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PLEASURE BOAT LOADING RELATED ACCIDENT EDUCATION.(U)

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PLEASURE BOAT LOADING RELATED ACCIDENT EDUCATION

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FINAL REPORT

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MAY 1978

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
United States Coast Guard
Office of Research and Development
Washington, D.C. 20590

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16. Abstract

The Coast Guard has undertaken research to identify educational alternatives in its long term efforts to improve the safety of recreational boating. Other organizations involved in boating safety education may find the illustrative approaches valuable in designing their boating safety education efforts. This project deals with educational solutions to loading related pleasure boat accidents. It was conducted in conjunction with two other projects to offer an illustrative overall educational program for loading related and collision pleasure boat accidents. The intent of this project is to establish educational content and methods that address the more serious loading related accident causes and will offer potential for reducing accidents and fatalities. The major loading related accident causes have been identified, and demographic characteristics were determined for operators of boats involved in the more frequently occurring accidents. A survey to determine boaters' attitudinal response to certain boating safety issues has been conducted. The results of the survey are suggested attitudinal resources for planning an educational program. Four personality inventories were also administered to boaters, but the results of the study were not conclusive. Educational program objectives, program message content, delivery systems and considerations for execution of the program are being recommended. If the recommended plan is undertaken, a small scale mass media effort would be required. Other recommended educational materials would be made available from the Coast Guard at the request of local or state agencies and private organizations that offer formal boating courses.

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

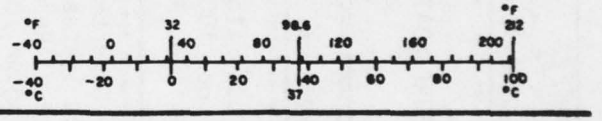

TABLE OF CONTENTS

		Page
1.0	PART I - INTRODUCTION AND OBJECTIVES FOR LOADING RELATED ACCIDENT EDUCATION PROGRAM	1
	1.1 Determination of Potential Benefits for Educational Programs	1
	1.2 Scope of Educational Solutions for Loading Related Accidents	3
	1.3 Objectives of the Loading Related Education Project	3
	1.4 Definitions for the Project	4
	1.5 Organization of Tasks	4
2.0	METHOD FOR IDENTIFICATION OF MAJOR LOADING RELATED ACCIDENT CAUSES AND PRE-ACCIDENT CONDITIONS	5/6
	2.1 Procedures for Analysis	5/6
	2.2 Criteria for Selection of Major Causes	9
3.0	RESULTS FOR IDENTIFICATION OF MAJOR LOADING RELATED ACCIDENT CAUSES AND PRE-ACCIDENT CONDITIONS	10
	3.1 Pre-Accident Conditions for Loading Related Accidents	10
	3.2 Accident Initiators for Loading Related Accidents	12
4.0	GENERAL RECOMMENDATIONS FOR EDUCATION AND INSTRUCTION	16
5.0	ANALYSIS OF RECREATIONAL BOATER CHARACTERISTICS FOR OPERATORS INVOLVED IN ACCIDENTS CAUSED BY PRIMARY INITIATORS	17
	5.1 Tabulation of Loading Related Accident Operator Demographic Characteristics	18
	5.2 Comparison of Loading Related Accident Operators and NBS Recreational Boaters	19
	5.2.1 Accident Operator Sex and NBS Operator Sex	20
	5.2.2 Accident Operator Age and NBS Operator Age	20
	5.2.3 Male Operator Age for Accident Operators and NBS Operators	22
	5.2.4 Accident Operator Boating Experience and NBS Operators	23
	5.2.5 Accident Operator Formal Boating Education and NBS Operators	24
6.0	SALIENT ATTITUDES AND PERSONALITY CHARACTERISTICS FOR LOCAL BOAT OWNERS AND OPERATORS	26
	6.1 Local Boater Attitude Study	26
	6.1.1 Introduction and Purpose	26
	6.1.2 Definitional Considerations of Attitudes and Attitude Measurement	28
	6.1.3 Method and Procedures	29
	6.1.3.1 Measurement Instrument - Questionnaire Construction	29
	6.1.3.2 Administration of the Attitude Study	30

TABLE OF CONTENTS, Continued

		Page
6.1.4	Results of the Attitude Study	31
6.1.4.1	Characteristics of the Respondents for the Study	31
6.1.4.2	Attitudinal Response for Responsibility for Safe Boating	33
6.1.4.3	Attitudinal Response for How the "Competent Boater" has Learned About Boating	37
6.1.5	Conclusion	40
6.2	Local Boater Personality Study	42
6.2.1	Introduction and Purpose	42
6.2.2	Definitional Considerations of Personality and Personality Tests	42
6.2.3	Selection and Description of Personality Tests for this Study	43
6.2.4	Method and Procedures	51
6.2.4.1	Measurement Instrument - Questionnaire Construction	51
6.2.4.2	Administration of the Personality Tests	51
6.2.5	Results of the Personality Study	52
6.2.5.1	Characteristics of the Respondents for the Study	52
6.2.5.2	Boater Personality and Accident History	55
7.0	PART II - SPECIFICATION OF EDUCATIONAL OBJECTIVES AND MESSAGE CONTENT	61/62
7.1	Introduction	61/62
7.2	Method for Designating Educational Objectives	65
7.3	Educational Objectives and Message Content for a Prototype Loading Related Accident Educational Program	67
8.0	PART III - PRODUCTION AND CONSIDERATIONS FOR DISSEMINATION OF PROTOTYPE EDUCATIONAL PROGRAM	71
8.1	Selection of Educational Materials (Media and Production) and Delivery Systems for Developing and Disseminating Messages	71
8.2	Resources for Delivering the Educational Program to the Recreational Boater Public	71
8.2.1	Delivery System 1 - Utilization of Mass Media (Print and Electronic Format)	72
8.2.2	Delivery System 2 - Utilization of Formal Boating Courses	75
8.2.3	Delivery System 3 - Utilization of Visitation and Vessel Boarding Programs	77
8.2.4	Delivery System 4 - Utilization of Home Study	79
8.3	Illustrative Loading Related Educational Program	79
8.4	Coordination of Production and Dissemination of Loading Related Educational Materials	91
8.5	Production of Prototype Messages	93

TABLE OF CONTENTS, Concluded

Page

REFERENCES 96

APPENDIX A - CAUSE IDENTIFICATION TREE FOR PRE-ACCIDENT CONDITIONS FOR ALL LOADING RELATED ACCIDENTS

APPENDIX B - CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH CAPSIZING, SWAMPING LEADING TO CAPSIZING, AND SWAMPING ACCIDENTS

APPENDIX C - CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH FALLS OVERBOARD ACCIDENTS

APPENDIX D - INSTRUCTIONS AND ATTITUDE/MEDIA PREFERENCE QUESTIONNAIRE

APPENDIX E - PERSONALITY SURVEY MEASUREMENT INSTRUMENT

APPENDIX F-1 - PERSONALITY STUDY: SUMMARY OF DEMOGRAPHIC INFORMATION FOR RESPONDENTS FOR NUMBER OF JOBS HELD, NUMBER OF AUTOMOBILE ACCIDENTS, AND NUMBER OF TRAFFIC CITATIONS DURING THE PAST FIVE YEARS

APPENDIX F-2 - PERSONALITY STUDY: SUMMARY OF BOAT LENGTH AND TYPE FOR THE MOST USED AND SECOND-MOST USED BOAT FOR RESPONDENTS

APPENDIX F-3 - PERSONALITY STUDY: SUMMARY OF INFORMATION ON BOATING ACTIVITY OF RESPONDENTS

APPENDIX G - PERSONALITY STUDY: SUMMARY OF RESPONDENTS' ACCIDENT HISTORIES - TYPES OF BOATING ACCIDENTS IN WHICH RESPONDENTS HAVE BEEN INVOLVED

APPENDIX H - SAMPLE FROM BOOKLET FOR DETERMINATION OF OPERATOR ALTERNATIVES

APPENDIX I-1 - LOGOS FOR COLLISION AND LOADING RELATED ACCIDENTS EDUCATIONAL PROGRAMS

APPENDIX I-2. SINGLE CONCEPT PAMPHLET, "SMALL BOAT STABILITY" (EXPERIMENTAL MATERIAL FROM EDUCATIONAL ALTERNATIVES FOR BOATING SAFETY PROGRAMS AND ILLUSTRATIVE MATERIAL FOR LOADING RELATED EDUCATIONAL PROGRAM)

APPENDIX I-3. SCRIPT FOR TELEVISION SPOTS (10 SECONDS EACH) USING COMPUTER ANIMATION

APPENDIX I-4. SCRIPT FOR RADIO SPOT (30 SECONDS)

APPENDIX I-5. SCRIPT PREPARED BY LOCAL POWER SQUADRON MEMBER J. BOWMAN FOR USE WITH SUPER 8 FILM IN POWER SQUADRON COURSE

APPENDIX I-6. PHOTOS OF ADVERTISING SPECIALTIES FOR LOADING RELATED ACCIDENT EDUCATIONAL PROGRAM LOGOS AND REFLECTIVE STICKERS

APPENDIX I-7. COPY FOR NEWSPAPER SUPPLEMENT INSERT

APPENDIX I-8. NEWSPAPER FILLER ITEMS

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PLEASURE BOAT LOADING RELATED ACCIDENT EDUCATION

1.0 PART I - INTRODUCTION AND OBJECTIVES FOR LOADING RELATED ACCIDENT EDUCATION PROGRAM

There is a growing concern for improving the quality of recreational boating, with a great deal of attention currently being focused on boating safety. One major approach to safety involves education of boaters to better qualify them for the task of operating their boats. Prior analysis of recreational boating accidents has identified two major accident types as causing the highest number of fatalities and the highest number of personal injuries. These are loading related accidents and collision accidents, respectively. This report deals with the problems and information necessary to implement an educational program for the various types of loading related accidents (capsizings, swampings, swampings leading to capsizing, and falls overboard). This effort also includes the identification of certain attitudinal factors and personality characteristics of a local group of boaters to help define the audience for boating education programs. The second accident type, collision accidents, is dealt with in another separately funded project. Both projects provide input into a third separately funded project dealing with educational alternatives for boating safety programs. The joint purpose of these three projects is to establish boating accident causes which have potentially high benefit for educational solutions, and to determine various ways and means for presenting educational countermeasures. While the three projects are interrelated and draw upon each other to some degree, each stands alone as a complete and integrated effort. This particular project establishes loading related accident causes and includes the methods for presenting educational solutions. A prototype educational program dealing with loading related accidents is included in the present report.

1.1 Determination of Potential Benefits for Educational Programs

The potential benefit for a given educational program is contingent upon the number of accidents and/or fatalities that can be directly addressed by the messages in the program, and upon the financial costs to disseminate those messages. It is logical that in order for a program to justify its costs, the accidents to be addressed in the messages should have high frequencies of occurrence in the boating

population and should have a large number of fatalities associated with the accidents. In other words, there must be a good reason to commit to an educational program for a specific group of accidents. However, in order for educational efforts to have any affect on the ongoing occurrences of the accidents, the accident type must involve boat operator decisions or behavior that are in error or in someway ineffective in preventing accidents or fatalities. An accident type that occurs as a result of circumstances that no operator can predict and reasonably avoid would be an unproductive selection for an educational program. The effect of education should be to provide boaters with information to identify the presence of dangerous circumstances, and to decide how to deal with those circumstances; further, education should provide them with behavioral alternatives for implementing the decisions. *Therefore, the challenge of this task is to identify accidents where known alternative actions on the part of the boater could have prevented the accidents or fatalities, and to explore resources that will provide boaters with access to those alternative actions.*

One major problem in determining the potential for effectiveness of any educational plan is the uncertainty that surrounds the boaters' behavior. Specifically, this involves the lack of precision in predicting whether boaters will make themselves available to presentation of the educational messages; whether they subsequently can recall the information in the educational messages when needed during a boating crisis; and whether the boaters will choose to act in the ways recommended in the educational messages if and when they recall the information. Consider further that training and education are processes taking place in the present for use at some future time. That is, education takes place now, but its application is solely in future situations that the trained or educated person may encounter.

Educational solutions may be an effective answer to dealing with boating accidents, but prediction of their success is tenuous at best. The USCG can "maximize" the potential for success of an educational program by utilizing the highest quality alternatives for conceiving, producing, and disseminating the various educational messages. These alternatives are discussed in the research report prepared for USCG, Educational Alternatives for Boating Safety Programs, January 1978. The utilization of these alternatives for loading related accidents is presented in this report.

1.2 Scope of Educational Solutions for Loading Related Accidents

Educational solutions here are limited to a means for informing boat operators about ways to deal effectively with situations specified as major causes in loading related accidents. Operator action or boating conditions that were unlikely to be changed by providing educational information about the situation (or consequences of the action) were not considered suitable for educational approaches. In cases where rules and regulations for boat operation exist and are pertinent to the operator behavior in question, enforcement strategies become involved as well as education methods. Educational methods typically end and enforcement begins when boat operators are informed of 1) their obligations to comply, 2) the likelihood of detection for non-compliance, and 3) the consequences for non-compliance. Enforcement strategies are comprised of monitoring for detection of non-compliance (surveillance), and the administering of appropriate punishments when non-compliance occurs. There is a point beyond which enforcement situations are not amenable to educational solutions.

1.3 Objectives of the Loading Related Education Project

This project is intended to accomplish the following objectives:

- to select the loading related boating conditions and accident causes for accident situations most likely to benefit from an educational program,
- to determine demographic characteristics of operators of boats involved in accidents resulting from the selected causes,
- to explore attitudinal factors of possible relevance for education for a group of pleasure boaters,
- to explore personality characteristics related to safety for a group of boaters using four personality inventories,
- to develop educational objectives that address boat operators' decisions and behavior in situations involving the selected accident causes,
- to specify message content, production messages, delivery systems, and considerations for the planning and execution of an effective educational program.

1.4 Definitions for the Project

Three terms used in this report require additional definitions for determining the scope of the project. A loading related accident refers to an accident where the outcome is one of the following types: a boater falls overboard, the boat swamps, the boat swamps and then capsizes, or the boat capsizes without swamping.* These accidents are all termed "loading related" because they may be initiated by or correlated with loading problems such as overloading the boat or persons/loads shifting in the boat. Accident initiator refers to the prime or direct cause of the accident. Pre-accident condition refers to boating conditions existing prior to the actual accident which would likely have an effect on the occurrence or severity of the accident. These conditions include calm or choppy/rough water, boat overloaded or not overloaded, and distribution of boat load balanced or unbalanced.

1.5 Organization of Tasks

The objectives of this project are carried out in three parts. In Part I the most frequently occurring loading related accident causes and associated demographic characteristics for operators are determined. Also, salient attitudes and personality characteristics are identified for a sample of boat owners and operators attending major boating trade shows in the winter of 1977. In Part II, educational objectives and message content are developed based upon the analysis of accident causes and other data from Part I. In Part III, the production of actual messages and considerations for presenting the educational program are reported.

---

* The specific definition used by the USCG Research and Development (R&D) Center for loading-related accidents is presented in Recreational Boat Safe Loading-Operator Study (Reference 1). The definition is as follows:

> Accidents which are related to a recreational boat's stability, freeboard, capacity, and 'motions' characteristics. 'Motions' is defined as a boat's performance while drifting, proceeding on a straight course at moderate speed, slow speed maneuvering or undergoing changes in throttle (on/off plane) or direction in such a manner as to cause suspicion of the boat's ability to react properly to the imposed maneuver.

2.0 METHOD FOR IDENTIFICATION OF MAJOR LOADING RELATED ACCIDENT CAUSES AND PRE-ACCIDENT CONDITIONS

A work flow diagram for the identification of causes (initiators) is given in Figure 1.

