats berthed in this area has increased substantially during the past 25 years. The County's current hurricane response plan does not adequately identify options that may be available to individual boat owners in the event of a hurricane nor did past public information sufficiently advise the boating public of how to prepare their craft.

Dade County has received a federal Coastal Zone Management Grant to find out what owners of berthed boats intend to do with their boats in a hurricane, and the degree of advance preparation that those boat owners can be expected to have done prior to a hurricane. Potential boating hurricane evacuation patterns will be analyzed and alternative marine evacuation programs and policies will be evaluated.

This will be a cooperative effort by Metro-Dade County and the University of Miami Boating Research Center. The data collection will be done through a mail survey of berthed boat owners in major marinas in Dade County. The mail survey will be followed up by telephone to obtain a statistically reliable sample size. The data will be analyzed to provide information to be used by the Office of Emergency Management in updating the County's Hurricane Plan. The

final report will also be sent to state agencies and to local governments throughout the State of Florida to assist them in developing marine hurricane response plans.
You can assist us in this important effort by attending the workshop on March 2nd. Members of the Boating Research Center will discuss the survey approach and the questions that they think should be asked, but we want to be sure that we have covered the right topics before going public with the survey. Please call me at 375-2835 any weekday from 8:30 to 5:30 if you will be able to attend.

Sincerely,

Jean Evoy
Project Coordinator

JE/mbc

workshop.let

List of Invitees to the Hurricane Workshop

Dockmaster
Nuta's Boat Yard

Teo A. Babun Jr
Antillean Marine Ship Corp

Samuel T. Cole
Gallagher-Cole Associates

Dockmaster
Rickenbacker Marina

Dockmaster
Homestead Bayfront Marina

Dockmaster
Dinner Key Marina

Dockmaster Hardies Marina

Paul Hawkins
H.J. Ross & Ass.

R.L. Jensen
Turnberry Isles Yacht & Co. Club

Mike Lamphera, Capt
Fla. Marine Patrol

Joseph McCormack, Sgt
Miami Beach Police

Coconut Grove SC

William P. Terheyden
Biscayne Bay Marriot Marina Cr.

Bruce C. Andrews
Miami Marina Management Corp

Doug Black
Monty Trainers Bayshore Marina

Jim Davis
Flamingo Marina

Dockmaster
Maule Lake Marina

Dockmaster
Matheson Hammock Marina

J.L. Douglas
Coral Gables Marine Patrol

Jo Ann Husfeldt
Sunset Harbor Marina

Craig I Jones

Nicalaos Nap
Coral Reef yacht Club

Van W. Snider Jr
Marine Industry Association/S. Fla

Leslie Du Toit

Tony Asbury
Grove Isle Yacht & Tennis Club

Michael Brescher

Dockmaster
Haulover Beach Park

Dockmaster
Black Point Marina

Douglas M. Halsey, ESQ
Douglas M. Halsey, P.A.

Frank Jenkins

Joseph M. Kolisch
J.M. Kolisch Insurance, Inc.

Richard Mc Alpin, ESQ
Mitchell, Harris, Horr

Margort Puccu
Cocoplum Yacht Club

Bill Tanner
Key Biscayne Yacht Club

Carrol V. Truss, PH.D.
University Yacht Club

Coast Guard Auxilliary
Coast Guard

Dockmaster
Crandon Park Marina

Exhibit 4

Workshop on Hurricane Preparedness
March 2, 1990
Suggestions/Comments for the Survey

1. Boat Type: Ask for other dimensions of the vessel (height, draft, beam).

2. Include the following questions
   Do you own a trailer?
   Is it well maintained?
   Do you know how to secure your trailered vessel?

3. For hurricane preparedness:
   Do you plan to move your boat during hurricane warnings?
   Eliminate any references to specific areas as to where the boat owner will move his boat.
   Have you made arrangements for your hurricane mooring site?
   Have you completed a dry run?
   Will someone pick you up from you hurricane mooring site?
   If you are out of town, have you made arrangements for someone to secure your boat?
   If you do not plan to move your boat, do you know how to secure your vessel in the water?
   Do you plan to stay in your vessel during a hurricane? If yes, where will you anchor?
   Questions 9 and 13 - eliminate specific references to areas where boat owners will bring their boats

4. For hurricane experience:
   Have you moved your vessel during a hurricane warning in the past?
   Where did you move your vessel?

5. Question number 15 should be eliminated.

UNIVERSITY OF Miami

Exhibit 5

April 17, 1990

Dear boat owner:

The Boating Research Center of the University of Miami, under contract to Metro-Dade County, is conducting a survey of berthed boat owners in marinas in Dade County. The survey results will assist the Metro Planning Department and Office of Emergency Management in revising hurricane plans.

Dade County has not experienced a major hurricane since 1950. Since that time, the pleasure boating population has soared while safe harbor space has diminished. In order to develop realistic hurricane plans we need your input. Please take a few minutes to complete the enclosed survey.

We would be happy to share with you the survey results once completed. Your cooperation is important and very much appreciated. If you have any questions please call the Boating Research Center at 361-4085.

Safe Boating,

Maria Luisa Villanueva
Associate Director
Boating Research Center

Rosenstiel School of Marine and Atmospheric Science
Marine Affairs
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361 4085

HURRICANE PREPAREDNESS SURVEY

University of Miami/Metro-Dade County

Check (X) the appropriate items or fill in the blanks. Please write an answer that cannot be adequately expressed by checking or filling in a blank.

BOAT TYPE

1. Boat Propulsion
   [ ] outboard [ ] sail [ ] others_____
   [ ] inboard [ ] inboard/outboard

2. Horsepower: _____HP

3. Boat Dimensions
   Length: _____ft Draft:_____ft
   Beam: _____ft Height:_____ft (minimum clearance)

4. Hull Material
   [ ] wood [ ] fiberglass [ ] metal [ ] others

5. Engine Type
   [ ] gas [ ] diesel [ ] others_____

6. Is your boat trailerable? [ ] Yes [ ]No [ ]Don't Know
   Do you own a trailer? [ ] Yes [ ]No

7. Year boat was built. 19____

8. Year boat was purchased. 19____

9. Number of years you have owned a boat: _____yrs

10. Registration Number: _____

HURRICANE PREPAREDNESS

11. Where is your boat berthed/stored? (name of marina, facility, etc.)_____

12. How long has your boat been berthed/stored in that location?
    [ ] less than 1 year [ ] 3 to 5 years [ ] over 10 years
    [ ] 1 to 2 year [ ] 5 to 10 years

13. Does your marina require you to move your boat before a hurricane?
    [ ] Yes [ ] No [ ] Don't Know

14. Does your marina provide you with information on what to do to prepare for a hurricane?
    [ ] Yes [ ] No [ ] Don't Know

15. In the event of a hurricane threatening Dade County, do you plan to move your boat?
[ ] Yes [ ] No [ ] Don't Know
If "No" or "Don't Know" please go to question 22.

16. How many hours before expected hurricane landfall do plan to move your boat?
[ ] 49 - 72 hours [ ] less than 24 hours
[ ] 24 - 48 hours [ ] others_____

17. Where do you plan to move your boat?_____

18. Do you have a written contract for hurricane mooring?
[ ] Yes [ ] No [ ] Don't Know

19. Have you made arrangements to have someone pick you up at your hurricane mooring site? (Note: We strongly recommend that you do not remain on your vessel during a hurricane.)
[ ] Yes [ ] No [ ] Don't Know

20. Have you conducted a dry run to test the amount of supplies, length of time, etc. required to implement your plan to move your boat when a hurricane threatens?
[ ] Yes [ ] No

21. If "yes", how long did it take to move your boat to the mooring site? _____hrs

22. If your boat is to remain in the marina during the hurricane, do you know the proper procedures for securing your boat in its slip or on its trailer?
[ ] Yes [ ] No [ ] Don't Know

23. If you are out of town during a hurricane, have you made arrangements for someone else to secure your vessel for you?
[ ] Yes [ ] No [ ] Don't Know

24. Do you have insurance for hurricane damage to your boat?
[ ] Yes [ ] No [ ] Don't Know

25. Do you have insurance for damages that your boat may inflict upon the marina or other parties?
[ ] Yes [ ] No [ ] Don't Know

HURRICANE EXPERIENCE

26. Have you been in Dade County when a hurricane threatened?
[ ]Yes [ ]No If "No" please go to 33.

27. What most recent year did it happen? 19____
Name of Tropical storm or Hurricane: _____

28. Where was your boat located/docked then? _____

29. Did you move your boat at that time? [ ]Yes [ ] No
If "No" please go to question 32.

30. Where did you move your boat?_____

31. How many hours before estimated hurricane landfall did you move your boat?

[ ] 49 - 72 hours [ ] less than 24 hours

[ ] 24 - 48 hours [ ] others _____

32. Did you incur damages? [ ] Yes [ ] No

If yes, approximate value of damages. About...$_____

Briefly describe the damages incurred._____

_____

_____

33. Please write down any suggestions you may have regarding the County hurricane response plan._____

_____

_____

34. Would you like to receive additional information regarding hurricane preparedness for boat owners? If "yes", please fill out the following:

Name:_____

Address:_____City:_____Zip:_____

Day Phone: _____

Thank you.