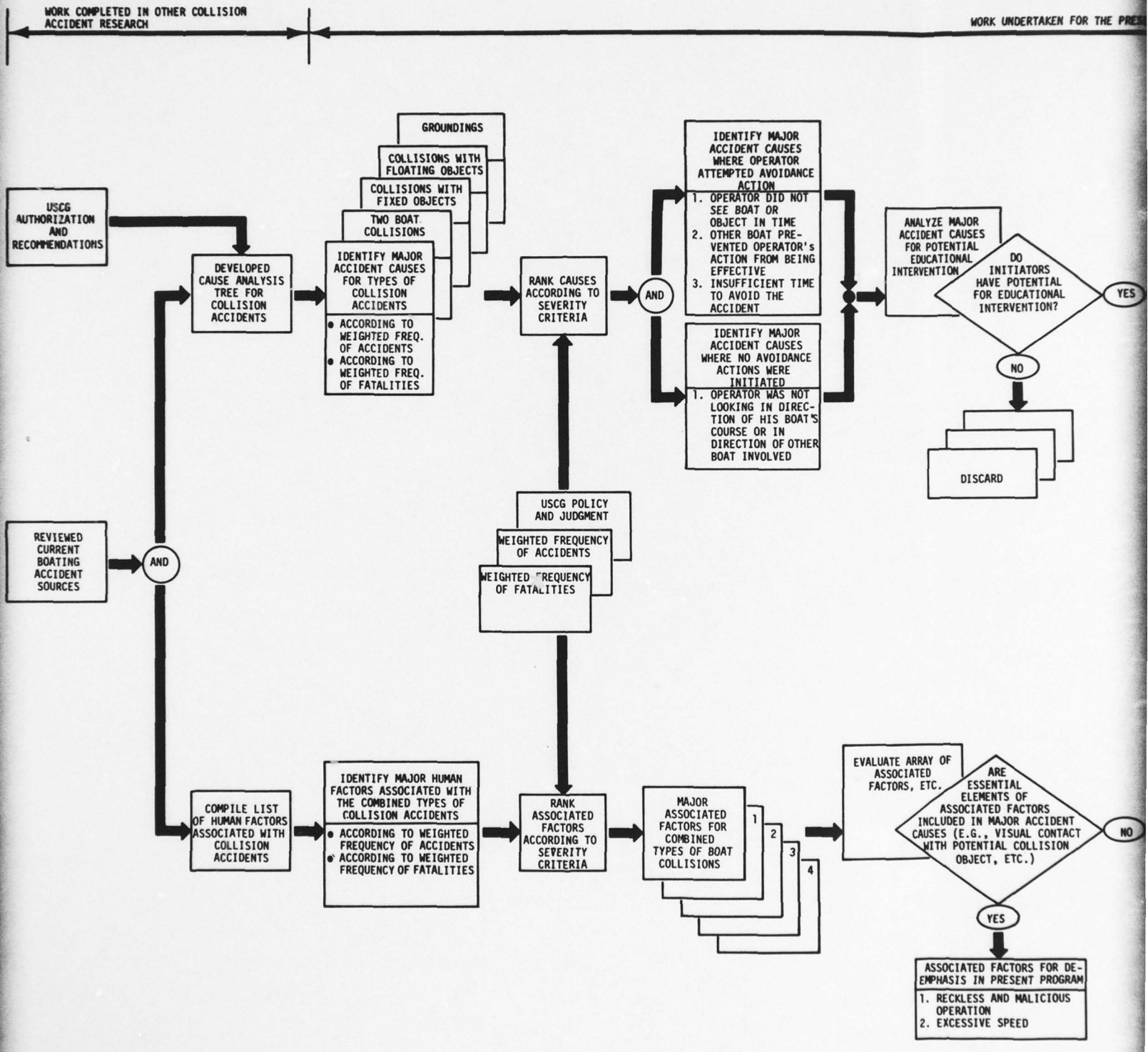
The method used for identification of the major loading related accident causes followed procedures developed for the "Education Study" Safe Loading-Operator Study and data obtained in that study. The earlier project consisted of data based on a sample of 261 loading related accidents from the years 1969 and 1973 which had been selected by USCG R&D personnel. The information supplied was that normally contained on BARs. Each accident sampled involved at least one fatality - there were 329 fatalities in the sample. All four types of loading related accidents were represented in the sample. It should be noted that the sampling method used provided that each accident type be adequately represented for analysis rather than represented in direct proportion to the number of such accidents in the overall national statistics. Other than this, it can be assumed that the sample is random with respect to such characteristics as will be examined in this report. The breakdown for the number of each type of accident involved is presented in Table 1.

TABLE 1. FREQUENCIES FOR VARIOUS TYPES OF LOADING RELATED ACCIDENTS AND FATALITIES

LOADING RELATED ACCIDENT TYPE	NUMBER OF ACCIDENTS	NUMBER OF FATALITIES
Capsizings	112	137
Swampings Leading to Capsizing	59	83
Swampings Only	28	42
Falls Overboard	62	67
TOTAL	261	329

2.1 Procedures for Analysis

Two types of information were taken into account in the analysis of each loading related accident. They were the environmental and boat loading conditions existing prior to the accident (pre-accident conditions), and the actual causes of the accident (accident initiators). Educational programs would produce the most benefit if directed at the accident causes with the highest frequency of occurrence (assuming suitability of the cause for an educational solution). Therefore, the intention of this preliminary effort was to identify those causes occurring most frequently.


WORK COMPLETED IN OTHER COLLISION ACCIDENT RESEARCH
WORK UNDERTAKEN FOR THE PRES
USCG AUTHORIZATION AND RECOMMENDATIONS
DEVELOPED CAUSE ANALYSIS TREE FOR COLLISION ACCIDENTS
GROUNDINGS
COLLISIONS WITH FLOATING OBJECTS
COLLISIONS WITH FIXED OBJECTS
TWO BOAT COLLISIONS
IDENTIFY MAJOR ACCIDENT CAUSES FOR TYPES OF COLLISION ACCIDENTS
• ACCORDING TO WEIGHTED FREQ. OF ACCIDENTS
• ACCORDING TO WEIGHTED FREQ. OF FATALITIES
RANK CAUSES ACCORDING TO SEVERITY CRITERIA
AND
IDENTIFY MAJOR ACCIDENT CAUSES WHERE OPERATOR ATTEMPTED AVOIDANCE ACTION
1. OPERATOR DID NOT SEE BOAT OR OBJECT IN TIME
2. OTHER BOAT PREVENTED OPERATOR's ACTION FROM BEING EFFECTIVE
3. INSUFFICIENT TIME TO AVOID THE ACCIDENT
IDENTIFY MAJOR ACCIDENT CAUSES WHERE NO AVOIDANCE ACTIONS WERE INITIATED
1. OPERATOR WAS NOT LOOKING IN DIRECTION OF HIS BOAT'S COURSE OR IN DIRECTION OF OTHER BOAT INVOLVED
ANALYZE MAJOR ACCIDENT CAUSES FOR POTENTIAL EDUCATIONAL INTERVENTION
DO INITIATORS HAVE POTENTIAL FOR EDUCATIONAL INTERVENTION?
YES
NO
DISCARD
REVIEWED CURRENT BOATING ACCIDENT SOURCES
AND
USCG POLICY AND JUDGMENT
WEIGHTED FREQUENCY OF ACCIDENTS
WEIGHTED FREQUENCY OF FATALITIES
COMPILE LIST OF HUMAN FACTORS ASSOCIATED WITH COLLISION ACCIDENTS
IDENTIFY MAJOR HUMAN FACTORS ASSOCIATED WITH THE COMBINED TYPES OF COLLISION ACCIDENTS
• ACCORDING TO WEIGHTED FREQUENCY OF ACCIDENTS
• ACCORDING TO WEIGHTED FREQUENCY OF FATALITIES
RANK ASSOCIATED FACTORS ACCORDING TO SEVERITY CRITERIA
MAJOR ASSOCIATED FACTORS FOR COMBINED TYPES OF BOAT COLLISIONS
1
2
3
4
EVALUATE ARRAY OF ASSOCIATED FACTORS, ETC.
ARE ESSENTIAL ELEMENTS OF ASSOCIATED FACTORS INCLUDED IN MAJOR ACCIDENT CAUSES (E.G., VISUAL CONTACT WITH POTENTIAL COLLISION OBJECT, ETC.)
NO
YES
ASSOCIATED FACTORS FOR DE-EMPHASIS IN PRESENT PROGRAM
1. RECKLESS AND MALICIOUS OPERATION
2. EXCESSIVE SPEED

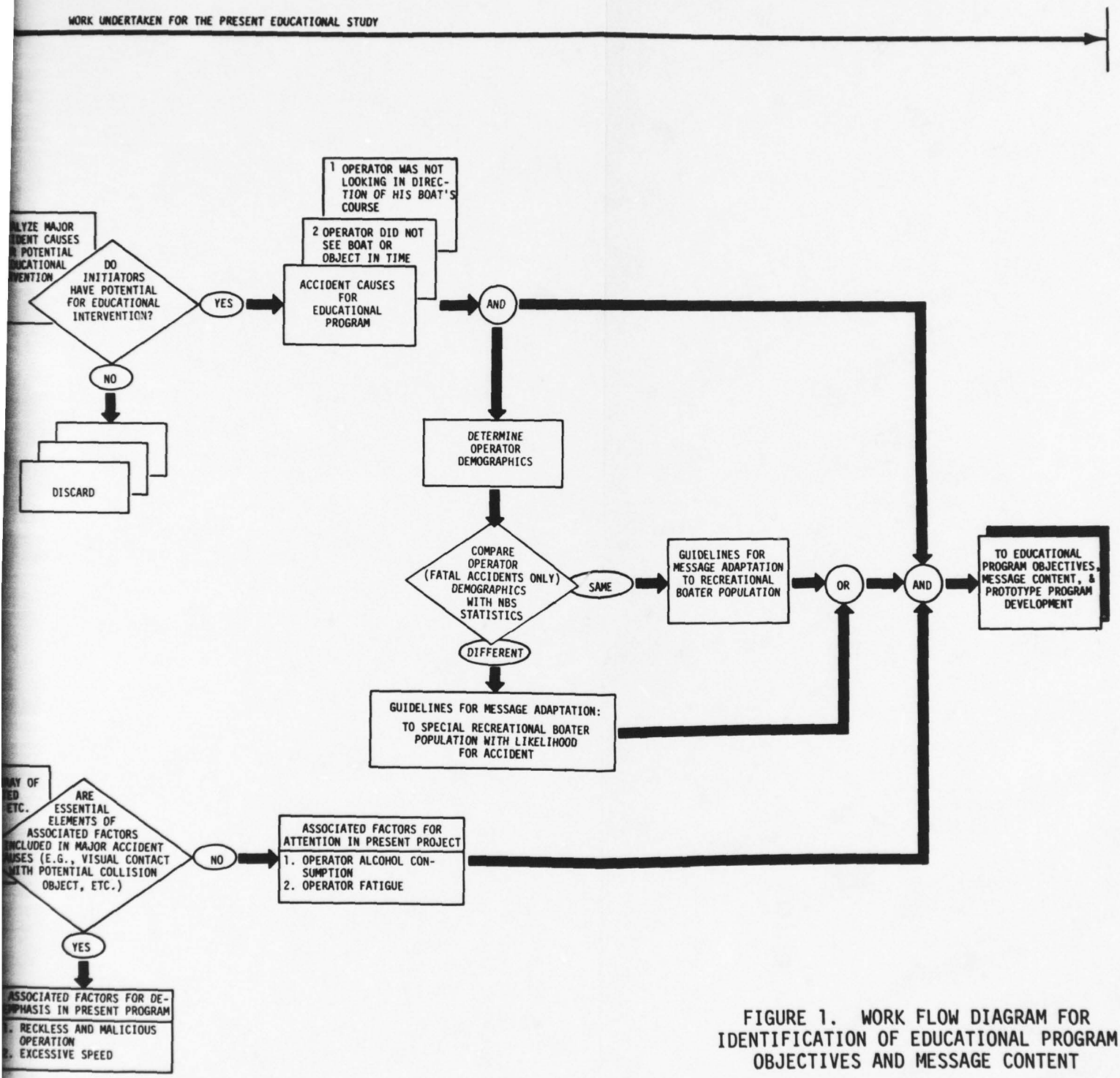


FIGURE 1. WORK FLOW DIAGRAM FOR IDENTIFICATION OF EDUCATIONAL PROGRAM OBJECTIVES AND MESSAGE CONTENT

2

The procedure for analysis of the data consisted of identification by qualified persons of the frequency with which various causes could be attributed to the accidents in the sample provided. To guide the analysis, accident cause identification trees were developed. The construction of the trees involved a systematic progression from very general accident causes to branches detailing more specific accident causes. Every accident analyzed was traced through the tree from the general causes to the most specific cause ascertainable from the BAR data sources. Although the various causes had been appropriately identified for the purposes of the Safe Loading-Operator Study project, the present effort required that additional tabulations be made for several data groups. The results and findings for the present educational project are based upon reiterations of the original Safe Loading-Operator Study and retabulations of the data for several unique problems addressed in this study.

The cause identification trees are presented in Appendices A through C. Appendix A is the cause identification tree for conditions existing in the boat or on the water prior to the accident (pre-accident conditions) for all four loading related accident types. Appendix B is the cause identification tree used for determining actual accident initiators for all loading related accident types except falls overboard. Appendix C is the same basic tree for accident initiators modified to facilitate analysis of accident initiators for the falls overboard accident type.

2.2 Criteria for Selection of Major Causes

The final selection of loading-related accident initiators to be addressed by the educational program was based upon three criteria:

- the frequency of loading related accidents that were linked to each cause; those causes associated with higher numbers of accidents warranted consideration for educational solution,
- the frequency of deaths that occurred as a result of the accidents linked to each cause; those causes associated with higher numbers of fatalities warranted consideration for educational solution, and
- the accessibility of each cause to educational methods (those causes for which operators' decisions and behavior were in some way at fault) warranted consideration for educational solution.

3.0 RESULTS FOR IDENTIFICATION OF MAJOR LOADING RELATED ACCIDENT CAUSES AND PRE-ACCIDENT CONDITIONS

The analysis for this part of the loading related education project involved direct use of findings in the Safe Loading-Operator "Education Study" and retabulations of those data. This analysis was conducted using two types of data: pre-accident conditions that may have contributed to the occurrence of the accident, and the accident causes or actual initiators of the accidents. Again, all of the accidents considered involved at least one fatality.

3.1 Pre-Accident Conditions for Loading Related Accidents

The pre-accident conditions concerned in this analysis were water conditions (choppy/rough or calm), boat load (overloaded or not overloaded), and distribution of boat load (balanced or unbalanced). Boats were categorized according to length, as being less than 16 ft (4.9 m) in length or 16 ft (4.9 m) and larger. The intent for this grouping was to explore the possible differences the pre-accident conditions may produce according to boat size. It was reasoned that the smaller boats would be more subject to distress in rough or choppy water, more often overloaded, and more easily unbalanced.

The outcome of the analysis produced similar results for both loading related accidents and loading related fatalities. The frequencies of accidents for the pre-accident conditions according to boat size are presented in Table 2. The data confirmed expectations that more smaller boats (i.e., boats less than 16 ft [4.9 m]) were in choppy or rough water at the time of the accident, and more smaller boats were overloaded, or were unbalanced at the time (or just before) the occurrence of the accident. These findings are all statistically significant at the 0.05 level of confidence using chi square analysis. It can also be observed that for all boats involved in the loading related accidents regardless of size, the greatest number of accidents occurred in choppy/rough water conditions and the majority of boats were not overloaded or unbalanced prior to the accident.

TABLE 2. LOADING RELATED ACCIDENTS: BOAT LENGTH AND PRE-ACCIDENT CONDITIONS*

PRE-ACCIDENT CONDITION	FREQUENCY OF ACCIDENTS IN BOATS		x^2 AND PROBABILITY
	<16 ft (4.9 m)	≥16 ft (4.9 m)	
Water Conditions			$x^2 = 5.63$; $x^2(1) = 3.84$, $p < 0.05$
Choppy/Rough Water	90	41	
Calm Water	73	14	
Load Amount			$x^2 = 11.00$; $x^2(1) = 3.84$, $p < 0.05$
Boat Overloaded	47	3	
Boat Not Overloaded	122	53	
Load Distribution			$x^2 = 4.96$; $x^2(1) = 3.84$, $p < 0.05$
Boat Unbalanced	41	5	
Boat Balanced	128	50	

* Discrepancies between these values and those given for the total accidents in the sample are the result of insufficient information being available in some of the BARs.

The number of fatalities for the pre-accident conditions according to boat size is presented in Table 3. The distribution of fatalities for the pre-accident conditions according to boat length roughly parallels the distribution of accidents in the previous analysis. Again, the expectation that small boats are more often involved in accidents/fatalities under unfavorable pre-accident conditions was confirmed for the fatality data. The comparisons, using Chi-square analyses, were statistically significant at the 0.05 level. More fatalities occurred for the choppy/rough water, not overloaded, and balanced conditions.

TABLE 3. LOADING RELATED FATALITIES: BOAT LENGTH AND PRE-ACCIDENT CONDITIONS*

PRE-ACCIDENT CONDITION	FREQUENCY OF FATALITIES IN BOATS		χ^2 AND PROBABILITY
	<16 ft (4.9 m)	≥16 ft (4.9 m)	
Water Conditions			$\chi^2 = 5.19$; $\chi^2(1) = 3.84$, $p < 0.05$
Choppy/Rough Water	123	53	
Calm Water	87	18	
Load Amount			$\chi^2 = 19.50$; $\chi^2(1) = 3.84$, $p < 0.05$
Boat Overloaded	72	4	
Boat Not Overloaded	145	67	
Load Distribution			$\chi^2 = 6.82$; $\chi^2(1) = 3.84$, $p < 0.05$
Boat Unbalanced	56	7	
Boat Balanced	161	63	

* Discrepancies between these values and those given for the total accidents in the sample are the result of insufficient information being available in some of the BARs.

3.2 Accident Initiators for Loading Related Accidents

The accident causes linked to all types of loading related accidents consist of four general groups. Two of these groups of accident causes, waves and wakes, represent combinations of causes and conditions given separate treatment in the original cause identification trees for the Safe Loading-Operator Study. For example, waves which initiated an accident could do so in two ways: by directly capsizing or swamping the boat, or throwing a person overboard; or waves could cause a load shift from a balanced distribution of weight to an extremely unbalanced distribution. Then, the unbalanced boat capsized, etc. In either case, however, the operator's decision and response to operation of the boat would be to minimize the effects of waves that would directly or indirectly cause distress to the boat. The waves and wakes categories for the present project include load shifts that were initially caused by waves or wakes which then resulted in the accident. In the former study, these load shifts were considered separately. The intent of the combinations was to isolate operator behavior and operator decisions that best related to educational objectives. The accident initiators considered for the present analysis were as follows:

- Waves that either directly caused the accidents or caused load shifts which resulted in accidents.
- Wakes that either directly caused the accidents or caused load shifts which resulted in accidents.
- Load shifts that were caused by persons who were not standing, persons who were in the process of standing up, or persons who were already standing.
- Sudden maneuvers of the boat performed by the operator of the boat such as a sudden turn or sudden acceleration.

The analysis of the loading related accidents for the educational task was conducted by grouping the accidents and fatalities in two ways. The first grouping was for all accidents and all fatalities for boats regardless of length, to get an overview or perspective of the major overall accident initiators. The second grouping was for accidents and fatalities according to boat length; i.e., boats less than 16 ft (4.9 m) in length and boats 16 ft (4.9 m) in length and longer. The analysis by boat length was intended to identify any possible unique risks that the smaller boats might encounter as opposed to the larger boats. Intuitively, the smaller boats, when taken as a general class, would be more easily swamped, capsized, etc., by heavy seas. However, it is also probable that the majority of operators of the smaller boats would avoid boating in seas that would not normally pose problems to larger boats.

The outcome of the analysis of accidents and fatalities for all boats is presented in Table 4. It can be observed that the accidents follow about the same distribution for frequency of occurrence as the fatalities.

TABLE 4. LOADING RELATED ACCIDENTS AND FATALITIES FOR ACCIDENT INITIATORS

INITIATORS OF ACCIDENT	FREQUENCY OF ACCIDENTS	FREQUENCY OF FATALITIES
Waves	75	109
Wakes	27	37
Load Shifts	116	130
Sudden Maneuver by Operator	23	27

The highest frequencies for both accidents and fatalities were for the load shifts initiator (116 accidents and 130 fatalities). The next most frequently occurring initiator for accidents and fatalities was the wave category (75 accidents and 109 fatalities. The accidents and fatalities associated with wakes and sudden maneuvers were considerably fewer. An exploratory combining of data seemed warranted since the wave and wake categories intuitively appear to be similar. It can be reasoned that effective boater decisions and response to operation of the boat may very likely be the same in the wave and wake distress situations. For example, the routine or planned operation of the boat should be in wave or wake conditions that are always within the safe limits of the boat. In the case of unpredictable water conditions such as the occurrence of a storm or a wake from a larger than expected (or closer than expected) vessel, the boat should be prepared to take the waves or wake in a way that minimizes shifting of loads or "shipping" water.

The comparison of combined wave and wake initiators to the load shifts initiator indicated that load shift accidents occurred slightly more often than the combined waves and wakes (116 load shift accidents vs 102 combined wave and wake accidents). However, there were more fatalities for the combined wave and wake accidents (130 load shift fatalities vs 146 combined wave and wake fatalities). Loading related accidents caused by sudden maneuvering of the boat by the operator ranked lowest among the general causes and there was no rationale for combining this data with any other category. It was decided at this point that in view of the general goal of identifying high frequency causes/conditions for educational purposes, the sudden maneuver category did not warrant further analysis.

At the suggestion of Coast Guard personnel, the remaining accident initiators (waves, wakes, and load shifts) were cross tabulated with length of the boats involved (whether the boats were less than 16 ft or longer). This analysis was undertaken as an exploratory effort to more specifically determine factors that were associated with or caused the accident.

The outcomes of the analyses of accidents and fatalities are in Tables 5 and 6. There are marked differences for frequencies of accidents and fatalities for the two boat length categories. Exploration of these differences using Chi-square analysis produced statistical significance for the number of accidents ($\chi^2 = 9.34$; $\chi^2(2) = 5.99$, $p < 0.05$) and ($\chi^2 = 10.30$; $\chi^2(2) = 5.99$, $p < 0.05$) for the number of

fatalities. These results suggest that for both accidents and fatalities, boat length and accident initiators are not independent. That is, the distribution of accidents and fatalities were different across initiators for boats less than 16 ft and boats 16 ft or longer. These differences suggest that combining the waves and wakes accidents for further analysis should be undertaken with caution. In fact, the extremely low number of accidents and fatalities given for the wake initiator in the larger boats classification suggests a quite different risk factor for the two sizes of boats. On the other hand, actual risk and operator's judgment or response to avoid an accident may be quite different things.

TABLE 5. LOADING RELATED ACCIDENTS FOR INITIATORS ACCORDING TO BOAT LENGTH

INITIATORS OF ACCIDENTS	FREQUENCY OF ACCIDENTS	
	<16 ft (4.9 m)	≥16 ft (4.9 m)
Waves	44	27
Wakes	22	4
Load Shifts	80	19

($\chi^2 = 9.34$; $\chi^2(2) = 5.99$, $p < 0.05$)

TABLE 6. LOADING RELATED FATALITIES FOR INITIATORS ACCORDING TO BOAT LENGTH

INITIATORS OF ACCIDENTS	FREQUENCY OF FATALITIES	
	<16 ft (4.9 m)	≥16 ft (4.9 m)
Waves	66	37
Wakes	31	5
Load Shifts	89	22

($\chi^2 = 10.30$; $\chi^2(2) = 5.99$, $p < 0.05$)

4.0 GENERAL RECOMMENDATIONS FOR EDUCATION AND INSTRUCTION

The selection of accident initiators to which this educational program can be directed was based upon the frequency of accidents and fatalities attributable to each initiator. The waves and wakes combined category and the load shifts (internally initiated) would seem to be logical choices for the educational effort. Although the total number of accidents for the combined wave and wake initiators was less than the number of accidents for load shifts (102 accidents to 116 accidents), the larger number of fatalities for the combined initiators seems to compensate for that difference (146 fatalities to 130 fatalities). The outcome of the previous analysis indicated that additional information was required for the specification of exact educational objectives and message content to implement those objectives. For example, the smaller boats in this data base appeared to be more affected by unpredictable water such as wakes from passing boats, and educational objectives here favor boat handling skills for operation in preparing the small boat for encountering the wake or wave. On the other hand, more larger boats were involved in accidents initiated by waves, and it may follow that the larger boats' operators venture into water with higher waves or in more unpredictable weather. Consequently, they may be more often confronted with decisions to return to quieter water. Objectives here favor a combination of boat handling skills, and guidelines to assist the boater in making decisions early enough to avoid endangering his boat in heavy weather. The determination of educational objectives for load shift accidents was somewhat less complex. The accidents and fatalities point to instruction for boaters concerning the stability of their boat, and persons in the boat moving about or standing. Educational objectives here involve determining and maintaining stability of boats, and providing ways to change positions, etc., in boats without significant risk or danger.

It is apparent from the foregoing discussion, that more precise information would be required to generate relevant educational objectives for these classes of accidents. However, this section does effectively identify the accident initiators for the educational program. This additional analysis of the individual accident cases themselves was undertaken to specify the exact operator knowledge and skills required for the educational objectives (see Part II of this report).

5.0 ANALYSIS OF RECREATIONAL BOATER CHARACTERISTICS FOR OPERATORS INVOLVED IN ACCIDENTS CAUSED BY PRIMARY INITIATORS

The profiling of boat operator characteristics was conducted for all operators involved in accidents initiated by the three most prevalent loading related accident initiators (primary initiators). These initiators involved in the highest numbers of accidents and fatalities were waves, wakes, and load shifts. The specific boat operator characteristics selected for analysis were the operator's sex, age, occupation, formal education, formal boating courses, boat operating experience, and marital/parental status. The characteristics were selected as being relevant to subsequent decisions for the educational plan concerning mass media and educational methods, and also for the availability of the information on the BARs. The analysis of the boater profiles was conducted in two steps: the identification of demographic characteristics for all boat operators in the primary loading related accident initiator groups, and the determination of whether certain characteristics departed from those of the boat operator population in general.

The identification of the operator demographic characteristics involved the tabulation of all available information for each characteristic as it was given on the copies of BARs provided by the U.S. Coast Guard Research and Development Center for the Safe Loading-Operator Study. New tabulations and additional statistical testing were required for the presentation of demographic information in a summary format. In order to determine the possible differences between the accident operator group and the population of recreational boaters, comparisons were made on characteristic by characteristic bases. The Nationwide Boating Survey (NBS) was consulted for statistics concerning the population of recreational boaters (Reference 2). The comparison between the two groups was based on the rationale that if systematic differences did emerge, it might be argued that persons in those different categories have differential risks for accidents. Comparisons were made only when there was sufficient data for analysis.

5.1 Tabulation of Loading Related Accident Operator Demographic Characteristics

The outcome for the identification of boat operator demographic characteristics for the primary accident initiators is summarized in Table 7. Most of the categories or subdivisions for reporting the operator characteristics are those used in NBS. The categories for the loading related accident operators needed to be the same as those used in NBS to allow for comparisons between the two groups of information in subsequent analyses.

TABLE 7. SUMMARY OF BOAT OPERATOR DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTICS	TABULATION*
Operator Sex	
Males	142
Females	4
Operator Age	
Mean	38.029 years
Standard Deviation	14.526 years
Range	12-71 years
Operator Occupation (data given reflect insufficient information on BARs)	
Student	
Elementary (0-8 years)	0
High School	9
University	0
White Collar	
Professional/Technical	7
Managers and Administrators	6
Sales Workers	4
Clerical Workers	1
Blue Collar	
Craft and Kindred (Skilled)	15
Operators (Semi-Skilled)	6
Laborers (Unskilled)	8
Farmers and Farm Laborers	2
Other	
Service Workers	0
Armed Forces	10
Housewives	2

* values refer to frequencies unless otherwise indicated.

TABLE 7. SUMMARY OF BOAT OPERATOR DEMOGRAPHIC CHARACTERISTICS (concluded)

DEMOGRAPHIC CHARACTERISTICS	TABULATION*
Operator Boating Education - Courses (data given reflect insufficient information on BARs)	
No Formal Course	79
USCG Auxiliary Course	5
Power Squadron Course	1
State Sponsored Couse	1
Boy/Sea Scouts Course	2
Local Boating Club Course	0
Public School Boating Course	0
College Boating Course	0
Summer Camp	1
Marine or Marina Dealer's Training	0
YMCA Course	0
Others	8
Operator Boating Experience (data given reflect insufficient information on BARs)	
Under 20 hrs	24
20 to 100 hrs	38
101 to 500 hrs	36
Greater than 500 hrs	40
Operator Formal Education Level (data given reflect insufficient information on BARs)	
0 to 6 yrs	0
Over 6 to 8 yrs	0
Over 8 to 12 yrs	1
Over 12 to 16 yrs	1
Over 16 yrs	1

* Values refer to frequencies unless otherwise indicated.

5.2 Comparison of Loading Related Accident Operators and NBS Recreational Boaters

Analyses to determine possible differences between the accident boat operators (those operators associated with the primary initiators) and the NBS recreational boaters were conducted for operator sex, age, age for male operators only, boating experience, and formal boating education. These characteristics were selected on the basis of the availability of sufficient data for analysis from the BARs. For example, formal education of operators could not be compared to any national norms since this information was available on only three cases.

5.2.1 Accident Operator Sex and NBS Operator Sex

There was a clear departure from NBS for the proportionate number of female operators involved in the loading related accidents. NBS indicates that the overall boating operator population consists of approximately 25% females. Of the operators where sex was reported in the accident group, 2.8% were females. The frequencies and the percentages for comparison are presented in Table 8.

TABLE 8. BOAT OPERATOR PROFILES FOR SEX

	ACCIDENT OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
Operator Sex	Number of Operators	Percentage	Number of Operators	Percentage
Males	141	97.2	12,287,731	75.1
Females	4	2.8	4,082,771	24.9
TOTAL	145	100.0	16,370,502	100.0

($\chi^2 = 38.11$, $\chi^2(1) = 3.84$, $p < 0.05$)

A "goodness of fit" chi square computation indicated that the differences in the distribution of operators by sex for the two groups was statistically significant ($\chi^2 = 38.11$; $\chi^2(1) = 3.84$, $p < 0.05$). That is, the proportion of male operators involved in loading related accidents(accidents initiated by waves, wakes, or load shifts and omitting the sudden maneuver) is greater than the proportion of male operators in the general boating population.

5.2.2 Accident Operator Age and NBS Operator Age

There is a difference of more than three years between the means of the two groups of boaters, and an apparent difference in the variabilities of the distributions of ages. The mean age for the accident operator profile was 38.03 years with a standard deviation of 14.53 years. The corresponding ages for operators in the general boating population were 34.2 years and 15.5 years respectively. The distributions of accident operator ages and those given in NBS are presented in Table 9. A "goodness of fit" chi square computation indicated that operators who are involved in loading related accidents have a different age distribution than the general

operator population ($\chi^2 = 36.40$; $\chi^2(8) = 15.51$, $p < 0.05$). The testing of mean ages was conducted to provide assistance in determining if the accident operator average age was really the same as the NBS operator age or if the average ages of the two groups differed significantly. A z test for population and sample means was computed to determine the statistical significance of the difference between the mean ages of the accident operators and NBS operators. In effect, this test is intended to assist in determining if a given example mean is from a specified population when the variance of the population is known. The advantage of the z test over the customary t test is that t would have been unnecessarily conservative since there was no need to estimate the population variance.* The computed z was $z = 2.88$ and is statistically significant at the 0.05 level ($z_{0.25} = \pm 1.96$). It appears that operators involved in loading related accidents initiated by waves, wakes, and load shifts are slightly older than the average boat operator.

TABLE 9. BOAT OPERATOR PROFILES FOR AGE

Age (Years)	ACCIDENT OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Operators	Percentage	Number of Operators	Percentage
Under 12	0	0	577,127	3.5
12-15	2	0.9	928,899	5.7
16-19	17	8.2	2,020,183	12.3
20-25	28	13.5	2,363,356	14.4
26-30	17	8.2	2,035,444	12.4
31-40	78	37.5	2,932,781	17.9
41-50	24	11.5	2,726,306	16.7
51-60	25	12.0	1,648,709	10.1
Over 60	17	8.2	1,137,697	6.9
TOTAL	208	100.0	16,370,502	100.0
Unknown: 32 Cases				

* The z test is appropriate when the population variance or standard deviation is known and $n > 30$. The statistic used is:

$$z = \frac{\bar{Y} - \mu_0}{\sigma / \sqrt{n}}$$

where n is the sample size, $\bar{Y}$ is the sample mean, μ_0 is the population mean, and σ is the population standard deviation.

5.2.3 Male Operator Age for Accident Operators and NBS Operators

Since the largest number of operators associated with accidents were males, an attempt was made to explore the possible involvement of age for the male operators only as compared to male operators in the NBS group. The male age distributions for both groups is presented in Table 10. The mean age of the male operators in the accident group was 38.2 years with a standard deviation of 14.58 years as compared to 35.3 years and 15.7 years respectively for the male operators in the NBS group. As would be expected from the previous analysis of age for all accident operators, the mean for the male accident operators was slightly greater than the NBS operators. Characteristics of the age distributions also followed the previous analysis. "Goodness of fit" chi square was computed to determine if the age distribution of the male accident operators was the same as the age distribution for male NBS operators. A chi square value of 33.97 was obtained which is statistically significant at the 0.05 level of confidence ($\chi^2_{0.05}(8) = 15.51$). The z test for sample and population means was computed, and was statistically significant ($z = 2.13$; $z_{0.25} = \pm 1.96$, $p < 0.05$). The two age distributions were apparently different. The z test for sample and population means was computed and also statistically significant ($z = 2.13$). The mean age of male operators in the accident group was significantly greater than the mean age of male operators in the NBS group. This difference between the two means was 2.9 years.

TABLE 10. MALE BOAT OPERATOR PROFILES FOR AGE

Age (Years)	ACCIDENT OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Male Operators	Percentage	Number of Male Operators	Percentage
Under 12	0	0	436,124	3.5
12-15	2	1.1	609,705	5.0
16-19	16	9.0	1,311,872	10.7
20-25	26	14.7	1,730,060	14.1
26-30	14	7.9	1,554,923	12.6
31-40	54	30.6	2,170,372	17.7
41-50	22	12.5	2,116,470	17.2
51-60	25	14.2	1,372,263	11.2
Over 60	17	9.6	985,942	8.0
TOTAL	176	100.0	12,287,731	100.0
Unknown: 27 Cases				

5.2.4 Accident Operator Boating Experience and NBS Operators

A comparison of the number of hours of boating experience for the boat operators in the accident group and the operators listed in NBS produced some differences with respect to the distributions of experience. At this point, it should be noted that NBS operator experience pertains to the primary boat operator of the family questioned rather than experience given for all boat operators in the household.* The effect of this shift in emphasis in the NBS data will very likely inflate the experience given for all recreational boaters, at least when these hours of experience are compared to the accident boat operator experience. The primary operators of boats will accumulate more experience in boating than others in the household, while the loading related accidents in question occurred to operators regardless of whether they were the primary operators of the household or less frequent operators in the household. A systematic bias in the results might favor an overestimation of the experience in the NBS group or an underestimation of the experience of the accident operator group. However, it remains that primary operators, being exposed to boating for a longer period of time, also have increased their chances for the occurrence of an accident simply as a function of exposure time. In analyzing the data, a conventional assumption will be made: that such counteractive biases will tend to cancel each other out and will contribute only to variability of the distributions.

Operators reported as having two to four years of experience were included in the 100-500 hours category; operators reported as having five years of experience were included in the greater than 500 hours category. The two distributions of boating experience are presented in Table 11.

TABLE 11. BOAT OPERATOR PROFILES FOR EXPERIENCE

Experience (Hours)	ACCIDENT OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Operators	Percentage	Number of Primary Operators	Percentage
Under 20	24	17.4	872,042	9.4
20-100	38	27.5	2,263,599	24.4
100-500	36	26.1	2,541,911	27.4
Over 500	40	29.0	3,599,494	38.8
TOTAL	138	100.0	9,277,046	100.0

* The primary operator in a boating household was defined as "that operator with the most operating time in 1973" in the instructions provided to respondents in the NBS survey.