Exhibit 6

Less than 25 Feet

Propulsion	North	Central	South	Total
Outboard	51 - 10	298	44	393
Inboard	13	30 -10	9	52
Sail	4	62	16	82
I/O	49	41	18- 10	108
Others	2	12	2	17

25' - <30'

Propulsion	North	Central	South	Total
Outboard	12	51	31	94
Inboard	21	112	98 - 10	231
Sail	6	87 - 10	38	131
I/O	30 - 10	41	29	100
Others	0	0	2	2

30' - <40'

Propulsion	North	Central	South	Total
Outboard	3	12	10	25
Inboard	27	148 - 10	125	300
Sail	1	43	24 - 10	68
I/O	8 - 8	16	4	28
Others	0	8	4	12

40' - <65'

Propulsion	North	Central	South	Total
Outboard	0	4	2	6
Inboard	12 - 10	56	25	93
Sail	0	8	2	10
I/O	1	0	0	1
Others		5	1	6

65' and over

Propulsion	North	Central	South	Total
Outboard	0	0	0	0
Inboard	0	1	0	1
Sail	0	0	0	0
I/O	0	0	0	0
Others	0	0	0	0

Exhibit 7
Summary Results of Pilot Study

Location	South	Central	North	Total
# Sent	51	38	39	128
#Responses	20	11	10	41
Boat Length				
LT 26′	1	4	1	6
26 to <30′	7	3	2	12
30 to <40′	10	4	3	17
40 to <60′	2		4	6
Propulsion				
outboard		2	1	3
inboard	11	1	7	19
inb/out	1	1	2	4
sail	5	1		6
inb/sail	3	5		8
out/sail		1		1
Hull				
wood			1	1
fiberglass	19	11	9	39
metal	1			1
Engine				
gas	8	6	6	20
diesel	12	5	5	22
Is Boat Trailerable				
Yes	6	3	4	13
No	13	8	6	27
Do you own a trailer				
Yes	2		1	3
No	14	3	6	23
Modelyear				
<1970	1	3	1	5
1970-1980	7	2	1	10
1981-1985	6	3	2	11
1986-1990	6	3	6	15
Purchase Date				
<1970				
1970-1980	5	3	1	9
1981-1985	7	3	3	13
1986-1990	8	4	6	18
Years as boatowner				
0 to 1	1	2	1	4
2 to 5	5	3	3	11
6 to 10	7	5	1	13
over 10 years	7	1	5	13
Where is boat berthed				
Matheson	15			15
Black Pointe	4	1		5
Homestead	1			1
Crandon		5		5
Coconut Grove SC		3		3
Key Bisc YC		1		1
Jockey Club			1	1
Jones Boat Yd				
Waterways			1	1

Little River		1		1
MOC		1		1
Maule Lake			2	2
Coastal Towers			1	1
ICW			2	2
Marina Condo			1	1
Haulover			1	1
Turnberry			1	1
How long boat berthed there				
<1yr	4	3		7
1 to <3	5	3	5	13
3 to <5	2	3	1	6
5 to <10	2	1	2	5
10 and over	3	1	2	6
Does your marina require evac				
Yes	18	10	4	32
No	2		4	6
Don't know		1		1
Does your marina provide info on how to prepare boat for hurricane?				
Yes	7	4	3	14
No	11	4	7	22
Don't Know	2	2	0	4
Will you move your boat when hurricane threatens				
Yes	16	10	5	31
No	3		5	8
Don't Know	1	1		2
How many hrs before expected landfall will you move				
49-72	2	4	0	6
24-48	10	6	3	19
less than 24	14	1	1	16
others				
Where will you move your boat				
Warehouse		1	1	2
Home	1		1	2
Miami River	5	2	1	8
Gables Cana	3	2		5
Ft. Lauderdale	0	1		1
Mangroves	1			1
Up the creek	1			1
Canal	0	1		1
Trailer	0	1		1
Jones Boat Yd	1			1
Old Cutler Estates		1		1
Don't Know	4	2	2	8
Do you have a written contract for hur. mooring				
Yes	1			1
No	15	11	4	30
Don't Know				
Arrange for pickup at mooring				
Yes	7	6	2	15
No	8	5	3	16
Have you conducted a dry run for moving your boat				
Yes	7	7	3	17
No	7	4	3	14

How long did it take to move your boat?				
less than 2 hrs	2	2	1	5
2 to < 6 hrs	4	4	2	10
6 to 10 hrs	2	1	1	4
over 10 hrs				
Know procedure for tying boat?				
Yes	10	4	6	20
No	5	3	4	12
Don't Know	1	1		2
Made arrangements if you are out of town?				
Yes	11	8	6	25
No	9	3	4	16
Do you have insurance for damages to your boat?				
Yes	14	7	6	27
No	3	2	0	5
Don't Know	3	2	1	6
Do you have insurance for damages to others?				
Yes	12	7	7	
No	2	3		5
Don't know	3	1	3	7
Have you been in Dade during hurricane threat				
Yes	16	7	6	29
NO	3	2	3	8
Yes (not boatowner)	1	2	1	4
What most recent year				
89	5	3	1	9
88	2	2	1	5
85-87	2	1		3
others	1			1
Where was boat docked then?				
Matheson	7		2	9
Black Pointe	1			1
Crandon		3		3
Dinner Key		1		1
Miami River				
King's Bay	1			1
Jones Bt Yrd				
Home		1	1	2
Coconut Grove SC		2		2
Homestead Bayfront	1			1
Maule Lake			1	1
Castaways			1	1
Aventura Condo			1	1
Did you move your boat then?				
Yes	8	5	1	14
No	6	2	4	12
Where did you move your boat				
Miami River	4			4
Gables Canal/Waterway	1	2		3
Home				
Ft. Lauderdale		1	1	2
Cocoplum	1	1		2
Mangrove	1			1
How many hours before expected				
49-72	1	4		5

24-48	3	1	1	5
less than 24	2			2
others				
Did you incurr damages				
Yes				
No	17	7	5	29

Exhibit 8

Cross Tabulation of Geog. Location and Decision to Move Boat

Move Location	Don't Know	No	Yes	Row Total
North	1 50.0	0 0	10 32.3	11 26.8
South	0 0	5 62.5	5 16.1	10 24.4
Central	1 50.0	3 37.5	16 51.6	20 48.8
Column	2 4.9	8 19.5	31 75.6	41 100

Chi Square	9.2663
D.F.	4
Significance	0.0547765

Crosstabulation of Boat Propulsion and Decision to Move Boat

Move Propulsion	Don't Know	No	Yes	Total
Outboard	0 0	1 12.5	2 6.5	3 7.3
Inboard	0 0	3 37.5	16 51.6	19 46.3
Sail	1 50	1 12.5	4 12.9	6 14.6
I/O	0 0	2 25	3 9.7	5 12.2
I/Sail	1 50	1 12.5	5 16.1	7 17.1
O/Sail	0 0	0 0	1 3.2	1 2.4
Column Total	2 4.9	8 19.5	31 75.6	41 100

Chi Square	6.80460
D.F.	10
Significance	0.753007

Crosstabulation of Boat Length and Decision to Move Boat

Move Boat Length	Don't Know	No	Yes	Total
LT 26'	0 0	1 12.5	5 16.1	6 14.6
26' to <30'	2 100	3 37.5	7 22.6	12 29.3
30 to <40'	0 0	2 25.0	15 48.4	17 41.5
40' to <60'	0 0	2 25	4 12.9	6 14.6
Column	2 4.9	8 19.5	31 75.6	41 100

Chi Square	7.09671
D.F.	6
Significance	0.311996

Exhibit 9

HURRICANE PREPAREDNESS SURVEY

University of Miami/Metro-Dade County

Check (X) the appropriate items or fill in the blanks. Please write an answer that cannot be adequately expressed by checking or filling in a blank.

BOAT TYPE

1. Boat Propulsion
   [ ] outboard [ ] sail [ ] others_____
   [ ] inboard [ ] inboard/outboard

2. Horsepower: _____HP

3. Boat Dimensions
   Length: _____ft Draft:_____ft
   Beam: _____ft Height:_____ft (minimum clearance)

4. Hull Material
   [ ] wood [ ] fiberglass [ ] metal [ ] others

5. Engine Type
   [ ] gas [ ] diesel [ ] others_____

6. Is your boat trailerable? [ ] Yes [ ]No [ ]Don't Know
   Do you own a trailer? [ ] Yes [ ]No

7. Year boat was built. 19____

8. Year boat was purchased. 19____

9. Number of years you have owned a boat: _____yrs

10. Registration Number: _____

HURRICANE PREPAREDNESS

11. Where is your boat berthed/stored? (name of marina, facility, etc.)_____
    Please check one: [ ] wet berth [ ] dry storage

12. How long has your boat been berthed/stored in that location?
    [ ] less than 1 year [ ] 3 to less than 5 years [ ] 10 years & over
    [ ] 1 to less than 3 years [ ] 5 to less than 10 years

13. Does your marina require you to move your boat before a hurricane?
    [ ] Yes [ ] No [ ] Don't Know

14. Does your marina provide you with information on what to do to prepare for a hurricane?
    [ ] Yes [ ] No [ ] Don't Know

15. In the event of a hurricane threatening Dade County, do you plan to move your boat?
[ ] Yes [ ] No [ ] Don't Know
If "No" or "Don't Know" please go to question 22.