"Goodness of fit" chi square was computed to determine if the two distributions differed sufficiently to be statistically significant. The obtained chi square was significant at the 0.05 level of confidence ($\chi^2 = 15.22$; $\chi^2_{0.05}(3) = 7.82$). Observation of the data indicates that the largest number of accident operators were concentrated in the "over 500 hours" category and the smallest number of accident operators were in the least boating experience category. Comparison of the tabled data for both groups of operators suggests that boat operators involved in loading related accidents appear to be somewhat less experienced than boat operators in general. The concentrations of accident operators generally parallel the proportions of all primary operators in NBS for the "20-100" and "100-500" hours categories. But there are proportionately more accident operators in the lowest experience category than in the lowest experience category for NBS operators (17.4% vs 9.4%). There may be a case for concluding that the loading related accidents in this analysis were at least partially a function of insufficient boater experience. In particular, there may be more risk for loading related accidents for the novice operators with less than 20 hours of boating experience.

5.2.5 Accident Operator Formal Boating Education and NBS Operators

As with the NBS boating experience analysis, the information for NBS boaters' formal boating courses refers only to the primary operator in the boating household. Again, it is more likely that the primary boat operator of the household will have taken a formal boating course and that the accident operator is not necessarily the primary boat operator of the household. The resulting possible bias in this case is probably not as great as in the previous analysis, where boating experience directly correlated with the definition given for the primary boat operator in NBS.

Whether or not an accident operator had taken a formal boating course was known for 93 operators. Of that group, 18 (19.4%) had taken a course. The proportion of NBS operators that had taken a formal boating course was 25.7%. The statistical significance of the difference between the two proporations was determined using an

alternative z statistic.* The computed z was not statistically significant at the 0.05 level of confidence ($z = 0.07$; $z_{0.25} = \pm 1.96$). It does not appear warranted to conclude that accident operators who have taken a formal boating course differ from the general population of primary operators who have taken a formal boating course. Consequently, there is no reason to expect a difference in risk for loading related accidents according to whether or not a boater has taken a formal boating course. Reference to the specific boating courses taken by the accident operators can be made in Table 7 of this report; reference to the specific boating courses taken by NBS operators can be made in pages 100-103, Reference 2. Testing for statistical significance of the distributions of the frequency at which various courses were taken by each group of operators was not warranted logically, nor were there sufficient frequencies in all boating courses for the accident operators for testing.

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* This test uses a normal approximation to the binomial distribution to test the null hypothesis $p = p_o$ against the alternative that $p \neq p_o$. The statistic used is:

$$z = \frac{|r - np_o| - 1/2}{\sqrt{np_o(1 - p_o)}}$$

where n is the sample size, r is the number of accident operators having taken a formal boating course, and p_o is the proportion of NBS operators having taken a formal boating course (see Reference 3, pp. 49-51).

6.0 SALIENT ATTITUDES AND PERSONALITY CHARACTERISTICS FOR LOCAL BOAT OWNERS AND OPERATORS

Attitudes and personality factors have long been established as predictors of human behavior. Voting preferences, susceptibility to persuasion, accident proneness, and responsiveness to advertising are some of the more frequently cited behaviors linked to attitude and personality factors. This part of the loading related accident educational task is intended to provide information that supplements the demographic analyses of boaters involved in both the collision and loading related accident data bases. The present effort is intended to: 1) increase USCG knowledge about attitudinal responses boaters may have towards safety related items, and explore the possible association of the attitudes to boating accident histories; and 2) increase USCG knowledge about the possible relationship of boating accident history to four personality factors of interest for planning an educational program.

Although the procedures for administration of the measurement instruments were similar, the intentions for use of the data and the development of measurement instruments were sufficiently different to warrant separate presentation in this report.

6.1 Local Boater Attitude Study

6.1.1 Introduction and Purpose

The attitudes held by persons are generally thought of as mediators of overt behavior. That is, actions carried out by persons can be viewed as either caused by, or affected by, the attitudes they have. In this study, information about attitudes held by recreational boaters was considered as supplemental information to the planning of educational materials. Boater attitude information was used in the same way as boater demographic facts to identify possible factors influencing boating accidents and to prepare educational countermeasures.

The conventional procedure for identifying this information is first to collect data relating to demographics and attitudes; then inferences are made concerning the planning and execution of the educational program (Reference 4). Inferences are involved at two levels. First, there are inferences about the population from the sample used for collection of the information. Second, there are inferences about how the information may contribute to successful strategies for the educational program. In the second case, these inferences lead to predictions about

what message content should be used to communicate the messages and how the messages should be adapted to reach a particular audience. Of course the interest here is in maximizing the likelihood of successful acceptance of the messages by the intended audience. This information about boaters would be particularly useful if unique demographic facts or attitudes were identified for persons with boating accident histories (and thereby likely to be characteristics of candidates for boating accidents).

This study was conducted to assess a group of recreational boaters' attitudes relating to safe operation of a boat and ways of achieving competence in the operation of a boat. It should be noted that this study was exploratory in purpose, and was not intended to provide information about all boaters in the recreational boating public. If the results of this assessment proved productive, then additional work on a much larger scale could be recommended.

The attitude study was conducted by E. Sager with assistance provided by K. Geissler and N. Whatley for analysis of the data.

The dimensions of boater attitudes considered for this study were determined by *a priori* reflection upon pivotal issues concerning safe and competent operation of a boat. Three attitudinal dimensions were selected as being possible useful mediators of boat operation behavior. It was assumed that strongly held attitudes on these dimensions should influence a boater's operation of his boat, or influence how he gets educational information about boating. Seven items were constructed to measure these dimensions:

- Who is responsible for the boater's safety (items 1, 2, and 3).
- The boater's perception of the role of chance in causing accidents (item 4).
- Where the "competent" boater has obtained his boating information (items 5, 6, and 7).

An attempt was also made to determine whether attitudes were related to the boater's accident history. The criterion variable used for the comparison was whether or not the boater had had a boating accident.

6.1.2 Definitional Considerations of Attitudes and Attitude Measurement

A general conceptualization of attitudes that serves the purposes of this study is stated by two authorities (Zimbardo and Ebbesen) in the fields of attitude measurement and persuasion.*

> "Attitudes have generally been regarded as either mental readiness or implicit predispositions which exert some general and consistent influence on a... class... of [affective] responses. These responses are usually directed toward some object, person, or group. In addition, attitudes are seen as enduring..., but ones which are *learned* rather than innate. Thus, even though attitudes are *not* momentarily transient, they are susceptible to change."**

Typically, attitudes are considered to be composed of three component parts:

1) An affective or emotional component which accounts for likes or dislikes about the object of the attitude

2) A cognitive component which accounts for beliefs about attributes of the object of the attitude

3) A behavioral component which accounts for a person's actions directed toward the object of the attitude.

Ideally, the measurement of attitudes for practical purposes should include a way to gain information about all three components. However, this would involve the unwieldly task of determining: preferences of all the persons involved, their beliefs and factual knowledge about the object of the attitudes, and a reliable record of their behavior toward the object. More acceptable methods for measuring attitudes tend to emphasize one or two of the components. The selection of the components for study is largely dictated by the intended use of the results, and by the availability of testing/measurement instruments. The usual method for collecting attitudinal information is to use some form of verbal interrogation technique such as interviews or questionnaire completion.

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* A non-technical discussion of the nature of attitudes is presented in Zimbardo, P. and E. Ebbesen, Influencing Attitudes and Changing Behavior. Reading, Mass.: Addison-Wesley Publishing Company, 1969, pp. 6-8 (Reference 5).

** Zimbardo & Ebbesen, p. 6.

This study focuses on the cognitive component; however, there are also affective implications involved in the beliefs and factual information under consideration. The method was intended to evaluate how boaters felt about the various safety issues. Questionnaires were used as the measurement instrument.

6.1.3 Method and Procedures

The study employed conventional materials and procedures used in field settings. Within the limitations imposed by the field settings, measurement was made as precisely as possible. The study was administered to persons selected from the general attendance of two boat trade shows.

6.1.3.1 Measurement Instrument - Questionnaire Construction - The measurement instrument used for the study was fairly detailed. It was intended that boaters cooperating with the survey effort would spend considerable time and concentrated effort in answering the questions.

The questionnaire consisted of three sections. Part One included demographic information, factual information concerning the boat owned, and the boaters' accident histories. This part of the questionnaire was originally prepared by T. Doll for the survey of boater personality characteristics (Section 6.2), and was utilized in the present attitude assessment study for purposes of economy. The demographics selected from that form served to identify the composition of the group of respondents in the present study. Items used for this study included: age, sex, marital status, formal education, and occupation.

Two additional items used to characterize the respondents, although they were not strictly demographic, were: the size and type of boat owned, and how often the boater used his boat.

Part Two consisted of the criterion attitude items. Part Three included a series of items designed for assessing boaters' mass media preference. Information from Part Three was used for the Educational Alternatives Project (Contract No. DOT-CG-40672-A) and will be presented in that Final Report, Educational Alternatives for Boating Safety Programs.

Seven criterion attitude items were constructed using the multiple choice format. The alternatives given for respondents to choose from represented the extent to which they agreed or disagreed with the stem of the item. This format is one of several conventional techniques for assessment of attitudes. Three criterion items addressed the issue of who is perceived as the primary responsible agent for boater safety, including the manufacturers of the boats, the boat operators, and the Coast Guard or other enforcement agencies. One item addressed an attitude concerning the role of chance as the causal factor in accidents; the three remaining items addressed attitudes toward various resources for achieving boating competency. A copy of the questionnaire is presented in Appendix D.

6.1.3.2 Administration of the Attitude Study - The study was administered to persons selected from the general attendance of two boat trade shows occurring late in February, located in Muscle Shoals, Alabama and Memphis, Tennessee. A research team of Wyle personnel selected respondents for the study and gave instructions for completion of the questionnaires. The team consisted of three persons well qualified for this task since they had extensive experience in interviewing for boating accident investigations. Prior to the administration, team members were briefed on how to select respondents, and how to introduce the study without influencing the results. They were given detailed definitions for several words used in the questionnaire that might prompt questions. A copy of the instructions is attached to the questionnaire in Appendix D. The study was administered from the local Coast Guard exhibition booth at the show, and each respondent completed the questionnaire at or near the booth within the control of the team members. Since it is desirable to obtain representation of respondents from all demographic categories, the research team was instructed to select a wide variety of participants for the study. As persons in the general attendance of the exhibition passed by the Coast Guard exhibition booth, likely candidates were approached personally by a team member and asked for their cooperation in the study. Each person was told that the project would take about 10 or 15 minutes of his time and that he would receive a small gift for his effort. The project was identified only as a "Wyle Laboratories Research Project." If a respondent persisted in an inquiry about the study, he was told that "the Coast Guard is funding the project." At no time was the attitude study identified as a safety related project of any kind. If the person agreed to participate, he was asked to sit down, given a questionnaire and pencil, and instructed on how to complete the questionnaire properly.

The questionnaires were given out to every other person on an alternate basis with the personality questionnaire discussed in Section 6.2. No respondent was given both questionnaires to complete. When the respondent returned his completed questionnaire, he was given his choice of one of three small gifts (floating key chains, small first aid kits, or disposable penlights).

There is one possible effect which may have resulted from the fact that the questionnaire was administered from the Coast Guard exhibition booth that should be mentioned. It is likely that the study was associated with the Coast Guard, and some respondents may have been influenced in their responses to the questionnaire items by the immediate presence of the enforcement agency. A possible resultant bias would be that respondents underestimated their boating accident history, or provided answers on the attitude items that were more "desirable" or more "safety conscious" than they actually felt. On the other hand, some respondents may have given more accurate answers than they otherwise would, by attending more carefully to the items. It is assumed for the analysis of the data that the biases should have a cancelling effect, and will contribute only to variability of the distributions of data. This is a conventional assumption that is routinely made for studies of this type.

6.1.4 Results of the Attitude Study

6.1.4.1 Characteristics of the Respondents for the Study - One hundred twenty-six respondents participated in the attitude study. Twenty-six respondents completed questionnaires at the Muscle Shoals boat show and 97 respondents completed questionnaires at the Memphis boat show. The ages for respondents ranged from one person under 12 years of age to nine persons between the ages of 51 to 60 years. Mean age for the respondents was 32.02 years. Nearly twice as many males as females particiated (84 males and 39 females); three persons did not indicate their sex on the questionnaire. Eighty-eight (73%) of the respondents were married and 22 (18%) were single; the remainder were either divorced, widowed, or separated. Five persons did not respond to the marital status item. Education level for the respondents was high, with 46.9% having at least one year of college. Education level was reported by all participants and ranged from five respondents with less than an eighth grade level to eight respondents with qualifications beyond the Master's degree. The most frequently reported occupations were in the managerial and medical categories. Selected demographics are summarized in Table 12.

TABLE 12. SUMMARY OF CHARACTERISTICS OF RESPONDENTS FOR AGE, SEX, SIZE OF BOAT AND TYPE OF BOAT

RESPONDENT CHARACTERISTIC	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Respondent Age		
Under 12	1	0.8 %
12 - 15	4	3.3 %
16 - 19	6	4.9 %
20 - 25	22	17.9 %
26 - 30	18	14.6 %
31 - 40	42	34.1 %
41 - 50	21	17.1 %
51 - 60	9	7.3 %
Over 60	0	0.0 %
Total	123	100.0 %
No answer:	3	
Respondent Sex		
Male	84	68.3 %
Female	39	31.7 %
Total	123	100.0 %
No answer:	3	
Length of Boat Respondents Used Most Often		
Under 14 ft	16	13.0 %
14 to 16 ft	44	35.8 %
16 to 18 ft	30	24.4 %
18 to 20 ft	16	13.0 %
20 to 22 ft	4	3.3 %
22 to 26 ft	5	4.1 %
Over 26 ft	8	6.5 %
Total	123	100.0 %
No answer:	3	
Type of Boat Respondents Used Most Often		
Johnboat	28	23.9 %
Runabout	65	55.6 %
High Performance	4	3.4 %
Cruiser	14	12.0 %
Sail Boat	4	3.4 %
Canoe	2	1.7 %
Total	117	100.0 %
No answer:	9	

Tabulation of information concerning the sizes and types of boats owned by respondents shows representation of all boat size categories, and all types of boats. As would be expected from NBS and CG-357 sources, the largest number of respondents owned boats in the 14 to 16 ft and 16 to 18 ft categories. Sixteen respondents owned boats less than 14 ft and eight respondents owned boats over 26 ft. The types of boats used most often by the respondents ranged from 65 respondents with runabouts to two respondents with canoes. Twenty-eight respondents used johnboats most often. A summary of distributions of respondents for boat size and boat type is also presented in Table 12.

Respondents were almost equally divided as to whether they had accidents or not. Sixty persons (47.6% of the total group) reported having had some boating mishap.

6.1.4.2 Attitudinal Response for Responsibility for Safe Boating - The first criterion items on the questionnaire dealt with the boaters' attitudes toward specific responsibility for safe boating or safe boat operation. A fourth item addressed the role of chance or luck as the determiner of the accident. Each criterion item was crosstabulated with whether or not the boater had a boating accident of any kind. Contingency coefficients (C) and χ^2 statistics were computed to facilitate interpretation of the crosstabulations.

Item 1 specified that "safe boating is primarily the responsibility of manufacturers of boats and boating equipment." If a boater agreed with this statement, the interpretation was that he is displacing some of the responsibility for safety away from himself. Disagreement with the statement, however, would not necessarily imply the opposite; i.e., that the boater assumes himself the responsible party. For example, a boater who disagreed with the statement might attribute primary responsibility to another source other than manufacturers or himself, such as the Coast Guard. The data for boaters' response to this item are presented in Table 13.

TABLE 13. RESPONSE OF BOATERS WITH AND WITHOUT ACCIDENT HISTORIES TO THE STATEMENT: "SAFE BOATING IS PRIMARILY THE RESPONSIBILITY OF MANUFACTURERS OF BOATS AND BOATING EQUIPMENT"

	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	5 (8.5%)	14 (22.2%)	19 (15.6%)
Somewhat Agree	30 (50.8%)	25 (39.7%)	55 (45.1%)
Somewhat Disagree	7 (11.9%)	8 (12.7%)	15 (12.3%)
Strongly Disagree	17 (28.8%)	16 (25.4%)	33 (27.0%)
TOTAL	59* (100%)	63* (100%)	122 (100%)

($\underline{C}$ = 0.192, $\chi^2(3)$ = 4.689, $p > 0.05$)

* Value varies as a function of incomplete questionnaires.

The majority of the respondents (74 persons, or 60.7%) attributed at least some responsibility for safe boating to manufacturers of boats and boating equipment. Of these, however, only 19 boaters (15.6%) strongly agreed. More than twice the number of persons strongly disagreed (33 persons, or 27%) than disagreeded somewhat (15 persons, or 12.3%) with the statement. These persons felt that primary responsibility rests with <u>someone other than</u> the manufacturers. Clearly there are aspects of boating safety which are the responsibility of boat manufacturers; i.e., the technical design, quality engineering, and reliable construction of the boat itself. The key phrase in this item is "<u>primarily</u> the responsibility." Since most boaters (84.4%) did not strongly agree with the statement, they apparently perceive other primary factors relating somehow to the <u>operation</u> of the boat or to standards and requirements by USCG agencies concerning safe design and manufacturing.

The crosstabulation of attitudes and accident/no accident classifications yielded no apparent relationship ($\underline{C}$ = 0.192, $\chi^2(3)$ = 4.689, $p > 0.05$).

<u>Item 2</u> specified that "safe boating is <u>primarily</u> the responsibility of all persons who operate boats." If a boater agreed with this statement, it can be interpreted that he is assuming, at least verbally, the primary responsibility for safe operation of his boat. If the boater disagreed with the statement, it can be interpreted that he may be displacing responsibility for his safety away from himself. The data for boaters' response to this item are presented in Table 14.

TABLE 14. RESPONSE OF BOATERS WITH AND WITHOUT ACCIDENT HISTORIES TO THE STATEMENT: "SAFE BOATING IS PRIMARILY THE RESPONSIBILITY OF ALL PERSONS WHO OPERATE BOATS"

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	54 (90.0%)	59 (90.8%)	113 (90.4%)
Somewhat Agree	6 (10.0%)	5 (7.7%)	11 (8.8%)
Somewhat Disagree	0 (0%)	0 (0%)	0 (0%)
Strongly Disagree	0 (0%)	1 (1.5%)	1 (0.8%)
TOTAL	60 (100%)	65 (100%)	125 (100%)

($\underline{C}$ = 0.094, $\chi^2(3)$ = 1.114, $p > 0.05$)

All but one respondent agreed with the statement at least to some extent. More than 90% of those respondents strongly agreed with the statement. There was no relationship between the boaters' attitudes and the accident/no accident classification ($\underline{C}$ = 0.094, $\chi^2(3)$ = 1.114, $p > 0.05$). Considering the high education levels of the respondents, this is reassuring though not a surprising finding.

Item 3 specified that "safe boating is primarily the responsibility of the Coast Guard and other government enforcement agencies." As with Item 1, if the boater agreed with this statement, this was taken as evidence that he tends to displace the primary responsibility for his safe boating to the Coast Guard or similar enforcement agencies. As with Item 1, however, the converse is not necessarily true if he disagreed with the statement. The data for boaters' response to this item are presented in Table 15.

TABLE 15. RESPONSE OF BOATERS WITH AND WITHOUT BOATING ACCIDENT HISTORIES TO THE STATEMENT: "SAFE BOATING IS PRIMARILY THE RESPONSIBILITY OF THE COAST GUARD AND OTHER GOVERNMENT ENFORCEMENT AGENCIES

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	9 (15.0%)	8 (12.5%)	17 (13.7%)
Somewhat Agree	28 (46.7%)	28 (43.8%)	56 (45.2%)
Somewhat Disagree	16 (26.7%)	13 (20.3%)	29 (23.4%)
Strongly Disagree	7 (11.7%)	15 (23.4%)	22 (17.7%)
TOTAL	60 (100%)	64 (100%)	124 (100%)

($\underline{C}$ = 0.157, $\chi^2(3)$ = 3.153, $p > 0.05$)

A majority of the boaters agreed with the statement (slightly more than 58% either agreed somewhat or strongly agreed).

This provides some evidence that the Coast Guard or other enforcing agencies are perceived as being partially responsible for boating safety. The boaters who disagreed with the statement tended to be more evenly divided between the "somewhat" and "strongly" alternatives than were boaters who agreed. It should be noted that the distribution of responses to this item is somewhat more conventional than was true for the previous items, in that the concentration of attitudes is in the less extreme categories, i.e., somewhat agree or somewhat disagree.

Again, the crosstabulation of the attitudes and accident/no accident categories produced no apparent relationship ($\underline{C} = 0.157$, $\chi^2(3) = 3.152$, $p > 0.05$).

Item 4 specified that "boating mishaps are usually the result of bad luck rather than poor operator judgment or inadequate operator skill." If the respondents agreed with this statement, it could be interpreted that, again, they tend to displace responsibility for the safe operation of their boat away from themselves and in this case take a more or less fatalistic viewpoint. Disagreement with the statement, however, allows no definitive interpretation regarding the agent perceived as responsible for mishaps. The data for boaters' response to this item are presented in Table 16.

TABLE 16. RESPONSE OF BOATERS WITH AND WITHOUT BOATING ACCIDENT HISTORIES TO THE STATEMENT: BOATING MISHAPS ARE USUALLY THE RESULT OF BAD LUCK RATHER THAN POOR OPERATOR JUDGMENT OR INADEQUATE OPERATOR SKILL"

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	3 (5.0%)	4 (6.2%)	7 (5.6%)
Somewhat Agree	5 (8.3%)	4 (6.2%)	9 (7.2%)
Somewhat Disagree	8 (13.3%)	10 (15.4%)	18 (14.4%)
Strongly Disagree	44 (73.3%)	47 (72.3%)	91 (72.8%)
TOTAL	60 (100%)	65 (100%)	125 (100%)

($\underline{C} = 0.055$, $\chi^2(3) = 0.376$, $p > 0.05$)

A small minority of the respondents (12.8%) agreed with the statement (either somewhat or strongly), and most respondents strongly disagreed. Although there is no certain basis for interpreting the strong disagreement of respondents on this item, it does suggest that there is considerable regard for operator judgment or skill. Again there was no relationship between boater attitudes on this item and the accident/no accident categories ($C = 0.055$, $\chi^2(3) = 0.376$, $p > 0.05$).

In summary, it is apparent that boaters do, at least verbally, assume primary responsibility for the operation of their boats. At the same time, they see boat manufacturers and the Coast Guard as sharing this responsibility to some extent. This seems to be a realistic expectation on their part. However, it is entirely possible that the presence of the Coast Guard exhibition booth and Coast Guard personnel influenced the responses to the responsibility items. Respondents may have reacted to the items in ways that seemed more acceptable to the Coast Guard such as answering with the more desirable alternative regardless of their true opinions. The confirmation of statistically significant associations between boater attitudes on the responsibility items and whether or not they had a boating accident would have demonstrated a valuable interdependence for subsequent educational research. But the low C values for the contingency coefficients and non-significant χ^2 values prevent further interpretation.

6.1.4.3 Attitudinal Response for How the "Competent Boater" has Learned About Boating - The last three items in the study dealt with the boater's attitudes toward resources for gaining competency in boating. As in the previous analysis, each attitude item was crosstabulated with whether or not the respondent had a boating accident.

Item 5 specified that "the person who is the more competent boater will most likely have taken a formal boating course in order to learn about boating." It was anticipated that this item would provide important information about how boaters viewed formal boating courses. If a boater agreed with this statement, it was taken that he probably views formal boating courses favorably. If a boater disagreed with this statement, he probably views formal boating courses unfavorably. This kind of information is valuable for determining ways to advertise the value of formal boating courses. The data for boaters' response to this item are presented in Table 17.

TABLE 17. RESPONSE OF BOATERS WITH AND WITHOUT BOATING ACCIDENT HISTORIES TO THE STATEMENT: "THE PERSON WHO IS THE MORE COMPETENT BOATER WILL MOST LIKELY HAVE TAKEN A FORMAL BOATING COURSE IN ORDER TO LEARN ABOUT BOATING."

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	20 (33.9%)	20 (30.8%)	40 (32.3%)
Somewhat Agree	25 (42.4%)	27 (41.5%)	52 (41.9%)
Somewhat Disagree	10 (16.9%)	14 (21.5%)	24 (19.4%)
Strongly Disagree	4 (6.8%)	4 (6.2%)	8 (6.5%)
TOTAL	59 (100%)	65 (100%)	124 (100%)

($\underline{C}$ = 0.06, $\chi^2(3)$ = 0.454, $p > 0.05$)

Respondents apparently valued the formal boating course as a source for learning about boating as 74.2% agreed with the statement. Of the 92 respondents agreeing with the statement, 40 strongly agreed. Eight respondents strongly disagreed. Calculation of $\underline{C}$ and χ^2 produced non-significant results, indicating that the attitude toward the formal boating course was probably independent of the accident/no accident categories ($\underline{C}$ = 0.06, $\chi^2(3)$ = 0.454, $p > 0.05$).

Item 6 specified that "the person who is the more competent boater will most likely have learned about boating from experience." If a boater agreed with the statement, it was taken that he probably views experience favorably and considers it to be a good teacher. If a boater disagreed with the statement, he probably values other sources of information about boating more highly. The item was intended to provide information that would be valuable in weighing the usefulness of experience in preparing and selecting educational materials. The data for boaters' response to this item are presented in Table 18.

TABLE 18. RESPONSE OF BOATERS WITH AND WITHOUT BOATING ACCIDENT HISTORIES TO THE STATEMENT: "THE PERSON WHO IS THE MORE COMPETENT BOATER WILL MOST LIKELY HAVE LEARNED ABOUT BOATING FROM EXPERIENCE."

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	20 (33.3%)	22 (34.9%)	42 (34.1%)
Somewhat Agree	33 (55.0%)	31 (49.2%)	64 (52.0%)
Somewhat Disagree	5 (8.3%)	8 (12.7%)	13 (10.6%)
Strongly Disagree	2 (3.3%)	2 (3.2%)	4 (3.3%)
TOTAL	60 (100%)	63 (100%)	123 (100%)

($\underline{C}$ = 0.079, $\chi^2(3)$ = 0.777, $p > 0.05$)

As might be expected, most boaters agreed that the more competent boaters will most likely have learned about boating from experience. One hundred and six (86.1%) agreed, and 42 (34.1% of all respondents) of those strongly agreed. Only four respondents (3.3%) strongly disagreed. The crosstabulation of attitudes and accident/no accident categories demonstrated no relationship between the two classifications ($\underline{C} = 0.079$, $\chi^2(3) = 0.777$, $p > 0.05$).

Item 7 specified that "the person who is the most competent boater will have a 'natural ability' for boat operation and seamanship (regardless of boating courses or boating experience)." If a boater agreed with the statement, it was interpreted that he identified and positively valued a natural ability for competent boating. If a boater disagreed with the statement, he either did not believe in such a natural ability or did not value it highly. This item in the study provided an alternative source of boating competence to formal education courses and experience. There is little doubt that some boaters can be more competent than others given they share the same length of boating experience and/or participation in formal boating courses. But whether or not this is a natural ability that transcends education or experience is another matter. It was of interest for the education project to determine whether boaters might resist the proposed education efforts as a result of valuing this ability. The data for boaters' response to this item are presented in Table 19.

TABLE 19. RESPONSE OF BOATERS WITH AND WITHOUT BOATING ACCIDENT HISTORIES TO THE STATEMENT: "THE PERSON WHO IS THE MOST COMPETENT BOATER WILL HAVE A 'NATURAL ABILITY' FOR BOAT OPERATION AND SEAMANSHIP (REGARDLESS OF BOATING COURSES OR BOATING EXPERIENCE)."

ATTITUDE	ACCIDENT	NO ACCIDENT	TOTAL
Strongly Agree	3 (5.0%)	6 (9.4%)	9 (7.3%)
Somewhat Agree	19 (31.7%)	14 (21.9%)	33 (26.6%)
Somewhat Disagree	21 (35.0%)	17 (26.6%)	38 (30.6%)
Strongly Disagree	17 (28.3%)	27 (42.2%)	44 (35.5%)
TOTAL	60 (100%)	64 (100%)	124 (100%)

($\underline{C} = 0.184$, $\chi^2(3) = 4.327$, $p > 0.05$)

Few respondents (9 persons or 7.3%) strongly agreed with the statement. There was a fairly even concentration of attitudes in the remaining three classifications ranging from 26.6% of the respondents who somewhat agreed to 35.5% of the respondents who strongly disagreed. Forty-two (33.9%) respondents acknowledged the existence of a natural ability for boat operation by agreeing with the statement. Calculation of $\underline{C}$ and χ^2 did not result in a statistically significant correlation between attitude and the accident/no accident dimension ($\underline{C} = 0.184$, $\chi^2(3) = 4.327$, $p > 0.05$).

In summary, respondents valued highly the contributions made to boater competency by formal boating courses and boating experience. A much smaller, but still surprising number identified the existence of "natural ability," and seemed to evaluate this ability on a level similar to education or experience.

6.1.5 Conclusion

Generalizations made here about implications for education must be directed primarily to respondents participating in this study. Any generalization to other boaters is based on the assumption that the other boaters do not differ in any significant ways from the group participating in this study. This assumption of course has not been justified in the present study.

Many respondents to the study held strong attitudes concerning the topics addressed by the items in the questionnaire. Most opinions expressed by respondents on the responsibility items were fairly consistent with what would intuitively be expected. Boat operators themselves were most often given primary responsibility for safe boating. Bad luck was not often viewed as most important. Manufacturers were seen as playing some role, but not usually the primary one. Perceptions concerning the Coast Guard varied rather evenly across the continuum of possible responses. Attitudes concerning the sources of learning of competent boating indicated a higher regard for formal courses than might be expected given the positive attitudes toward experience and to a lesser extent, toward natural ability. Apparently, accident history is independent of the attitudes assessed in this sample of recreational boaters.

There are several implications of these findings for boating education on a local level. There does not seem to be a substantial barrier preventing local boaters from taking one or more formal boating courses. Given the high regard in which

the Coast Guard is held, and the acceptance of the Coast Guard as playing a responsible role in boating safety (Item 3 above), the sponsorship of such courses by the Coast Guard should enhance the success for recruiting boaters. Perhaps the high regard for experience, and for some persons, for natural ability, should be exploited in the construction and selection of educational material and announcements about boating courses. Messages might be designed to appeal to boaters by portraying the course instructors and boaters who have taken the course as experienced and likely to possess natural boating skills. There appears to be no need to expend great effort in convincing operators that primary responsibility for safe operation of their boat rests with them.

It should be reiterated here that the educational program theme used in the prototype campaign of this undertaking, "You're Obligated to Know, You Know," bears upon the outcome of this survey. However, the intent of the obligation refers not to responsibility for safe boating, but to an obligation to <u>be informed</u> about safe boating and to possess judgment and boat operating skill. It could be reasoned that the sense of responsibility which local boaters have about safe operation could be capitalized on and leads to an intuitive prediction of success for the educational program theme. It would seem valuable to conduct a similar study on a nationwide basis in order to determine salient attitudes held by the general population of boaters. Certainly, this information would be valuable for planning future educational programs.

6.2 Local Boater Personality Study

6.2.1 Introduction and Purpose

Exploring the possible use of personality characteristics for adapting educational messages or other modes of influence has considerable precedent. Much commercial and academic research has been devoted to determining what aspects of personality facilitate receptiveness to influence from others. There also exists similar research exploring the association of certain personality characteristics and safety records in a variety of working and recreational settings.

This section of the report deals with an attempt to identify measurable aspects of personality that could possibly offer guidelines in the design of educational materials for recreational boaters. The study was designed and administered by T. Doll. The data were analyzed and interpreted by K. Geissler and E. Sager. It should be noted that this study was exploratory in purpose and was not intended to provide information about all boaters in the recreational boating public. If the results of this assessment proved productive, then additional work on a much larger scale could be recommended.

6.2.2 Definitional Considerations of Personality and Personality Tests

Definitions of personality abound in the literature of experimental and descriptive psychology. The consideration of personality for this project requires synthesis of a general group of definitions, and it is strongly suggested in one definition given by Gordon Allport (Reference 6). Personality as used in this report refers to a fundamental pattern of characteristics within an individual person from which mental and behavioral events stem.

The isolation of one or more of these fundamental characteristics for a specific purpose in personality research is routine. John Horrocks, a world authority on personality measurement clearly identifies this issue in a statement concerning the selection of personality tests. It is apparent that when a particular test is selected, the investigator has also selected the personality characteristic corresponding to the test.

"A test user selects a personality test because he feels that its theoretical base permits it to supply information categorized in such a manner that it is useful for his purposes. Certainly his interpretation of its results must usually be made either within the theory that the test represents, or within an adaptation of that theory that the test user may wish to make." (Reference 7, p. 493).

6.2.3 Selection and Description of Personality Tests for this Study

The choice of personality characteristics for this study was based upon prior research in related fields. Four alternative personality tests were selected for the assessment. Each test was developed by authorities in personality testing, and was subsequently shortened to meet the requirements for administration to recreational boaters. The tests used were as follows:

- McGuire Safe-Driver Scale (MSDS). This test was designed for use in predicting safe driving of automobiles. It was not to have any value for message adaptation, but was included in order to determine whether accident proneness in boating can be predicted on the basis of accident proneness in automobile driving.

- Rotter's Scale to Measure Internal vs. External Control (Rotter I-E Scale). This test was intended to measure attitudes related to whether a person is directed more toward reinforcement from his environment or is more oriented toward inner influences. It was used here to assess boaters' accessibility via educational efforts.

- Authoritarian F Scale. This test was included in order to determine whether educational methods might be adapted to boaters in terms of their relationship with authority.

- 16 Personality Factor Scale (16-P.F.Scale). This test was intended to determine whether educational efforts might be designed to accommodate particular types of persons in terms of maturity, dominance, trust, and confidence, i.e., the stability complex.

As a general point, the choice of tests was made according to factors that predispose a person to accept or resist influence in the form of various types of persuasive efforts.* The exception here was the MSDS test.

* For additional discussion see Janis, Irving L., et al., Personality and Persuasibility. p. 69, 1959 (Reference 8).

The interpretation of test results was intended to identify an informational resource for the design of educational materials. In the event that boaters scored extremely high or low on a given characteristic, then there may exist rationale for adapting materials in the direction suggested by the test. Ordinarily the determination of high or low scores is done using established norms or averages based upon the general population as a whole. An alternative procedure was required here to assess the significance of the test results, since all forms of the tests had been shortened. Instead, extremity of test scores was taken in conjunction with the extent to which the characteristic in question correlated with boaters' accident histories. In other words, if the scores for boaters appeared extremely high or low for a characteristic, and if scores on that characteristic were related to the categorization of whether or not the boaters had had a boating accident, then serious consideration would be directed to utilizing that personality dimension in developing educational material.

A summary of salient information concerning each personality test used for the study is presented in Tables 20-A through 20-D. The tables include descriptions of the original personality tests and information concerning the adaptation of those tests to the requirements of this study.