16. How many hours before expected hurricane landfall do you plan to move your boat?
[ ] 49 - 72 hours [ ] less than 24 hours
[ ] 24 - 48 hours [ ] others_____

17. Where do you plan to move your boat?_____

18. Do you have a written contract for hurricane mooring?
[ ] Yes [ ] No [ ] Don't Know

19. Have you made arrangements to have someone pick you up at your hurricane mooring site? (Note: We strongly recommend that you do not remain on your vessel during a hurricane.)
[ ] Yes [ ] No [ ] Don't Know

20. Have you conducted a dry run to test the amount of supplies, length of time, etc. required to implement your plan to move your boat when a hurricane threatens?
[ ] Yes [ ] No

21. If "yes", how long did it take to move your boat to the mooring site? _____hrs

22. If your boat is to remain in the marina during the hurricane, do you know the proper procedures for securing your boat in its slip or on its trailer?
[ ] Yes [ ] No [ ] Don't Know

23. If you are out of town during a hurricane, have you made arrangements for someone else to secure your vessel for you?
[ ] Yes [ ] No [ ] Don't Know

24. Do you have insurance for hurricane damage to your boat?
[ ] Yes [ ] No [ ] Don't Know

25. Do you have insurance for damages that your boat may inflict upon the marina or other parties during a hurricane?
[ ] Yes [ ] No [ ] Don't Know

HURRICANE EXPERIENCE

26. Have you been in Dade County when a hurricane threatened?
[ ]Yes [ ]No If "No" please go to 33.

27. What most recent year did it happen? 19____

28. Where was your boat located/docked then? _____

29. Did you move your boat at that time? [ ]Yes [ ] No
If "No" please go to question 32.

30. Where did you move your boat?_____

31. How many hours before estimated hurricane landfall did you move your boat?

[ ] 49 - 72 hours [ ] less than 24 hours

[ ] 24 - 48 hours [ ] others _____

32. Did you incur damages? [ ] Yes [ ] No

If yes, approximate value of damages. About...$_____

Briefly describe the damages incurred._____

_____

_____

33. Please write down any suggestions you may have regarding the County hurricane response plan._____

_____

_____

34. Would you like to receive additional information regarding hurricane preparedness for boat owners? If "yes", please fill out the following:

Name:_____

Address:_____City:_____Zip:_____

Day Phone: _____

Thank you.

Exhibit 10

Summary Results of Hurricane Survey by Geographic Location

No. Sent: 1000
No. Responses: 350
No. used in analysis: 323
North: 14 Central: 168 South:106 Others/Unknown location:35

BOAT TYPE	North	Central	South	Other
Boat Length				
LT 26'	4	49	17	17
26 to <30'	3	24	22	3
30 to <40'	16	68	56	5
40 to <60'	1	25	11	7
60 and over	0	1	0	1
No resp	0	1	0	1
Beam				
<6'	0	5	3	3
6 - 10	8	96	49	15
11- 15	5	53	50	10
16- 20	0	6	3	1
over 20	0	1	0	0
No resp	1	7	0	6
Draft				
No resp	0	0	1	2
1'	1	6	2	3
2'	1	14	16	5
3'	8	50	42	5
4'	2	59	33	5
5'	0	22	9	7
6'	0	6	1	1
7'	0	1	0	0
9'	0	1	0	0
10' and over	0	0	1	2
Height				
<10	2	9	9	6
10 - 19	5	16	28	4
20 - 29	2	5	6	1
30 - 39	0	26	15	0
40 - 49	3	69	30	6
50 and above	0	26	11	7
No resp	2	17	7	11

Horsepower				
< 20	4	59	24	4
20 - 49	0	47	14	6
50 - 99	0	12	7	7
100 - 199	1	8	2	5
200 - 300	3	9	10	3
over 300	5	22	42	4
No resp	1	18	7	3
Boat Propulsion				
outboard	2	13	14	12
inboard	6	29	39	4
sail	2	52	24	5
inb/out	2	7	5	3
inb/sail	2	64	24	10
out/sail	0	2	0	0
others	1	0	0	1
Hull				
wood	1	4	0	2
fiberglass	13	159	104	30
metal	0	4	2	1
others/no resp	0	0	0	1
Fuel				
gas	11	75	56	23
diesel	13	89	48	11
others	0	4	2	1
Is Boat Trailerable				
Yes	6	36	18	18
No	7	130	87	16
Don't Know	0	2	1	0
No resp	1	0	0	1
Do you own a trailer				
Yes	2	25	12	14
No	10	134	92	19
Don't know	1	0	0	1
No resp	13			
Modelyear				
<1970	3	21	6	3
1970-1980	3	87	51	10
1981-1985	2	36	26	11
1986-1990	6	24	23	11
Purchase date				
<1970	1	0	3	3
1970-1980	3	39	22	7
1981-1985	1	48	26	10
1986-1990	9	81	55	15

Years as boatowner				
0 to 1	2	11	6	4
2 to 5	4	49	25	10
6 to 10	0	43	22	9
10 and above	8	65	53	12

HURRICANE PREPAREDNESS

How long boat berthed there				
< 1 year	1	16	11	3
1 to <3	6	55	44	14
3 to <5	5	39	31	5
5 to <10	1	23	9	4
10 and over	1	35	11	4
No resp	0	0	0	5
Does your marina require evacuation				
Yes	6	142	77	10
No	7	13	18	13
Don't Know	1	13	10	8
No resp	0	0	1	4
Does marina provide info...				
Yes	5	72	25	6
No	6	67	60	14
Don't Know	3	28	20	10
No resp	0	1	1	5
Will you move your boat				
Yes	9	135	57	16
No	1	18	34	14
Don't Know	4	12	13	3
No resp	0	3	2	2
How many hours before estimated hurricane landfall will you move your boat				
49-72	3	43	3	10
24-48	7	81	45	14
less than 24	0	14	45	14
others	2	4	1	0
Where will you move your boat				
Trailer home /dry storage	2	20	11	8
Miami River	2	43	9	3
Gables Waterway	0	16	10	0
Gables Estates	0	0	1	0
Gables by the Sea	0	2	0	0
Ft. Lauderdale	0	6	0	9
Cocoplum	0	8	0	1

Old Cutler Canal	0	2	0	0
Black Point Mang	0	0	2	0
Matheson Lake	0	0	2	0
Key Bisc Pines	0	2	1	0
Key Bisc Hurri	0	2	0	0
Arvida Waterways	0	0	1	0
ICW by 79th	2	0	0	0
Little River	0	2	0	0
Keystone Point	0	2	1	0
Marine Stadium	0	4	0	0
Biscayne Bay	0	6	6	0
Kings Bay lagoon	0	2	2	0
Maule Lake	1	0	0	0
Snapper Creek	0	0	1	0
Private dock	0	2	0	1
Inland canal	1	7	1	1
No resp/Dont know	6	42	57	22
Other	0	0	1	0
Do you have a written contract for hurricane mooring				
Yes	1	14	2	4
No	11	130	68	14
Don't know	1	12	22	3
No resp	1	12	14	14
Arrange for pickup at mooring				
Yes	7	77	21	5
No	4	58	35	13
Don't know	2	17	32	3
No resp	1	16	18	14
Have you conducted a dry run for moving your boat				
Yes	3	87	30	7
No	9	65	44	15
Don't know	0	1	1	0
No resp	2	15	31	13
How long did it take to move boat				
less than 2 hrs	2	16	13	6
2 to <6 hrs	3	65	14	3
6 to 10 hrs	0	4	2	0
over 10 hrs	0	4	1	1
No resp	9	79	76	25

Know procedures for tying boat				
Yes	10	79	59	17
No	1	10	20	4
Don't Know	3	55	23	6
No resp	0	14	4	8
Made arrangements if out of town				
Yes	6	105	51	14
No	8	55	50	16
Don't Know	0	6	4	1
No resp	0	2	1	4
Do you have insurance for damages to your boat				
Yes	11	127	82	18
No	1	24	12	2
Don't know	2	14	12	12
No resp	0	3	0	3
Do you have insurance for damages to others				
Yes	7	114	66	19
No	2	22	12	3
Don't Know	5	29	27	10
No Resp	0	3	1	3