TABLE 20-A. THE MCGUIRE SAFE-DRIVER SCALE

Source and Description	Items Utilized In Boater Personality Survey	Scoring
Obtainable from Western Psychological Services, 12031 Wilshire Blvd., Los Angeles, CA 90025. Seventy-six items which differentiate between persons with accident. Five automobile driving records, and those with accident histories.	Part II, items 1-16: Sixteen items correlated with accident frequency at the 10% significance level and survived cross-validation in further studies by McGuire.* These items show the safe driver, when compared with the accident-haver, as more intellectually oriented and esthetic in nature. He is quicker to deny open feelings of hostility and tends toward more "feminine" interests. He is less likely to be aggressive or prestige-seeking, and prefers social roles which emphasize closeness to people and social service in preference to those oriented toward authority and/or competition. His current and past history reflect a lesser degree of family disruption.	Each items represents a statement followed by two alternative responses (e.g., "true" and "false") from which the respondent must pick one. The total score is the sum of items marked in the manner which McGuire found to be correlated with a safe driving record. Resulting possible scores range from 0 to 16.

*McGuire, F.L., Methodological and Psycho-Social Variables in Accident Research, 1971. (Reference 9)

TABLE 20-B. ROTTER'S SCALE TO MEASURE INTERNAL vs. EXTERNAL CONTROL (ROTTER I-E SCALE)

Source and Description	Items Utilized In Boater Personality Survey	Scoring
Rotter, J.B. Generalized expectancies for internal versus external control of reinforcement, Psychological Monographs, 1966, 80, Whole No. 609, 1-8.* This test measures a person's perception of internal versus external control of reinforcment; that is, his generalized expectancy that outcomes are determined by skill or by chance. The test is a 29 item, forced choice questionnaire, with six "filler" items and 23 items offering choices between internal and external belief statements.	Part III, items 1-16: The shortened version of the test was used, excluding the "filler" items; two items specifically addressing issues involving students (and thus not applicable to the majority of the present sample of respondents); and the five items with the lowest correlations to the total test score.	The total number of "external" responses were summed, resulting in a possible range of 0 to 16 for the score values.

* Reference 10

TABLE 20-C. AUTHORITARIAN F SCALE (FORCED CHOICE F SCALE)

Source and Description	Items Utilized in the Boater Personality Survey	Scoring
Berkowitz, N.W., and Wolkon, G.H. "A forced choice form of the F Scale - free of acquiescent response set. Sociometry, 1964, 27, 54-65. * Designed to measure ethnic prejudice and "prefascist tendencies" without mentioning minority groups by name. The authoritarian personality comprises the following nine values: conventionalism (rigid adherence to conventional, middle-class values), authoritarian submission (submissive, uncritical attitude toward idealized moral authorities of the in-group), authoritarian aggression (tendency to be on the lookout for, and to condemn, reject and punish people who violate conventional values), anti-intraception (opposition to the subjective, the imaginative, and tender-minded), superstition and sterotypy (the belief in mystical determinants of the individual's fate; the disposition to think in rigid categories), power and "toughness" (preoccupation with the dominance-submission, strong-weak, leader-follower dimension; identification with power figures,	The short form of the Scale was used, which includes 12 items rather than the full 25. Two additional items were excluded because they addressed potentially sensitive or inflammatory issues: one dealing with homosexuality, one with religion. Thus, a total of 10 items appear on the questionnaire.	Each item presents two alternative statements between which the respondent must choose. These represent psychologically opposite views of a situation, which have been found to differentiate between authoritarian and non-authoritarian personalities. Scores were obtained by summing the number of items marked in the manner consistent with a high authoritarian personality, resulting in a possible score range from 0 to 10.

* Reference 11

TABLE 20-C. AUTHORITARIAN F SCALE (FORCED CHOICE F SCALE) (concluded)

Source and Description	Items Utilized in the Boater Personality Survey	Scoring
overemphasis upon the conventionalized attributes of the ego; exaggerated assertion of strength and toughness), destructiveness and cynicism (generalized hostility, vilification of the human), projectivity (the disposition to believe that wild and dangerous things go on in the world: the projection outwards of unconscious emotional impulses), and sex (exaggerated concern with sexual "goings-on"). The form developed by Berkowitz and Wolkon avoids two problems encountered with previous versions: 1) acquiescence response set and 2) inadequate counterbalancing.		

TABLE 20-D. SIXTEEN PERSONALITY FACTOR SCALE (16-P.F.SCALE)

Source and Description	Items Utilized in the Boater Personality Survey	Scoring
Obtained from Individual Psychology, Inc., 515 Madison Ave., New York, N.Y. Developed by Dr. Raymond B. Cattell with D.R. Saunders and G.F. Slice. The test defines 16 unitary, independent source traits of personality, based on 15 years of study with factor analytical methods. It follows Cattell's personality theory; by far the most comprehensive and fully developed of the personality theories based on factor analysis. Within the factors, several "complexes" have been isolated which combine certain of the factors to represent broader areas of personality.	The complex of "Stability" was used, which is composed of these factors: Maturity, Dominance, Trustfulness, and Self-Confidence. A high score indicates a stable, non-neurotic personality, while a low score indicates a trouble-maker, with low morale, who may be accident-prone. The four individual factors, are described as follows: Mature vs. Childish: The high scorer is emotionally mature, calm, phlegmatic, realistic about life, possessing ego strength, having an integrated philosophy of life. The low scorer is emotionally immature, lacking in frustration tolerance, evasive, neurotically fatigued, easily annoyed by things and people, generally dissatisfied, and having various neurotic symptoms (phobias, sleep disturbances, and psychosomatic complaints). Dominant vs. Submissive: A high score indicates a person who tends to be ascendant, self-assertive, aggressive, courageous in his approach to situations, and who may at times be stern	These scales contain items which present a statement of question followed by three possible responses which indicate varying degrees of approval or agreement. The answers are assigned values of 0, 1 or 2, according to how they relate to the trait in question. The score is the sum of the numerical value for all the items, and a high score indicates a high degree of the first characteristic named in the description of the trait (e.g., maturity). Possible scores range from 0 to 12 on each scale.

TABLE 20-D. SIXTEEN PERSONALITY FACTOR SCALE (16-P.F.SCALE) (concluded)

Source and Description	Items Utilized in the Boater Personality Survey	Scoring
	and solemn. The person who scores low on this factor tends to be a follower, to lean on others, to go along with the group. He is often soft-hearted, expressive, and tends to be easily upset. Trustful vs. Suspecting: A high score is achieved by a person who tends to be free of jealous tendencies, concerned about other people, and is a good team worker. A low score indicates a person who tends to be mistrusting, often involved in his own ego, is self-opinionated, and interested in his internal mental life. He is usually unconcerned about other people, and is a poor team member. Self-confident vs. Insecure: The high scorer tends to be placid, with unshakable nerve, who is very confident in himself and his abilities. The low scorer tends to be depressed, moody, a worrier, brooder, who avoids people, and is perturbed by his own anxious feelings. He does not feel accepted in groups, or free to participate.	

6.2.4 Method and Procedures

6.2.4.1 Measurement Instrument - Questionnaire Construction - The questionnaire used for the boater personality study, shown in Appendix E, was constructed in three parts. Part I consisted of items addressing the following information:

- demographic characteristics
  - age
  - sex
  - marital status
  - education
  - occupation
  - number of jobs held in the past five years
  - whether respondent is a homeowner
- information on the boat or boats most used by the respondent
- history of automobile accidents and traffic citations
- respondent's boating activity
- respondent's boating accident history
- respondent's attitude concerning various sources of boating information.

Part II included 16 items from the McGuire Safe-Driver Scale and 24 items from the 16-P.F. Scales. An additional question was included that concerned the respondent's use of news and entertainment sources.

Part III consisted of 16 items from the Rotter I-E Scale and 10 items from the Authoritarian F Scale.

It may be noted that the majority of items included in such personality tests are indirect. That is, the items address interests which the respondent would not necessarily perceive to be related to the trait in question. Such tests are not interpreted from the nature of the person's statements about himself, but rather on the basis of research findings of correlations between answers to the items and actual behavior.

6.2.4.2 Administration of the Personality Tests - The study was administered to a total of 191 persons. The majority of participants were attending two boat trade shows in February, 1977. Sixty-six persons participated at the Muscle Shoals, Alabama show, and 118 persons participated in the Memphis, Tennessee show. The remainder of the respondents for the survey included five Wyle employees who were experienced boaters. Two questionnaires could not be identified as to where they were completed.

A research team of three Wyle Marine Technology personnel administered the study. This team consisted of persons well qualified for the task since they each have had experience in interviewing boaters for accident investigations. The study was administered from the local Coast Guard exhibition booth at the shows, and each respondent completed the questionnaire at or near the booth. The research team was instructed to select respondents in a somewhat random fashion by varying the times when persons would be approached and asked to volunteer a few minutes of their time. When respondents completed their questionnaire, they were given a small gift for their participation.

6.2.5 Results of the Personality Study

6.2.5.1 Characteristics of the Respondents for the Study - The age of respondents ranged from 13 to 68 years, with a mean age of 35.57 and standard deviation of 12.689. This is not significantly different from the population mean of respondents in the 1973 Nationwide Boating Survey which was 34.2 years, with a standard deviation of 15.5 years ($z = 1.21$, $p > 0.05$). One hundred thirty-eight respondents were males, 40 were females, and 13 did not indicate their sex on the questionnaire. This information was also compared to the breakdown of respondents by sex to the NBS and was found not to be significantly different. The present study consisted of 77.5% of known male cases as compared to 75.1% male boaters given in NBS ($\chi^2 = 0.45$, $p > 0.05$). The conformity of sample proportions with respect to age and sex composition to national averages was not necessarily an expected outcome for the study since sampling was dependent upon boat show attendance.

The majority of the respondents were married (72.1%), were homeowners (72.3%), and almost all had at least a high school diploma (92.6%). The distributions for these characteristics are presented in Table 21 in greater detail.

Occupational information about the respondents is presented in Table 22 and is categorized according to the guidelines set up in the Dictionary of Occupational Titles (contained in Robinson, et al, Reference 12). This includes 10 main occupational categories, to which the categories, "student," "housewife," and "retired," were added by Wyle for the present survey. The category with the largest number of respondents (37.6%) was the professional, technical, and managerial division; with clerical and sales work represented second (22.0%).

TABLE 21. SUMMARY OF DEMOGRAPHIC INFORMATION FOR RESPONDENTS FOR AGE, SEX, MARITAL STATUS, AND EDUCATION

DEMOGRAPHIC CHARACTERISTICS	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*
Age		
< 20	13	7.0
20 - 29	60	32.2
30 - 39	57	30.6
40 - 49	24	12.9
50 - 59	23	12.4
> 59	9	4.8
Missing Information	5	
Sex		
Male	138	77.5
Female	40	22.5
Missing Information	13	
Marital Status		
Single	37	20.2
Married	132	72.1
Divorced/Separated	14	7.7
Missing Information	8	
Home Ownership		
Home Owner	136	72.3
Not a Home Owner	52	27.7
Missing Information	3	
Education		
No high school diploma	14	7.4
High school graduate	42	22.1
Business/Trade School	13	6.8
1 yr college/Associate Degree	60	31.6
Bachelor's Degree	44	23.2
Master's and beyond	17	8.9
Missing Information	1	

* Percentages are based on the total number of cases for which the information under consideration was available.

TABLE 22. SUMMARY OF OCCUPATIONAL INFORMATION ON RESPONDENTS

OCCUPATIONAL CATEGORY	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*
Professional, technical, and managerial	70	37.6
Clerical and sales	41	22.0
Service	16	8.6
Farming, fishery, forestry, and related	1	0.5
Processing (Blue Collar)	1	0.5
Machines trades	7	3.8
Bench work	7	3.8
Structural Work	4	2.2
Student	12	6.5
Retired	4	2.2
Housewife	8	4.3
Other	15	8.1
Missing Information	5	

* Percentages are based on the total number of cases for which the information under consideration was available.

Information was also requested about respondents' automobile accident/citation history, job changes, boating activity, and boat type and length. Since this information was not utilized in the evaluation of the results, the data are summarized only and presented in Appendix F.

One item addressed the credibility which respondents attributed to various sources of boating information. These results are presented in Table 23. The Coast Guard was the most highly regarded source of boating information by far, with over three-fourths of all respondents classifying it as "extremely believable," and less than 2% rating it as "not very believable." This suggests that the endoresement of any educational program by the Coast Guard should serve as a promotional aid in terms of credibility. The operational manuals supplied with boating equipment and boating magazines were regarded fairly well, with 40 to 60% rating them "extremely believable," and less than 10% rating them "not very believable." The next three sources: informed personal friends and acquaintances; boat dealers and marina operators; and television, were rated by 10 to 30% of boaters as "extremely believable," and by 15 to 20% as "not very believable." The lowest credibility was attributed to newspapers and radio, both of which were judged by only about 10% of the respondents as "extremely believable," and by over one-fourth of respondents as "not very believable."

6.2.5.2 Boater Personality and Accident History - The design for the survey required that respondents' personality be evaluated according to their boating accident history. The questionnaire was designed to produce information far in excess of that needed for this analysis, and the data were tabulated only according to whether or not the boater had been involved in an accident. Of the 191 respondents, 92 (48.2%) had checked at least one of the eight accident categories, and were therefore classified in the boating accident group. A summary of the complete boating accident history as reported by the respondents is presented in Appendix G.

Two statistical tests were conducted in order to determine the possible correlation between scores from each personality test and whether or not the boater had an accident history. The contingency coefficient (C) was calculated for the distribution of personality scores on each test for the accident/no accident classifications. C values were low and ranged from $C = 0.154$ to $C = 0.342$. None were statistically significant at the 0.05 level of probability. The C values for each personality test and their corresponding χ^2 values are given in Table 24.

TABLE 23. SUMMARY OF CREDIBILITY ATTRIBUTED TO VARIOUS SOURCES OF BOATING INFORMATION BY RESPONDENTS

SOURCE OF INFORMATION	NOT VERY BELIEVABLE		USUALLY BELIEVABLE		EXTREMELY BELIEVABLE		MISSING
	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*	FREQUENCY OF RESPONDENTS
USCG Publications	2	1.7	20	16.9	96	81.4	73
Operational Manuals Supplied with Boating Equipment	9	7.3	37	29.8	78	62.9	67
Boating Magazines	7	5.6	64	51.6	53	42.7	67
Informed Personal Friends and Acquaintances	20	16.3	68	55.3	35	28.5	68
Boat Dealers and Marina Operators	29	24.0	70	57.9	22	18.2	70
Television	22	18.8	81	69.2	14	12.0	74
Radio	30	25.9	75	64.9	11	9.5	75
Newspaper	34	29.6	68	59.1	13	11.3	76

* Percentages are based on the total number of cases for which the information under consideration was available.

TABLE 24. CONTINGENCY COEFFICIENT AND χ^2 VALUE FOR CROSSTABULATION OF SCORES FOR TEST DISTRIBUTIONS AND ACCIDENT/NO-ACCIDENT GROUP

PERSONALITY SCALE	C and χ^2 Values (SIGNIFICANCE)
McGuire Safe-Driver Scale	C = 0.286 $\chi^2(11) = 15.187$ $(p > 0.05)$ n.s.
Rotter I-E Scale	C = 0.342 $\chi^2(12) = 20.551$ $(p > 0.05)$ n.s.
Authoritarian F Scale	C = 0.154 $\chi^2(9) = 3.995$ $(p > 0.05)$ n.s.
16-P.F.: Stability Complex Mature/Childish	C = 0.275 $\chi^2(11) = 14.334$ $(p > 0.05)$ n.s.
Dominant/Submissive	C = 0.305 $\chi^2(11) = 18.004$ $(p > 0.05)$ n.s.
Trustful/Suspecting	C = 0.271 $\chi^2(10) = 14.068$ $(p > 0.05)$ n.s.
Confident/Insecure	C = 0.240 $\chi^2(8) = 10.793$ $(p > 0.05)$ n.s.

The point biserial statistic, r_{pb}, was calculated as an alternative procedure to the $\underline{C}$ and χ^2 analyses. The r_{pb} statistic is an appropriate procedure for analysis of data where there is continuous measurement on one variable and dichotomous measurement on the other. It was anticipated that this statistic would either confirm the previous non-parametric analyses, or identify previously undisclosed association between a personality test and the accident variable (given that the accident data were cast only in nominal categories). Point biserial values varied from $r_{pb} = 0.028$ to $r_{pb} = 0.256$ (see Table 25). The latter value was significant at the 0.05 level of probability and was the calculation for the dominance scale in the 16-P.F. stability complex. Apparently there is some positive association between the distribution of dominance scores and the corresponding accident/no accident reports. This was the only significant point biserial correlation value. Scores on the other personality tests, including the McGuire Safe Driver Scale, exhibited no systematic relationship to the accident/no accident dimension.

In addition to these examinations of correlations in score distributions, comparisons of central tendencies of the scores were undertaken. A comparison was made for the accident and no accident groups according to the mean scores for each personality test. Two tailed t-tests were calculated for each of the mean score comparisons for the accident/no accident groups, and the value for the dominance scale of the 16-P.F. inventory was statistically significant. As might be predicted from the preceding significant positive correlation for the dominance scale, the group of boaters with accident histories had slightly higher dominance scores than the group reporting no accidents ($\overline{X} = 5.821$ vs. $\overline{X} = 4.663$). However, the small difference between the two mean scores does not offer usable evidence for adapting messages to more dominant personalities. At best, it can be said that the "dominant" scale discriminates statistically between people who have reported having been involved in accidents and those who report no accident involvement. The mean scores and t-test values for each personality test and the accident/no accident groups are given in Table 26.