HURRICANE EXPERIENCE

Have you been in Dade during a hurricane threat				
Yes	10	134	91	20
No	4	30	14	11
No resp	0	4	1	4
What most recent year				
1989	2	33	22	1
1988	6	63	29	5
1985-1987				
before 1985	0	33	32	13
No resp	6	39	23	16
Did you move your boat then				
Yes	2	89	24	7
No	7	32	43	6
Don't Know	0	0	1	0
No resp	5	49	38	22
Where did you move boat				
79th Csway	1	0	0	0
Biscayne Bay	0	3	0	0
Cocoplum	0	9	0	0
Dry Storage/Trailered	1	15	6	2

Ft. Lauderdale	0	2	0	0
Gables Estates	0	0	1	0
Gables by the Sea	0	2	0	0
Gables Waterway	0	15	5	0
Inland Canal	0	3	3	0
Key Biscayne Pines Canal	0	2	1	0
Key Biscayne Hurric	0	1	0	0
Keystone	0	1	1	0
Kings Bay	0	1	1	0
Marine Stad	0	1	0	0
Matheson Lake	0	0	1	0
Miami River	1	29	7	1
Normandy Isles	0	0	0	1
Old Cutler	0	2	0	0
Private Dock	0	1	0	1
Snapper Creek	0	1	0	0
Other	0	1	0	0
No resp/Don't Know	11	82	28	80
How many hours before expected landfall				
49-72	0	16	10	1
24-48	3	53	11	6
less than 24	1	14	6	1
others	1	1	1	0
No resp	9	84	78	27
Did you incur damages				
Yes	0	4	2	0
No	11	135	82	20
No resp	3	29	22	15
Val of damages				
< $500	0	2	2	0
1000 - 2000	0	1	1	0
>2000	0	1	1	0

Exhibit 11

Summary Results of Hurricane Survey

No. Sent: 1000
No. Responses: 350
No. used in analysis: 323

BOAT TYPE

Boat Length	
LT 26'	93
26 to <30'	51
30 to <40'	132
40 to <60'	43
60 and over	4
Beam	
<6'	11
6 - 10	168
11- 15	118
16- 20	10
over 20	2
No resp	14
Draft	
No resp	20
1'	12
2'	36
3'	105
4'	99
5'	38
6'	8
7'	1
9'	1
10' and over	3
Height	
<10	26
10 - 19	53
20 - 29	14
30 - 39	41
40 - 49	108
50 and above	44
No resp	37
Horsepower	
< 20	91
20 - 49	60
50 - 99	26
100 - 199	16
200 - 300	28
over 300	73
No resp	29

Boat Propulsion	
outboard	41
inboard	78
sail	83
inb/out	17
inb/sail	100
out/sail	2
others	2
Hull	
wood	7
fiberglass	306
metal	7
others/no resp	4
Fuel	
gas	165
diesel	151
others	7
Is Boat Trailerable	
Yes	78
No	240
Don't Know	3
No resp	2
Do you own a trailer	
Yes	53
No	255
Don't know	2
No resp	13
Modelyear	
<1970	33
1970-1980	151
1981-1985	75
1986-1990	64
Purchase date	
<1970	7
1970-1980	71
1981-1985	85
1986-1990	160
Years as boatowner	
0 to 1	23
2 to 5	88
6 to 10	74
10 to 20	138

HURRICANE PREPAREDNESS

Where is boat berthed

No response	12
Aventura Condo	1
Biscayne Bay YC	4
Black Point	26
Briar Bay YC	1
Brickell Place	2
Carriage House	2
Ceder Mills	1
Coastal Towers Condo	2
Coconut Grove SC	50
Cocoplum Marina	3
Coral Gables by the Sea	1
Coral GAbles SC	2
Coral Gables Waterway	3
Coral Reef YC	8
County Marina	3
Crandon	38
Del Prado Condo	1
Dinner Key	47
Eden Rock Hotel	1
Grove Isle Marina	2
Harbour Cay Club	1
Homestead BF	16
Isla del Mar	3
The Jockey Club	1
Key Biscayne YC	5
Kings Bay YC	5
Marina Plaza Apts	1
Matheson Hammock	35
Maule Lake Marina	2
Miami Marina	1
Miami Outboard Club	1
Miami River	1
Miami YC	2
Monty Trainers	2
Ocean Neptune Marina	1
Palm Island	1
Pelican Key Harbour	1
Rickenbacker Marina	1
Royal Harbour YC	3
Snapper Creek Marina	3
Sunset Harbor	3
Other Yacht Club	1
Private canal/condo/residence	12
Dry Storage	3

How long boat berthed there

< 1 year	31
1 to <3	119
3 to <5	80
5 to <10	37
10 and over	51

Does your marina require evacuation

Yes	235
No	51
Don't Know	32
No resp	7

Does marina provide info...

Yes	108
No	147
Don't Know	61
No resp	7

Will you move your boat

Yes	217
No	67
Don't Know	32
No resp	7

How many hours before eta

49-72	206
24-48	39
less thatn 24	71
others	7

Where will you move your boat

Trailer home/dry storage	39
Miami River	57
Gables Waterway	27
Gables Estates	1
Gables by the Sea	2
Ft. Lauderdale	6
Cocoplum	9
Old Cutler Canal	2
Black Point Mangroves	2
Matheson Lake	2
Key Biscayne Pines Canal	3
Key Biscayne Hurricane Harbor	2
Arvida Waterways	1
ICW by 79th	1
Little River	2
Keystone Point	3
Marine Stadium	4
Biscayne Bay	10
Kings Bay lagoon	4
Maule Lake	1
Snapper Creek	1

Private dock	3
Inland canal	12
No response/ Don't Know	127
Other	1

Do you have a written contract for hur. mooring

Yes	21
No	223
Don't know	38
No resp	41

Arrange for pickup at mooring

Yes	110
No	110
Don't know	54
No resp	49

Have you conducted a dry run for moving boat

Yes	127
No	133
Don't know	2
No resp	61

How long did it take to move boat

less than 2 hrs	37
2 to <6 hrs	85
6 to 10 hrs	6
over 10 hrs	6
nO RESP	189

Know procedures for tying boat

Yes	165
No	45
Don't Know	87
No resp	26

Made arrangements if out of town

Yes	176
No	129
Don't Know	11
No resp	7
No Resp	

Do you have insurance for damages to your boat

Yes	238
No	39
Don't know	49
No resp	6

Do you have insurance for damages to others

Yes	206
No	39
Don't Know	71
No Resp	7

HURRICANE EXPERIENCE

Have you been in Dade during ahurricane threat

Yes	255
No	59
Don't Know	0
No resp	6

What most recent year

1989	58
1988	50
1985-1987	53
before 1985	78
No resp	84

Where was boat docked then

79th Csway	1
Bahamas	1
Biscayne Bay YC	4
Black Point	2
Coconut Grove SC	42
Coral Gables SC	1
Coral Gables Waterway	4
Coral Reef YC	6
Crandon	16
Dinner Key	30
Dry STorage	4
Gables by the Sea	2
Home	9
Homestead BF	9
Inland Canal	5
Key Biscayne YC	6
Keystone Marina	1
King Cole Marina	1
KingsBay	10
Matheson	25
Miami Beach	1
Monty's	2
No vessel then	18
No response	93
Other Marina	17
Others	6
Private canal/condo	6

Did you move your boat then

Yes	120
No	88
Don't Know	1
No resp	114

Where did you move boat

79th Csway	2
Biscayne Bay	3
Cocoplum	9
Dry Storage/Trail	20
Ft. Lauderdale	2
Gables Estates	1
Gables by the Sea	2
Gables Waterway	20
Inland Canal	7
Key Biscayne Pines Canal	3
Key Biscayne Hurricane	1
Keystone	2
Kings Bay	1
Marine Stad	1
Matheson Lake	1
Miami River	38
Normandy Isles	2
Old Cutler	2
Private Dock	2
Snapper Creek	1
Other	1
No resp/Don't Know	201

How many hours before expected landfall

49-72	27
24-48	73
less than 24	22
others	3
no resp	198

Did you incur damages

Yes	6
No	248
No resp	69

Val of damages

< $500	2
1000 - 2000	3
>2000	1

Exhibit 12

Cross Tabulations
Geographic Locations by
Survey Variables

Boat Propulsion

Propulsion	N	C	S	O
outboard	2	13	14	12
inboard	6	29	39	4
sail	2	52	24	5
inb/outboard	2	7	5	3
inb/sail	2	64	24	10
out/sail	0	2	0	0
others	0	1	0	1

Chi Square	50.7317
D.F.	18
Significance	5.84642E-5

Boat Length

Length	N	C	S	O
<26'	4	49	17	17
26-<30'	3	24	22	3
30-<40'	6	68	56	6
40-<60	1	25	11	7
60 and over	0	1	1	0

Chi Square	32.1558
D.F.	15
Significance	6.13094E-3

Beam

Beam	N	C	S	O
<6	0	5	3	3
6 - 10	8	96	49	15
11 -15	5	53	50	10
>16	0	6	3	1
No Resp	1	7	0	6

Chi Square	29.7957
D.F.	15
Significance	0.0126798

Horsepower

Horsepower	N	C	S	O
<20	4	59	24	4
20-49	0	40	14	6
50-99	0	12	7	7
100-199	1	8	2	5
200-300	3	9	10	6
over 300	5	22	42	4
No Resp	1	18	7	3

Chi Square	62.889
D.F.	18
Significance	7.46965E-7

Height

Height	N	C	S	O
<10	2	9	9	6
10-19	5	16	28	4
20-29	2	5	6	1
30-39	0	26	15	0
40-49	3	69	30	6
50 and above	0	26	11	7
No Resp	2	17	7	11

Chi Square	58.8522
D.F.	18
Significance	3.13204E-6

Boat Hull

Hull	N	C	S	O
wood	1	4	0	2
fiberglass	13	159	104	30
metal	0	4	2	1
others/no resp	0	1	0	3

Chi Square	18.6560
D.F.	12
Significance	0.0971764

Boat Fuel

Fuel	N	C	S	O
gas	11	75	56	23
diesel	3	89	48	11
others	0	4	2	1

Chi Aquare	10.5386
D.F.	6
Significance	.103727

Is your boat trailerable?