To summarize these results, the personality dimensions which were explored in this study did not serve as useful discriminators between boaters who reported having had accidents and those who did not report such accident histories. In addition, examination of the group performance as a whole revealed no extreme score values for any of the scales. Thus, it cannot be concluded that boaters as a whole exhibit extreme tendencies on any of the traits as measured here. At this time, no recommendations can be made concerning the tailoring of educational efforts to fit particular personality types representative of either accident prone boaters or boaters in general.

TABLE 25. POINT BISERIAL CORRELATION AND ASSOCIATED t-VALUES FOR TEST DISTRIBUTIONS AND ACCIDENT/NO-ACCIDENT GROUPS

PERSONALITY SCALE	r_{pb} and t values (SIGNIFICANCE)
McGuire Safe-Driver Scale	$r_{pb} = -0.052$ $t(168) = 0.675$ $(p > 0.05)$ n.s.
Rotter I-E Scale	$r_{pb} = -0.130$ $t(153) = 1.626$ $(p > 0.05)$ n.s.
Authoritarian F-Scale	$r_{pb} = -0.053$ $t(162) = -0.680$ $(p > 0.05)$ n.s.
16-P.F.: Stability Complex	
Mature/Childish	$r_{pb} = 0.028$ $t(173) = 0.368$ $(p > 0.05)$ n.s.
Dominant/Submissive	$r_{pb} = 0.256$ $t(174) = 3.495$ $(p < 0.05)$
Trustful/Suspecting	$r_{pb} = 0.037$ $t(175) = 0.487$ $(p > 0.05)$ n.s.
Confident/Insecure	$r_{pb} = 0.058$ $t(174) = 0.768$ $(p > 0.05)$ n.s.

TABLE 26. COMPARISONS OF MEAN SCORES ON PERSONALITY TESTS BETWEEN ACCIDENT AND NO-ACCIDENT GROUPS

PERSONALITY SCALE	GROUP MEANS		t-value (SIGNIFICANCE)
	ACCIDENT	NO ACCIDENT	
McGuire Safe-Driver Scale	9.598	9.841	t(168) = 0.680 ($p > 0.05$) n.s.
Rotter I-E Scale	4.76	5.53	t(153) = 1.628 ($p > 0.05$) n.s.
Authoritarian F-Scale	5.316	5.506	t(162) = 0.679 ($p > 0.05$) n.s.
16-P.F.: Stability Complex			
Mature/Childish	7.774	7.648	t(173) = 0.367 ($p > 0.05$) n.s.
Dominant/Submissive	5.821	4.663	t(174) = 3.488 ($p < 0.05$)
Trustful/Suspecting	6.440	6.301	t(175) = 0.489 ($p > 0.05$) n.s.
Confident/Insecure	4.965	5.187	t(174) = 0.761 ($p > 0.05$) n.s.

7.0 PART II - SPECIFICATION OF EDUCATIONAL OBJECTIVES AND MESSAGE CONTENT

7.1 Introduction

The planning of an educational program should conform to known principles of learning. One of the central principles for guiding the development of an educational program is the specification of the exact nature of the behavior desired on the part of the person(s) to be educated. The resulting educational intentions are referred to as objectives. They provide guidance for subsequent decisions to be made about 1) the selection of educational methods, 2) the means for implementing the methods, and 3) the content of the educational messages themselves. The work flow diagram for the specification of educational objectives, and subsequent message content, media, production methods and delivery systems is given in Figure 2.

Objectives for an educational program such as those proposed for this project require two different types. The first type consists of the "general educational objectives" which deal with the needs and urgencies of a given problem area. They focus on the ultimate goals for the educational program, such as the reduction of loading related boating accidents for the coming season. These objectives provide guidance for determining the parameters of the problem area, and structure a framework for formulating specific objectives used for actual instructional purposes. Discussion of general objectives for projects of this nature are typically presented in the introductory sections of reports where the purposes of the project are justified.

Operational or specific objectives are the second types of objectives. These are used to develop operational programs that implement the general goals of the project. There is much agreement in the educational literature that the statement of objectives for an operational program should be as specific as possible in the kinds of information that they include.

Convention suggests that the statement of operational educational objectives for a program be based upon the following kinds of information*:

- identification of the persons who are to be educated.
- specification of behaviors that will be used for instruction or learning purposes.

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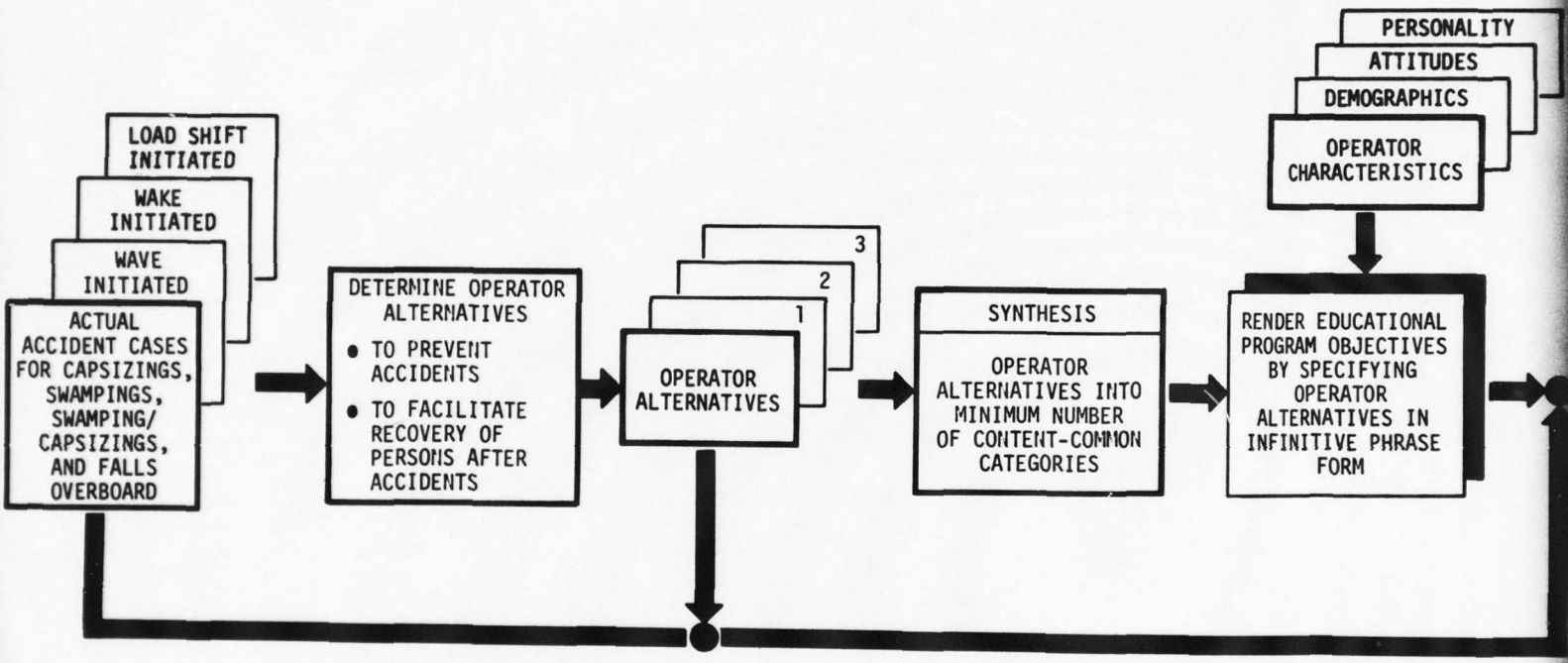
* Discussion of objectives for education is available in Kibler, R.J., D.J. Cegala, D.T. Miles, and L.L. Parker, Objectives for Instruction and Evaluation, Boston: Allyn and Bacon, Inc., 1974. (Reference 13)


LOAD SHIFT INITIATED
WAKE INITIATED
WAVE INITIATED
ACTUAL ACCIDENT CASES FOR CAPSIZINGS, SWAMPINGS, SWAMPING/ CAPSIZINGS, AND FALLS OVERBOARD
DETERMINE OPERATOR ALTERNATIVES
• TO PREVENT ACCIDENTS
• TO FACILITATE RECOVERY OF PERSONS AFTER ACCIDENTS
3
2
1
OPERATOR ALTERNATIVES
SYNTHESIS
OPERATOR ALTERNATIVES INTO MINIMUM NUMBER OF CONTENT-COMMON CATEGORIES
PERSONALITY
ATTITUDES
DEMOGRAPHICS
OPERATOR CHARACTERISTICS
RENDER EDUCATIONAL PROGRAM OBJECTIVES BY SPECIFYING OPERATOR ALTERNATIVES IN INFINITIVE PHRASE FORM

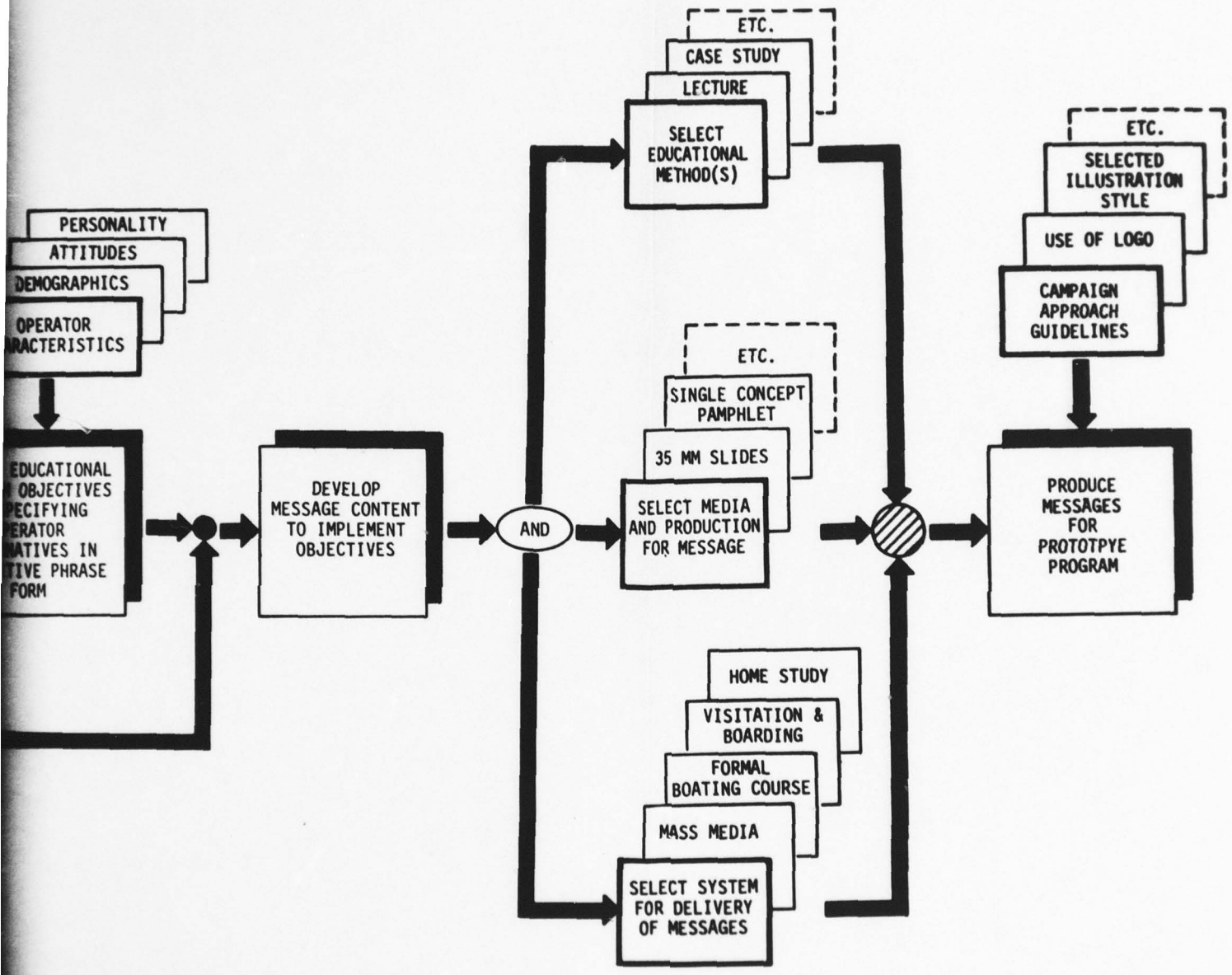


FIGURE 2. WORK FLOW DIAGRAM FOR DESIGNATING LOADING RELATED OBJECTIVES, MESSAGES, MEDIA, AND DELIVERY SYSTEMS

2

- specification of performance that will be expected of the persons after the operational program is discontinued, or when it must be applied in real life situations.
- identification of conditions within which the education will take place.

7.2 Method for Designating Educational Objectives

The preparation of educational objectives for the loading related accidents required two steps. First, all reports of boating accidents involving the previously identified primary loading related accident initiators were reviewed once again. The review was conducted by three persons, two of whom had extensive experience in conducting in-depth boat accident investigations, and one person who was readily qualified to assess operator behavior in accident situations. Each person working at this task received a booklet consisting of instructions for the task and a group of the reports of the boat accidents organized by accident type, e.g., "swampings caused by exceptional wave conditions." The persons were to read the report of each accident and to identify plausible operator decisions and/or actions that would have prevented the accident or reduced its severity within the conditions of the accident's occurrence. Then using a work sheet accompanying the booklet the persons wrote down the identification number for each accident and the corresponding alternative decisions or actions the operator could have employed. The instructions and a sample work sheet are presented in Appendix H.

The second step in the preparation of the educational objectives was reduction of the most frequently occurring actions and decision alternatives given for the accidents into a smaller number of more general statements. In effect, the method used was inductive in that the more specifically given operator alternatives were generalized into a few more comprehensive statements. Three persons with experience in content analysis procedures participated in these judgments (E. Sager [principal investigator], J. Berman, and J. Murray [consultants]).

An effort was made to identify two kinds of statements for each major accident initiator pertaining to how the accident could have been avoided and how resulting fatalities could have been prevented. The reduced statements from each group of operators were then rephrased to a form consistent with behavioral objective format, i.e., an "infinitive phrase." The phrasing for each objective specified identification of the persons being educated and the desired outcome of the educational effort. For example, the first objective for the loading related educational

program was: "To maximize boaters' alertness to exceptional wave and wake conditions relative to freeboard and stability of their boat."

The priority for defining the objectives was actual operator actions and decisions that interacted with the immediate weather/water conditions, or interacted with the stability characteristics of the boat itself to cause the accident or fatality. For this reason, the objectives specify the initiator or cause of the accidents, and are not worded in a way that identifies the type of accident or the outcome of the operator's behavior (such as capsizing). This approach proved to be a workable one and was supported during the analysis of operator alternatives to avoid the accidents or fatalities. In the process of reviewing each accident scenario, it became clear that the repetitions for operator alternative actions and judgments overlapped across wave and wake initiators, and across the four accident types (capsizing, swamping, swamping/capsizing, and falls overboard). Consequently, all operational objectives and message content were organized within two groups: waves/wakes and load shifts.

There are two advantages for preparing objectives in this way as opposed to formulating the objectives directly from the accident initiators without reference to the original scenarios. First, the accident initiators themselves are abstractions from the actual accident events. That is, the initiators are an interpretation of a group of accidents having a common set of causal characteristics. It is this attribute that permits the use of a cause identification tree for analyses of the accidents. However, it is apparent that each accident has its own set of unique characteristics not necessarily noted in the cause identification tree interpretation, such as particular circumstances or weather conditions. The inductive method employed allows for the potential of each of the unique characteristics to influence the formulation of the objectives.

The second advantage to the procedure used is that it provided valuable assistance in constructing the messages for implementing the objectives. The method produced an array of operater alternatives and circumstances taken from the accidents themselves rather than from "typical" scenarios based upon abstract cause identification trees. The result was a more direct message content that precisely addressed corresponding educational objectives.

7.3 Educational Objectives and Message Content for a Prototype Loading Related Accident Educational Program

Seven loading related educational objectives were produced by employing the content reduction procedure. Five objectives addressed avoidance of accidents; two objectives addressed recovery of all persons after an accident had occurred. Corresponding statements of message content were primarily developed using information from the actual accident scenarios, and from the array of operator alternatives used for the objectives.

The objectives and message content generated for the program are presented in Table 27. Note that the message content given in this table refers to the information necessary to implement the objectives and not to actual messages for dissemination. Production of messages for dissemination in the educational program required one or more productions to actually deliver the content of the messages to the recreational boaters in question. For example, in the first message given in the table, message content addressed four different informational items. Actual production of that information resulted in four separate production messages utilizing two formats in newspapers, a 35 mm slide show, and a single concept pamphlet.

TABLE 27. OPERATIONAL OBJECTIVES AND MESSAGE CONTENT FOR LOADING RELATED ACCIDENT PROGRAM

OBJECTIVES - ACCIDENT AVOIDANCE	MESSAGE CONTENT
Wave and Wake Initiators • To maximize boaters' alertness to exceptional wave and wake conditions relative to freeboard and stability of their boat.	• Content will be directed to identifying the nature of the loading related accidents initiated by waves or wakes including statistical outcomes of past accidents. This may take the form of indicating the boaters' chances of survival given national or regional statistics. However, the emphasis will be on ways in which the accidents can be avoided. Information will address: 1) alertness to exceptional wave or wake conditions, 2) attentiveness to water and weather conditions prior to and during boating, 3) instructions in ways to determine freeboard and stability of boat, and 4) rapid recognition of exceptional wave or wake conditions relative to the boat.
• To increase boaters' speed of reaction and precision of execution for maneuvers in reacting to exceptional wave and wake conditions.	• Content is to be directed to providing instruction on execution of adaptive maneuvers for quartering the bow of the boat into on-coming waves or wakes and for making the appropriate power settings, etc. Information will employ highly visual materials that are oriented to the boaters' perspective (in order that transfer from the message reception situation to the actual boating crisis situation is facilitated).
• To encourage boaters to determine the stability of their boat during safe shore side situations.	• Content is directed to manufacturers' means for determining stability for various boats. Emphasis here will be on safe and risk free ways the boaters can estimate the ways in which their boat will react under various water and wind conditions.