Trailer	N	C	S	O
Yes	6	36	18	18
No	7	130	87	16
Don't Know	0	2	1	0
No Resp	1	0	0	1

Chi Square	36.3529
D.F.	9
Signnificance	3.43176E-5

Do you own a trailer?

Own Trailer	N	C	S	O
Yes	2	25	12	14
No	10	134	92	19
Don't Know	1	0	0	1
No Resp	1	9	2	1

Chi Square	34.0097
D.F.	9
Significance	8.89732E-5

Year boat was built

Modelyear	N	C	S	O
<1970	3	21	6	3
1970-1980	3	87	51	10
1981-1985	2	36	26	11
1986-1990	6	24	23	11

Chi Square	20.8971
D.F.	9
Significance	0.0131151

Year boat was purchased

Issue Date	N	C	S	O
<1970	1	0	3	3
1970-1980	3	39	22	7
1981-1985	1	38	26	10
1986-1990	9	81	55	15

Chi Square	15.9166
D.F.	9
Significance	0.0686445

Number of years you have owned a boat

No. of Years as boat owner	N	C	S	O
0 to 1	2	11	6	4
2 to 5	4	49	25	10
6 to 10	0	43	22	9
10 and above	8	65	53	12

Chi Square	10.3859
D.F.	9
Significance	.320154

How long has your boat been berthed/stored in that location?

How Long in Marina	N	C	S	O
<1 year	1	16	11	3
1 to <3	6	55	44	14
3 to <5	5	39	31	5
5 to <10	1	23	9	4
10 and over	1	35	11	4

Chi Square	53.8522
D.F.	15
Significance	2.89521E-6

Does your marina require you to move your boat before a hurricane?

Require Evac.	N	C	S	O
Yes	6	142	77	10
No	7	13	18	13
Don't Know	1	13	10	8
No Resp	0	0	1	4

Chi Square	73.7821
D.F.	9
Significance	2.74791E-12

Does your marina provide you with information on what to do to prepare for a hurricane?

Provide Info	N	C	S	O
Yes	5	72	25	6
No	6	67	60	14
Don't Know	3	28	20	10
No Resp	0	1	1	5

Chi Square	43.5217
D.F.	9
Significance	1.72871E-6

In the event of a hurricane threatening Dade County, do you plan to move your boat?

Move Boat	N	C	S	O
Yes	9	135	57	16
No	1	18	34	14
Don't Know	4	12	13	3
No Resp	0	3	2	2

Chi Square	41.1722
D.F.	9
Significance	4.655358E-6

How many hours before expected hurricane landfall do you plan to move your boat?

Number of Hours	N	C	S	O
49 - 72	3	43	3	10
24 - 48	7	81	45	14
<24	0	14	45	14
Others	2	4	1	0

Chi Square	46.5952
D.F.	12
Significance	5,47717E-6

Do you have a wriiten contract for hurricane mooring?

Written Contract	N	C	S	O
Yes	1	14	2	4
No	11	130	68	14
Don't Know	1	12	22	3
No Resp	1	12	14	14

Chi Square	48.0634
D.F.	9
Significance	2.48531E-7

Have you made arrangements to have someone pick you up at your hurricane mooring site?

Pick_Up	N	C	S	O
Yes	7	77	21	5
No	4	28	35	13
Don't Know	2	17	32	4
No Resp	1	16	18	14

Chi Square	54.3846
D.F.	9
Significance	1.59522E-8

Have you conducted a dry run to rest the amount of supplies, length of time, etc. required to implement your plan to move your boat when a hurricane threatens?

Dry Run	N	C	S	O
Yes	3	87	30	7
No	9	65	44	15
Don't Know	0	1	1	0
No Resp	2	15	31	13

Chi Square	38.1320
D.F.	9
Significance	1.65058E-5

How long did it take you to move your boat to the mooring site?

No. of Hours	N	C	S	O
< 2 hours	2	16	13	6
2 to <6 hours	3	65	14	3
6 to <10 hours	0	4	2	0
over 10 hours	0	4	1	1
No resp	9	79	76	25

Chi Square	33.0539
D.F.	12
Significance	9.49429E-4

If your boat is to remain in the marina during a hurricane, do you know the proper procedures for securing your boat in its lip or on its trailer?

Secure Boat	N	C	S	O
Yes	10	79	59	17
No	1	20	20	4
Don't Know	3	55	23	6
No Resp	0	14	4	8

Chi Square	22.7927
D.F.	9
Significance	6.67894E-3

If you are our of town during a hurricane, have you made arrangements for someone else to secure your vessel for you?

Out of Town	N	C	S	O
Yes	6	105	51	14
No	8	5	50	16
Don't Know	0	6	4	1
No Resp	0	2	1	4

Chi Square	25.555
D.F.	9
Significance	2.41440E-4

Do you have insurance to hurricane damage to your boat?

Insurance	N	C	S	O
Yes	11	127	82	18
No	1	24	12	2
Don't Know	2	14	12	12
No Resp	0	3	0	3

Chi Square	31.5078

Do you have insurance for damages that your boat may inflict upon the marina or other parties?

Liability	N	C	S	O
Yes	7	114	66	19
No	2	22	12	3
Donn't Know	5	29	27	10
No Resp	0	3	1	3

Chi Square	13.9498
D.F.	9
Significance	0.124121

Have you been in Dade County when a hurricane threatened?

Hurricane Exp	N	C	S	O
Yes	10	134	91	20
No	4	30	14	11
No Resp	0	4	1	4

Chi Square	19.6585
D.F.	9
Significance	3.18461E-3

What most recent year did it happen?

Year	N	C	S	O
>1989	2	33	22	1
1985-1988	6	63	29	5
<1985	0	33	32	13
No Response	6	39	23	16

Chi Square	28.4052
D.F.	9
Significance	8.15930E-4

Did you move your boat?

Move Boat	N	C	S	O
Yes	2	87	24	7
No	7	32	43	6
Don't Know	0	0	1	0
No Resp	5	49	38	22

Chi Square	46.8309
D.F.	9
Significance	4.22036E-7

How many hours before expected landfall did you move your boat?

No. of Hours	N	C	S	O
49-72	0	16	10	1
24-48	3	53	11	6
<24	1	14	6	1
Others	1	1	1	0
No Resp	9	84	78	27

Chi Square	31.7774
D.F.	12
Significance	1.4975E-3

Did you incur damages?

Incur Damages	N	C	S	O
Yes	0	4	2	0
No	11	135	82	20
No Resp	3	29	22	15

Chi Square	12.1172
D.F.	6
Significance	0.594046

Exhibit 13
Cross Tabulation of Selected Marinas by Survey Variables
Boat Propulsion

	Outb	Inb	Sail	I/O	I/S	O/S	Total
BBYC	0	0	3	0	1	0	4
BP	0	10	3	5	4	0	26
CCGSC	1	1	28	0	15	1	50
CRYC	0	1	4	0	3	0	8
CRAN	0	9	14	2	12	0	38
DK	2	8	4	0	33	1	47
HBF	0	10	4	0	1	0	16
KBYC	0	3	0	0	0	0	5
KIBYC	0	1	3	0	1	0	5
MATH	0	11	8	0	10	0	35
TOTAL	3	54	71	7	80	2	234

Chi Square 132.555
D.F. 45 Significance 1.45981E-10

Boat Hull

	Wood	Fglas	Metal	Other NoRes	Total
BBYC	0	4	0	0	4
BP	0	26	0	0	26
CCGSC	1	49	0	0	50
CRYC	0	8	0	0	8
CRAN	0	38	0	0	38
DK	2	42	2	1	47
HBF	0	15	1	0	16
KBYC	0	5	0	0	5
KIBYC	0	5	0	0	5
MATH	0	34	1	0	35
TOTAL	3	226	4	1	234

Chi Square 15.866
D.F. 27 Significance 0.955454

	Fuel			
	Gas	Diesel	Othr	Total
BBYC	3	1	0	4
BP	17	8	1	26
CCGSC	33	14	3	50
CRYC	3	4	1	8
CRAN	18	19	1	38
DK	6	41	0	47
HBF	4	6	0	16
KBYC	3	2	0	5
KIBYC	2	3	0	5
MATH	16	19	0	35
Total	111	117	6	234

Chi Square	48.6719		
D.F.	18	Significance	1.19548E-4

	Boat Trailerable			
	Yes	No	DontK	Total
BBYC	0	4	0	4
BP	7	18	1	26
CCGSC	16	34	0	50
CRYC	4	4	0	8
CRAN	8	29	1	38
DK	1	45	1	47
HBF	0	16	0	16
KBYC	3	2	0	5
KIBYC	0	5	0	5
MATH	3	32	0	35
Total	42	189	3	234

Chi Square	39.2840		
D.F.	18	Significance	2.60966E-3

Own Trailer

	Yes	No	No Resp	Total
BBYC	0	2	2	4
BP	3	22	1	26
CCGSC	11	35	4	50
CRYC	4	4	0	8
CRAN	3	35	0	38
DK	1	44	2	47
HBF	0	16	0	16
KBYC	2	3	0	5
KIBYC	0	5	0	5
MATH	1	33	1	35
Total	25	199	10	234

Chi Square	59.1964		
D.F.	18	Significance	2.7574E-6

Modelyear

	<1970	70-80	81-85	86-90	Total
BBYC	0	4	0	0	4
BP	2	10	7	7	26
CCGSC	14	24	9	3	50
CRYC	1	2	3	2	8
CRAN	4	20	8	6	38
DK	2	26	13	6	47
HBF	1	8	1	6	16
KBYC	0	2	1	2	5
KIBYC	0	3	1	1	5
MATH	1	20	0	5	35
Total	25	119	52	38	234

Chi Square	42.2316		
D.F.	27	Significance	0.0317872

Purchase Date

	<1970	70-80	81-85	86-90	Total
BBYC	0	4	0	0	4
BP	1	3	7	15	26
CCGSC	0	19	15	16	50
CRYC	0	2	2	4	8
CRAN	0	4	12	22	38
DK	0	8	15	24	47
HBF	1	3	2	10	16
KBYC	0	0	3	2	5
KIBYC	0	1	1	3	5
MATH	1	12	8	14	35
Total	3	56	65	110	234

Chi Square	42.1533		
D.F.	27	Significance	0.0317872

Years Owned a boat

	0-1	2-5	6-10	over 10	Total
BBYC	0	0	0	4	4
BP	1	7	3	15	26
CCGSC	1	13	14	22	50
CRYC	1	3	2	2	8
CRAN	2	14	7	15	38
DK	6	10	13	18	47
HBF	1	2	6	7	16
KBYC	0	2	1	2	5
KIBYC	1	1	2	1	5
MATH	0	8	7	20	35
Total	13	60	55	106	234

Chi Square	28.7878		
D.F.	27	Significance	0.371266

How Long Berthed in the Marina

Years	<1	1-<3	3-<5	5-<10	10+	Total
BBYC	0	0	0	0	4	4
BP	2	21	3	0	0	26
CCGSC	5	6	13	7	19	50
CRYC	0	3	3	2	0	8
CRAN	2	15	8	9	4	38
DK	5	23	10	3	6	47
HBF	1	5	8	0	2	16
KBYC	0	1	2	2	0	5
KIBYC	1	2	1	0	1	5
MATH	1	8	12	7	7	35
Total	17	84	60	30	43	234

Chi Square	93.9876		
D.F.	36	Significance	4.48818E-7

Marina Require Evacuation

	Yes	No	DontK	Total
BBYC	4	0	0	4
BP	20	4	2	26
CCGSC	48	1	1	50
CRYC	8	0	0	8
CRAN	34	1	3	38
DK	37	4	6	47
HBF	9	3	4	16
KBYC	5	0	0	5
KIBYC	2	2	1	5
MATH	30	3	2	35
Total	197	18	19	234

Chi Square	32.2028		
D.F.	18	Significance	0.0208018

Marina Provide Information

	Yes	No	DontK	Total
BBYC	1	1	2	4
BP	5	13	8	26
CCGSC	26	20	4	50
CRYC	6	2	0	8
CRAN	13	12	13	38
DK	20	22	5	47
HBF	1	11	4	16
KBYC	2	2	1	5
KIBYC	0	5	0	5
MATH	9	22	4	35
Total	83	110	41	234

Chi Square	45.4175		
D.F.	18	Significance	3.60589E-4

Move boat when hurricane threatens

	Yes	No	DontK	Total
BBYC	4	0	0	4
BP	5	16	5	26
CCGSC	47	2	1	50
CRYC	8	0	0	8
CRAN	30	2	5	38
DK	37	4	4	47
HBF	4	7	3	16
KBYC	4	1	0	5
KIBYC	2	3	0	5
MATH	28	4	3	35
Total	169	39	21	234

Chi Square	99.6396		
D.F.	27	Significance	2.94960E-10

How many hours before estimated hurricane landfall

	49-72	24-48	<24	Others	No Resp	Total
BBYC	0	3	0	1	0	4
BP	0	8	1	0	17	26
CCGSC	18	25	4	1	2	50
CRYC	2	6	0	0	0	8
CRAN	7	23	3	0	5	38
DK	11	21	5	2	8	47
HBF	1	3	1	0	11	16
KBYC	2	2	0	0	1	5
KIBYC	0	2	0	0	2	5
MATH	6	19	4	1	5	35
Total	47	113	18	5	51	234

Chi Square	93.0927		
D.F.	36	Significance	5.99674E-7

Written Contract for Mooring

	Yes	No	DontK	NoResp	Total
BBYC	1	3	0	0	4
BP	0	10	10	6	26
CCGSC	4	42	2	2	50
CRYC	0	8	0	0	8
CRAN	5	28	1	4	38
DK	4	34	5	4	47
HBF	0	7	6	3	16
KBYC	0	5	0	0	5
KIBYC	1	3	0	1	5
MATH	1	28	4	2	35
Total	16	168	28	22	234

Chi Square	62.0897		
D.F.	27	Significance	1.39475E-4

Dry Run

	Yes	No	DontK	NoResp	Total
BBYC	4	0	0	0	4
BP	3	11	0	12	26
CCGSC	37	11	0	2	50
CRYC	6	2	0	0	8
CRAN	14	20	0	4	38
DK	22	18	1	6	47
HBF	1	6	0	9	16
KBYC	3	2	0	0	5
KIBYC	0	4	0	1	5
MATH	14	16	1	4	35
Total	104	90	2	38	234

Chi Square	82.2865		
D.F.	27	Significance	1.69272E-7

How long did it take to move your boat

	<2hrs	2-<6	6-<10	10 & over	No Resp	Total
BBYC	1	3	0	0	0	4
BP	1	1	0	0	24	26
CCGSC	4	31	1	2	12	50
CRYC	1	5	0	0	2	8
CRAN	4	7	1	2	24	38
DK	2	18	2	0	25	47
HBF	1	0	0	1	14	16
KBYC	2	1	0	0	2	5
KIBYC	0	0	0	0	5	5
MATH	8	4	1	0	22	35
Total	24	70	5	5	130	234

Chi Square	88.5789		
D.F.	36	Significance	2.52831E-6

Secure Boat

	Yes	No	DontK	NoResp	Total
BBYC	3	0	0	1	4
BP	16	7	2	1	26
CCGSC	17	3	22	8	50
CRYC	2	1	5	0	8
CRAN	18	8	11	1	38
DK	22	7	14	4	47
HBF	11	2	2	1	16
KBYC	2	0	3	0	5
KIBYC	4	0	1	0	5
MATH	17	9	9	0	35
Total	112	37	69	16	234

Chi Square	46.0250		
D.F.	27	Significance	0.0126445

Made Arrangements if Out of Town

	Yes	No	DontK	No Resp	Total
BBYC	4	0	0	0	4
BP	13	13	0	0	26
CCGSC	37	12	1	0	50
CRYC	5	2	1	0	8
CRAN	16	19	2	1	38
DK	27	16	3	1	47
HBF	7	6	2	1	16
KBYC	5	0	0	0	5
KIBYC	1	4	0	0	5
MATH	18	16	1	0	35
Total	133	88	10	3	234

Chi Square	33.5113		
D.F.	27	Significance	.180718

Boat Insurance

	Yes	No	DontK	NoResp	Total
BBYC	3	0	1	0	4
BP	19	3	4	0	26
CCGSC	39	7	3	1	50
CRYC	8	0	0	0	8
CRAN	27	7	3	1	38
DK	38	5	3	1	47
HBF	11	1	4	0	16
KBYC	4	0	1	0	5
KIBYC	5	0	0	0	5
MATH	26	6	3	0	35
Total	180	29	22	3	234

Chi Square	18.0478		
D.F.	27	Significance	0.902051

Liability Insurance

	Yes	No	DontK	NoResp	Total
BBYC	4	0	0	0	4
BP	15	3	8	0	26
CCGSC	30	8	11	1	50
CRYC	6	0	2	0	8
CRAN	24	5	8	1	38
DK	36	6	4	1	47
HBF	9	1	6	0	16
KBYC	5	0	0	0	5
KIBYC	2	1	2	0	5
MATH	21	7	7	0	35
Total	152	31	48	3	234

Chi Square	20.6665		
D.F.	27	Significance	0.801654

Have you been in Dade during a hurricane threat

	Yes	No	No Resp	Total
BBYC	4	0	0	4
BP	20	6	0	26
CCGSC	46	4	0	50
CRYC	7	1	0	8
CRAN	24	11	3	38
DK	37	9	1	47
HBF	15	1	0	16
KBYC	5	0	0	5
KIBYC	3	2	0	5
MATH	33	2	0	35
Total	194	36	4	234

Chi Square	29.1664		
D.F.	18	Significance	.046283

What most recent year experience hurricane threat

Year	1989	85-88	<85	No Resp	Total
BBYC	0	4	0	0	4
BP	6	3	8	9	26
CCGSC	12	23	10	5	50
CRYC	4	2	1	1	8
CRAN	6	10	9	13	38
DK	10	18	6	13	47
HBF	2	5	7	2	16
KBYC	2	1	2	0	5
KIBYC	0	2	1	2	5
MATH	9	12	10	4	35
Total	51	80	54	49	234

Chi Square	42.6866		
D.F.	27	Significance	0.0281285

Did you move your boat then

	Yes	No	NoResp	Total
BBYC	4	0	0	4
BP	2	9	15	26
CCGSC	39	7	4	50
CRYC	6	1	1	8
CRAN	10	8	20	38
DK	23	8	16	47
HBF	2	10	4	16
KBYC	4	1	0	5
KIBYC	1	2	2	5
MATH	11	15	9	35
Total	102	61	71	234

Chi square	80.3400		
D.F.	18	Significance	7.47169E-10

How many hours before expected hurricane landfall did you move your boat

	48-72	24-47	<24	Others	NoResp	Total
BBYC	0	4	0	0	0	4
BP	1	1	0	0	24	26
CCGSC	8	25	3	1	13	50
CRYC	3	2	0	1	2	8
CRAN	1	6	2	0	29	38
DK	3	13	5	0	26	47
HBF	2	0	0	0	14	16
KBYC	1	1	2	0	1	5
KIBYC	0	1	1	0	3	5
MATH	4	4	3	0	24	35
Total	23	57	16	2	136	234

Chi Square	102.178		
D.F	36	Significance	2.9698E-8

Did you incur damages

	Yes	No	NoResp	Total
BBYC	0	3	1	4
BP	1	19	6	26
CCGSC	0	45	5	50
CRYC	0	8	0	8
CRAN	1	29	8	38
DK	0	37	10	47
HBF	0	16	0	16
KBYC	1	4	0	5
KIBYC	0	2	3	5
MATH	1	26	8	35
Total	4	189	41	234

Chi Square	29.9712		
D.F.	18	Significance	0.0377270

Exhibit 14

Potential Hurricane Destinations Used in Model Runs

1. Black Point Mangrove
3. Old Cutler Canal (C-100)
4. Kings Bay
5. Coral Gables by the Sea
6. Snapper Creek Canal
7. Gables Estates
8. Key Biscayne Pines Canal
9. Key Biscayne Hurricane Harbor
10. Marine Stadium
11. Little River/Belle Meade Area
12. Normandy Isle/79th Street Csway Area
13. Keystone Point
14. Maule Lake/Oleta River
15. Miami River
16. Matheson Hammock Canal
17. Gables Waterways
18. Arvida Waterways
19. Cocoplum
20. Ft. Lauderdale

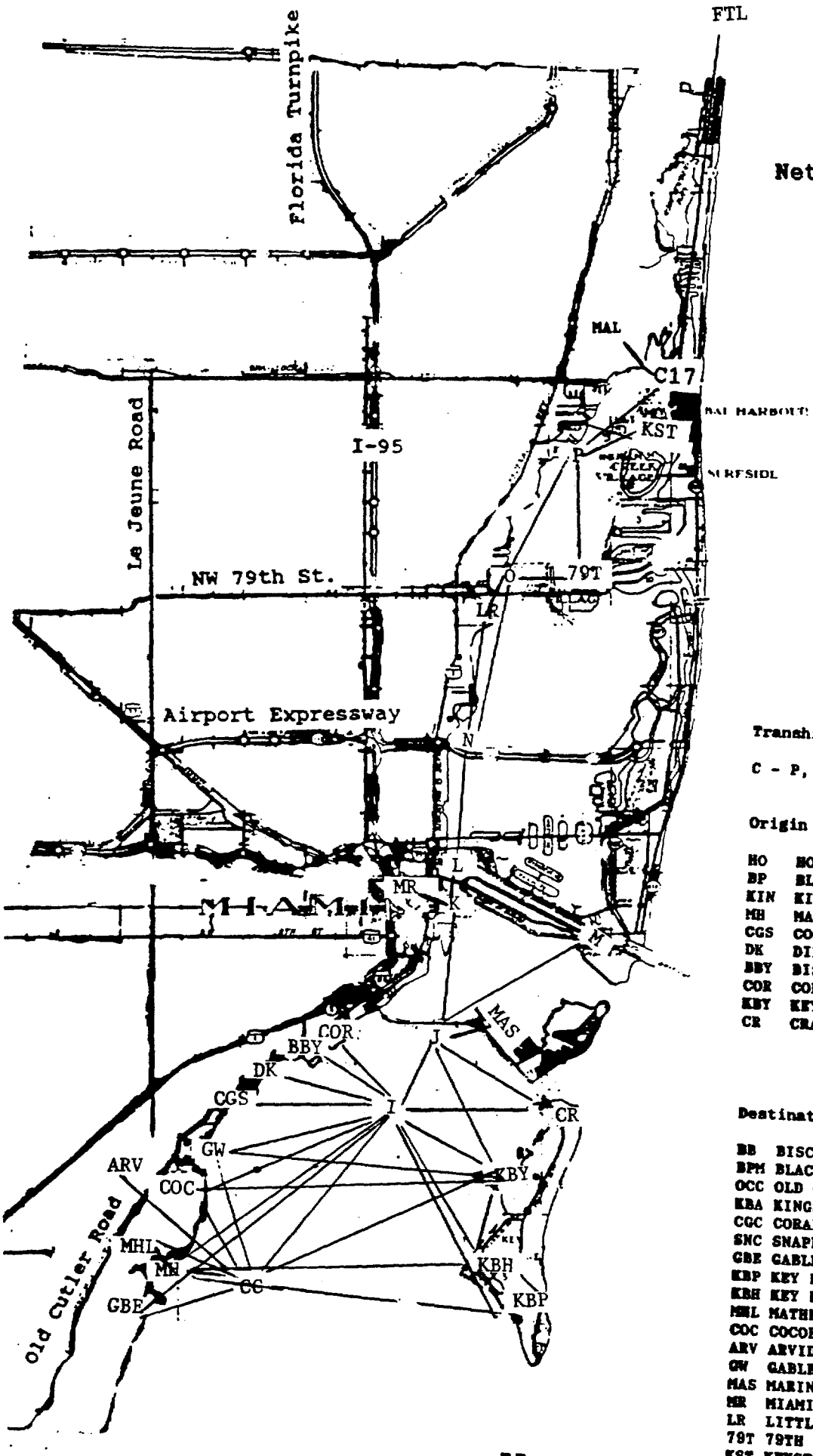

EXHIBIT 15

Network Nodes and Arcs

Transhipment Nodes

C - P, CC, C17

Origin Nodes

HO	HOMESTEAD BF
BP	BLACK POINT MARINA
KIN	KINGS BAY YC
MH	MATHESON HAMMOCK
CGS	COCONUT GROVE SC
DK	DINNER KEY
BBY	BISCAYNE BAY YC
COR	CORAL REEF YC
KBY	KEY BISCAYNE YC
CR	CRANDON MARINA

Destination Nodes

BB	BISCAYNE BAY BY ELLIOT
BPM	BLACK POINT MANGROVE
OCC	OLD CUTLER CANAL
KBA	KINGS BAY CANAL/MANGROVE
CGC	CORAL GBLS BY THE SEA
SNC	SNAPPER CREEK CANAL
GBE	GABLES ESTATES
KBP	KEY BISCAYNE PINES CANAL
KBH	KEY BISCAYNE HURRICANE HARBOR
MHL	MATHESON HAMMOCK LAKE
COC	COCOPLUM
ARV	ARVIDEA WATERWAYS
GW	GABLES WATERWAYS
MAS	MARINE STADIUM
MR	MIAMI RIVER
LR	LITTLE RIVER
79T	79TH CSWAY/NORMANDY
KST	KEYSTONE
MAL	MAULE LAKE
FTL	FT. LAUDERDALE

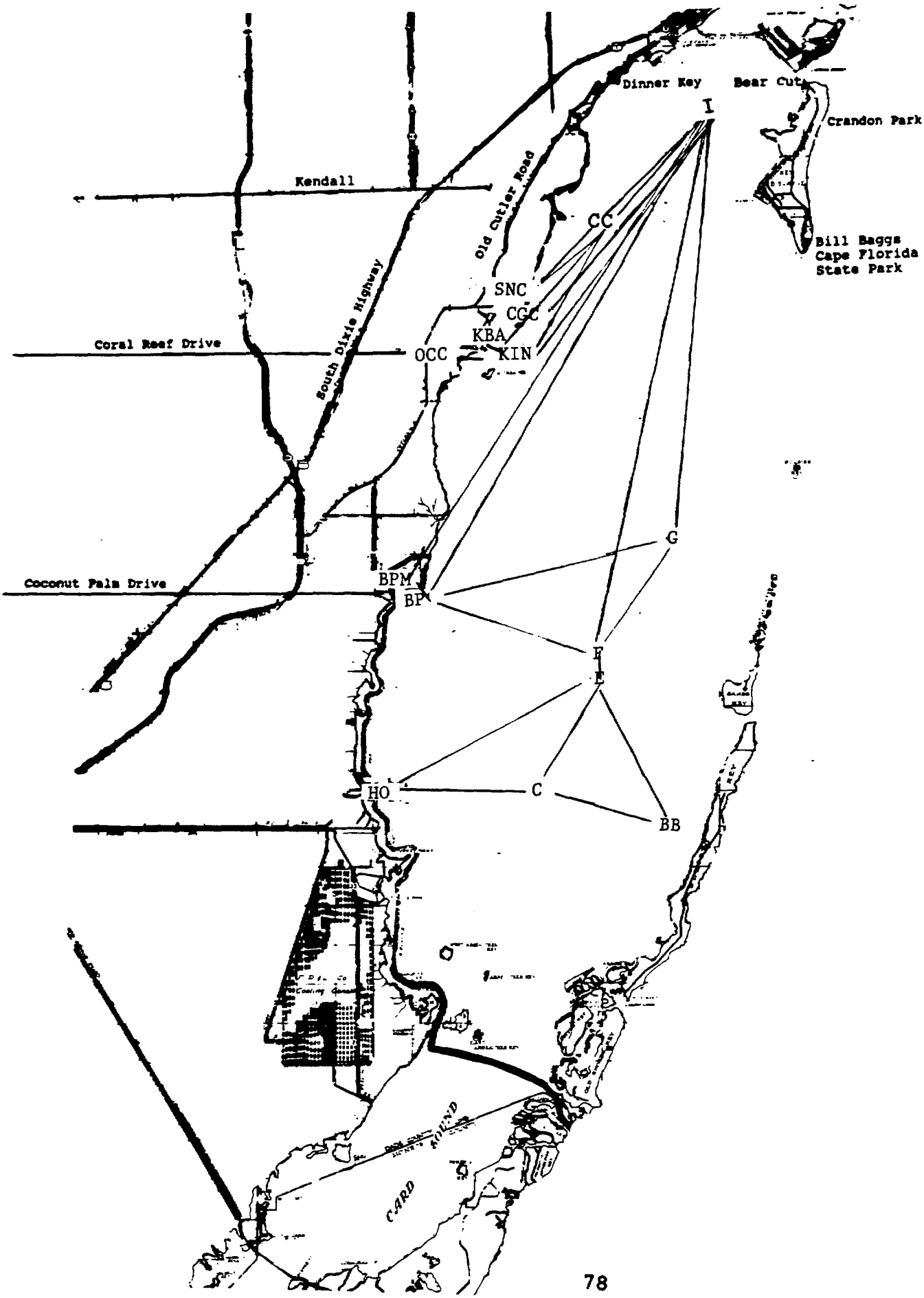
Dinner Key
Bear Cut
Crandon Park
Bill Baggs
Cape Florida
State Park
I
Kendall
Old Cutler Road
CC
SNC
CGC
KBA
KIN
OCC
Coral Reef Drive
South Dixie Highway
G
Coconut Palm Drive
BPM
BP
F
E
HO
C
BB
CARD

Exhibit 16

Summary of Network Flow

DESTINATION	CODE	FLOW
NORMANDY/79TH	79T	90
ARVIDA WATERWAYS	ARV	10
BISCAYNE BAY	BB	131
BLACK POINT MAN	BPM	68
CG BY THE SEA	CGC	27
COCOPLUM	COC	66
FT. LAUDERDALE	FTL	54
GABLES ESTATES	GBE	16
CG WATERWAYS	GW	250
KINGS BAY	KBA	56
KB HURRICANE HAR	KBH	39
KB PINES	KBP	22
KEYSTONE	KST	134
LITTLE RIVER	LR	69
MAULE LAKE	MAL	41
MIAMI RIVER	MR	859
MARINE STADIUM	MAS	30
OLD CUTLER CANAL	OCC	42
SNAPPER CREEK	SNC	52

Exhibit 17

Tabulation of Respondent's Comments

Comments	Number
Leave boats in the marinas during hurricane	38
County should provide safe storage	11
Education - Inform boat owners of Dade County Plan, send out information on how to secure boats, etc	16
Suggest areas for safe hurricane haven	18
Leave the Miami River open as hurricane haven	10
Provide good and reasonable plans	16
Other comments/suggestions	34

Comments/Suggestions from the Survey

33. Please write down any suggestions you may have regarding the County hurricane response plan. IT IS ABSURD. OWNERS HAVE NOWHERE TO MOVE THEIR BOATS AND REQUIRING THEM TO DO SO WILL ONLY ADD TO THE CHAOS. BECAUSE OF THE "MOVING" REQUIREMENT, WHEN I PUR

CHASED MY NEW BOAT, I SOUGHT DOCKAGE WHERE I WOULDN'T HAVE TO MOVE AND WOULD HAVE SOME PROTECTION. UNLESS "EXPERTS" ARE EMPLOYED TO DEVELOPE A PLAN WHICH WOULD ALLOW MINIMAL MOVEMENT OF VESSELS (RECOGNIZING MOST BOAT OWNERS HAVE HOMES BUSINESSES AND FAMILIES WHICH THEY MUST ALSO BE CONCERNED ABOUT) THE FINANCIAL AND PHYSICAL DAMAGE TOLL WILL BE ASTRONOMICAL.

33. Please write down any suggestions you may have regarding the County hurricane response plan. I STRONGLY SUGGEST THAT BOATS REMAIN IN THEIR NORMAL MOORING/MARINA FACILITY TO HAVE THOUSANDS OF BOATERS MOVE THEIR VESSELS

FROM THEIR MARINA WHEN THERE IS NOT RESONABLE / SAFE ALTERNATIVE DOCKAGE FACILITY IS INSANE THE SAFETY OF THE BOAT OPERATOR/ HIS HER FAMILY ANOTHE NEED TO PROTECT LIVES SHOULD PREVENT THE POTENTIAL DAMAGE TO THE MARINA OR DOCKAGE FACILITY

33. Please write down any suggestions you may have regarding the County hurricane response plan. Revise it to allow boats to stay out docks & moorings

33. Please write down any suggestions you may have regarding the County hurricane response plan. There is no place to go. The "move" order needs to be rescinded. We need help.

33. Please write down any suggestions you may have regarding the County hurricane response plan. IDENTIFY ADDITIONAL AREAS INTO WHICH BOATERS CAN GO TO SEEK SHELTER

33. Please write down any suggestions you may have regarding the County hurricane response plan. Let's get in agreement with State regarding Miami & New Rivers. Suggests plans for mooring in Marine Stadium.

For Dade Co. officials to change its mind about safe harbor for boats up + Miami River – during the hurricane season – is irresponsible. These plans should have been publicized months ago. Why are they closing the River this year – there is no other place to go. If it wasn't necessary other years, why this year.

33. Please write down any suggestions you may have regarding the County hurricane response plan. Allow boats to remain at birth/on mooring (1) There is no longer anywhere else to go (2) it is more dangerous to move

33. Please write down any suggestions you may have regarding the County hurricane response plan. What plan? - to my knowledge the County has no plan applicable to wet stored boats - the only thing I've ever seen is the handout which accompanied this questionnaire. It makes no suggestions or gives any help as to where some one might find safe harbor - other than some vague refference to local rivers, creeks ect - which in most cases would not be appropriate without property owners prior permission -

Thank you.

33. Please write down any suggestions you may have regarding the County hurricane response plan. Recommend that the present convoy system up Miami River be continued - in spite of flood waters in River I believe a properly secured boat will survive - If the River is not to be available where else can hundreds of boats go? - Only other alternative would be to set storm anchors (possibly permanently) in Biscayne Bay - I have seen more damage done in overcrowded "hurrican holes" by other vessels poorly secured, than by the storm itself.

Thank you.