TABLE 27. OPERATIONAL OBJECTIVES AND MESSAGE CONTENT FOR LOADING RELATED ACCIDENT PROGRAM (Continued)

OBJECTIVES - ACCIDENT AVOIDANCE	MESSAGE CONTENT
Internal Load Shift Initiators • To inform boaters of appropriate ways in which to change from one position to another in a small boat.	• Content will address the nature of the loading related accident initiated by load shifts including seriousness of accidents caused by person's movement in the boat. Emphasis on instruction will be methods for thoughtful and skillful movement of persons within small recreational boats. Information will concern: 1) the effects of persons standing up on the small boat's roll stability with respect to raising the center of gravity, 2) loading of the boat to provide walkways on the longitudinal axis of the boat flooring for use while moving about in the boat, 3) providing ways in which a boater can determine how stability axes of his boat are influenced by various loading distributions and load amounts. The boaters will be encouraged to experiment with load distribution and load amounts (not to exceed those of capacity plate recommendations) to experience the actual margins and limits of the boat's stability.
• To encourage boaters to determine the stability dynamics of their own boats, and to limit the operation of their boat to limits well within the margins of safety.	• Content will be directed to identifying traditional methods for achieving stable and balanced loading of small recreational boats. Material covered will include: 1) aspects of boat stability, 2) recognition of the freeboard of the boat, 3) considerations for hoving anchor or retrieving objects from the water, 4) effects of center of gravity on roll stability, and 5) margins of safe loading according to effects on boat stability and according to limits given on capacity labels.

TABLE 27. OPERATIONAL OBJECTIVES AND MESSAGE CONTENT FOR LOADING RELATED ACCIDENT PROGRAM (Concluded)

OBJECTIVES - RECOVERY OF ALL PERSONS	MESSAGE CONTENT
All Initiators • To encourage thoughtful ownership and use of PFDs for the boater.	• Content will deal with the advantages and limitations of each type of PFD. These advantages and limitations will be specific to the use of the PFDs in terms of: 1) convenient and accessible stowage; 2) instructions for use and for donning PFDs; 3) encouragement of boaters to don their own PFDs in simulated crisis conditions; and 4) providing the boater with instructions as to how to determine if his boat has maximum, adequate, or insufficient PFD protection.
• To stimulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat.	• Content will deal with the advantages and dangers of remaining with a swamped or capsized boat after an accident. Specific information will be given for: 1) equipment to carry in order to signal for assistance, to provide handholds and additional flotation, etc., that will provide assistance for persons in the water who are remaining with the distressed vessel; 2) how to determine actual distance or best estimate distance from shore in the event that the stricken boat sinks or assistance is unavailable; 3) the deleterious effects of water temperature, wind conditions, and water conditions while in the water or attempting to swim to shore; 4) if attempt to swim for shore is made, to take some form of flotation on the trip; and 5) the need to have a rehearsed plan of response to a loading related accident.

8.0 PART III - PRODUCTION AND CONSIDERATIONS FOR DISSEMINATION OF PROTOTYPE EDUCATIONAL PROGRAM

8.1 Selection of Educational Materials (Media and Production) and Delivery Systems for Developing and Disseminating Messages

The materials and delivery systems selected for implementing the educational objectives were based upon the known performance characteristics for the choices made in previous advertising and public service campaign efforts. Because each objective and the corresponding message content had their own unique requirements for execution, each had to be separately evaluated. Each objective and corresponding content was evaluated according to four areas of judgment. Evaluation was made by E. Sager (principal investigator), J. Berman, and J. Murray (consultants). These judgmental areas included:

- the complexity or nature of information to be communicated in the respective message(s)
- the identity of the group of boaters who would most benefit from the message(s)
- the specific environment in which the messages were to be received, e.g., in a formal boating class, or at home watching television
- cost of production, broadcast, or publication

8.2 Resources for Delivering the Educational Program to the Recreational Boater Public

Recommendations for delivering the educational program to boaters are the result of several alternatives. These alternatives by which an operational program is executed are identified in three general groups:

1. educational methods (i.e., lecture, conference or group discussion, case study, role playing, simulation - games, structured experience [laboratory training], and programmed instruction [programmed learning])
2. media and productions of messages (i.e., television spots, radio spots, pamphlets, newspapers, magazine articles, outdoor advertising, and advertising specialties
3. systems for delivery of the program (i.e., mass media - print and electronic, formal boating courses - USCG Auxiliary and Power Squadron, USCG visitation and vessel boarding, and home study materials for the boater)

The interdependency of the educational methods, media and production messages, and delivery systems is apparent in the logic of the following statement about educational materials:

> The mass media (delivery system) is utilized when a television spot (media and message) announces the conduct of a formal boating course (delivery system). In one evening class, a 35 mm slide show on navigation lights (media and message) is used to support the lecture (educational method) on the display and recognition of navigation lights. Programmed learning materials (educational method) given out for use after the completion of the course (home study delivery system) provide boaters with an on-going educational resource.

The various media and message production alternatives for delivery of a boater educational program are presented in the following section. They are organized within the various delivery systems. All reasonable media for use in an extensive boater educational program are given. However, the specific educational material suggested in the loading related accident educational program do not make exhaustive use of these alternatives. Instead, media, production messages, and delivery systems were selected in order to recommend an educational program of reasonable magnitude.

8.2.1 Delivery System 1 - Utilization of Mass Media (Print and Electronic Format)

The use of mass media is directed to two principle purposes: instruction, and announcements concerning the availability of additional instructional information, such as the dates and time for conduct of a local Power Squadron Course. Media and productions which can be used are presented below in a brief, tabular format.

Pamphlets: consisting of single concept pamphlets dealing with aspects of loading related accidents, and factors associated with high risk for all accidents; materials are instructional in nature; provide factual information about boating, and suggest ways to increase one's skill in competent operation of boats. Distribution of the series of pamphlets could be accomplished by eight different means:

1. point of purchase displays at boating supply stores, beverage stores in geographic areas where recreational boating is extensive, and at fishing bait shops or hunting supply stores.

2. to accompany registration materials for boat licensing, fishing licensing, and hunting licensing; banks granting boat loans.

3. USCG Booth for display at Boating Trade Shows or boating competition events.

4. to accompany insurance policies that are purchased for boats.

5. to be distributed at boating and yachting clubs; boating and sailing schools.

6. direct mail sent to a sample of boaters; individual persons receiving materials are chosen from subscriber lists of boating magazines.

7. to be sent on request to individual boaters by USCG.

8. materials distributed within formal boating courses such as USCG Auxiliary, Power Squadron, Red Cross, Boy Scouts, etc.

Newspapers: consisting of a variety of printed materials some of which are instructional and some of which are intended only to remind boaters of prior instruction, or of the availability of additional instructional information. Seven alternative uses of the newspaper medium are possible:

1. information is sent intermittently to staff columnists who prepare a regular boating column; staff columnist interprets the message and supports the educational program for reduction of loading related accidents; staff columnist is encouraged to follow guidelines for the basic approach and style adopted for the overall educational program.

2. advertising space is purchased for repetitive single concept materials; purpose is to stimulate recall of prior messages from the overall educational program; sports section is preferred.

3. filler material is prepared by educational program specialists, and is submitted to various newspapers in high boating accident areas; this material is published wnen space is available; "filler" information is both instructional and repetitive in nature.

4. press release intermittently given to local sports editors dealing with the running and progress of the educational program; to identify the program and keep it in the forefront of boaters' awareness.

5. "magazine" supplement inserted in Thursday's daily newspaper on a one time or serial basis per boating season; supplement consists of two or three critical loading related concepts in programmed instruction format, highly visual in implementation, with recreational tone.

6. develop or encourage adaptation of a personal experience column to appear weekly in sports sections; message content stresses personal accounts of near or close calls with detailed reiteration of effective actions and decisions that prevented fatalities, injuries, or serious accident. The potential for personal experience as a vehicle for education is explored in the attitude study reported in Section 6.1 of this report.

7. develop or refine a "question and answer" formal *feature* that focuses upon loading related accidents; emphasis should be on regional rather than local boating to enable the presentation of several genuine questions per feature.

Magazines: consisting of a variety of printed materials some of which are instructional, some of which are intended to remind boaters of prior instruction, and some of which identify the availability of instructional information. At least five alternatives are possible:

1. provide short features in dealer oriented magazines (e.g., Boat and Motor Dealer, and The Boating Industry) identifying the new educational effort including the intentions and methods; provide useable information to be passed on to customers.

2. Insert instructional features in major airline passenger magazines; content may be modified programmed instruction in form and method (e.g., Sky for United Airlines and Airways for Delta Airlines).

3. purchase advertising space for repetition of prior educational messages as in newspaper utilization.

4. develop or encourage adaptation of existing "question and answer" features in magazines oriented toward the boating consumer, as in newspaper utilization; information should encourage use of sound boating practices and procedures.

5. develop features on personal experience, some of which might be taken from files of BARs with appropriate "masking" identification of actual persons involved; as in newspaper utilization.

Outdoor Advertising: consisting of purchase of several 24 and/or 30 sheet poster panel buys*; purchased poster panels should be located on roadways in higher boating accident areas; exposure should be during boating season; designed for initiating recall of prior educational messages.

Transit Advertising: consisting of purchase of poster panels for vehicles such as commuter buses and trains; panel design is identical to that for outdoor advertising poster panels: intended to elicit recall of prior educational messages.

Television: consisting of a variety of information, some of which concerns announcements about instructional opportunities (e.g., USCG Auxiliary or Power Squadron boating courses); some of which are actually instructional; and some of which are for initiating recall of previously learned material only (reminders):

1. a series of instructional spot messages, each of which is single concept in scope and intent; time length 30 seconds each; messages are professionally produced and shown as public service announcements (PSAs).

2. a series of animated logos designed to accompany and complement instructional television and printed information; these are intended for local use, to be "tagged" by local boating organizations; "voice-overs" or the audio track can be made in the local station, and they should be shown during station break times as PSAs; maximum time length, 10 seconds.

3. press releases given intermittently to local sports reports concerning the running and progress of the educational program; releases are timed to coincide with accelerations of print media distribution, with showings of 30 second spot messages, and with announcements about the conduct of formal boating courses.

Radio: consisting of spot announcements about instructional opportunities (e.g., Coast Guard Auxiliary or Power Squadron boating courses) and reminders of key points for recall of prior educational messages; each message is single concept in scope and intent; time lengths are 10 seconds and 30 seconds; messages are professionally produced and nationally distributed.

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* Single panel buys placed strategically along highways are an alternative to group purchases involving several panels. For the usual group purchases the messages are intended to reach a more general population than the recreational boater, and several panels are placed to saturate a given neighborhood or area.

Pamphlets: consisting of the same series of single concept pamphlets used for printed mass media distribution; the complete set of pamphlets should be distributed or made available during the conduct of the boating course.

Moving Picture Films: consisting of two approaches for use of films in boating instruction: 1) one or two 16 mm films approximately 20 minutes in length;* each film deals with a single concept that addresses loading related accidents; each film is to be professionally produced by a company with extensive experience in training films; prints of the film are to be made available to various Power Squadron courses, USCG Auxiliary courses, etc., on a regular basis (at their request) so that course units can be planned around their use; 2) encouragement of local course instructors to experiment with Super 8 regular film or cassette cartridge film for presenting localized information visually; Super 8 film on reels or in cartridges can be purchased fairly reasonably at bulk purchasing rates; planning and shooting instructional manuals are available (Reference 14). Super 8 cameras and projectors are readily available for use from members of the organizations sponsoring the courses (see the Hope Reports on camera and video equipment purchased by various segments of the national population, Reference 15).

35 mm Slide Presentations: consisting of a series of single concept slide shows of about 40 slides each; intent of the slide shows is threefold: to conduct instruction for complex informational materials, to develop desirable attitudes toward competent operation of boats, and to present alternatives for developing of skill for competent operation of boats; it is recommended that three versions of each show be prepared by a professional production house; shows are to be circulated among local organizations sponsoring boating courses at their request; use of each show is to provide high quality visual instructional materials to supplement conventional lectures used in various course units; the alternative versions for the slide shows are:

1. 40 slides consisting of photographic and special title/graphic slides in carousel magazine; magazines are not sealed so the sponsoring boating organization can put in their own identification slide for the presentation ("tag" slide); with "tone cueing" from accompanying audio cassettes; audio supplemental message is provided and no participation is required on the part of the course instructor to show the slides.

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* Twenty minutes of time when students are not directly interacting with the class instructor should not seriously detract from the student's concentration on material presented in the continuation of lecture.

2. 40 slides prepared as above; audio supplemental message is provided on cassette tape and is accompanied by printed script; course instructor is required to follow along with the audio track and to manually advance slides at appropriate times indicated on printed script.

3. 40 slides prepared as above, distributed with suggested printed script only; instructor is required to deliver verbal information in lecture and to manually advance slides at appropriate times.

Video Tape Recording (VTR): one 30 minute tape each consisting of instructor briefing for the presentation of the instructional unit (one evening's presentation), and including a review of all materials for the unit; information included on the tape recommends how to best structure the evening's activities, how to present the various visual aids, options available for the unit (developed for the loading related educational program), and how to maximize class members' participation; VTRs are professionally produced and distributed to local organizations sponsoring regular boating courses *at their request;* VTR format recommended in 1/2 inch tape for use on widely available Sony 3600 series VTR playback units; additional information on how to present course units and various resources for assistance is presented in Tasks III and IV, "Methods for Education" and "Mass Media Alternatives," respectively, in the Final Report for Educational Alternatives for Boating Safety Programs, 1977.

8.2.3 Delivery System 3 - Utilization of Visitation and Vessel Boarding Programs

The same basic instructional and audio/visual materials should be made available during formal lectures at school visits, at special events such as regatas, or at special workshops given by Universities, boating clubs, etc.

Pamphlets: consisting of the same series of single concept pamphlets used for mass media distribution, and "in class" distribution; in this delivery system, pamphlets are to be selectively distributed, i.e., instructional content for the particular pamphlets given out should reflect locally frequent accidents or should relate to the intentions of the visitation or boarding.

Advertising Specialties: consisting of an assortment of selected items; as a representative sample, the following were designed for the prototype loading related safety program:

1. floating key chains with an imprint of the small boat - runabout - education logo;* one version of the key chain also includes the reminder to "Stay With It" referring to resourceful thinking during a swamping or capsizing; identification of the floating characteristic of the key chain with resourceful survival strategies following an accident is intended.

2. imprints of the logos are suggested for accessories likely to accompany drinking of alcoholic beverages aboard the boat (e.g., resealable bottle caps); (this strategy has precedent in some of the more progressive traffic highway safety programs); the intention here is to remind the boater that he is obligated to use alcohol in moderation, if at all, while operating his craft.

3. first aid kits and bandage dispensers imprinted with various education topical logos; the association of the educational program directly with safety related equipment and concepts is recommended; in the present program this has been done in a way that demonstrates the intentions of the program go beyond safety and first aid.

4. the production of highly reflective materials such as logo stickers; they offer great flexibility for use by boaters and can be related to several messages in the educational program; when fastened to equipment like oars, paddles, bailers, etc., these stickers facilitate locating the items in the dark; the assistance provided in locating certain items in the aftermath of an accident might help the boater to stabilize the crisis situation.

5. pencil clips endorsed with the assortment of educational program logos; they assist in identifying the broad scope of the educational program; in fact no recreational boater is beyond the intentions of this program regardless of his experience or the size of his boat; the pencil clips are intended for use on larger craft where course plotting is required or where fuel consumption must be carefully calculated.

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* See Section 8.4 for specifications for use of educational program logos; also see Appendix I-1 for a presentation of illustrative program logos.

8.2.4 Delivery System 4 - Utilization of Home Study

The development of a systematic home study plan consists of a series of materials designed to complement other delivery systems. The materials should include the following items:

1. single concept pamphlets should be a separate series adapted for home study use
2. programmed learning texts or magazine inserts in newspapers (see Mass Media Delivery Systems)
3. conventional television programming using approach employed in the "National Boating Test" sponsored by Johnson Outboard Motor Co., or local television station production of various accident related aspects of boating in a local area.

8.3 Illustrative Loading Related Educational Program

Various alternatives available for production were selected for use in the development of the prototype educational program. The selected media and production messages, and the selected delivery system are presented in tabular form in Table 28. They are presented with the corresponding educational objectives for the loading related program. As was stated earlier, production messages are the executions of message content specified in Table 27. The rationale for selections made concerning the media and delivery system are also in tabular form, and are presented in Table 29.

TABLE 28. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR LOADING RELATED ACCIDENT PROGRAM

OBJECTIVES - ACCIDENT AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
Wave and Wake Initiators		
• To maximize boaters' alertness to exceptional wave and wake conditions relative to freeboard and stability of their boat.	1) Newspaper Boating Column: give press kit or information to established boating columnists (1200 regular or seasonal columns available).	• Print Mass Media
	2) Newspaper Filler consisting of short items in completed form.	
	3) 35 mm Slide Show on boat stability (roll): will include theory for hull design and righting arm; insert spaces for slides of boats having the various hull designs and types of boats in the local area (inserted by local class instructors).	• Formal Boating Course (USCG Auxiliary, etc.)
	4) (Optional) Single Concept Pamphlet for each type of hull (will include photos from the slide show) and serve as take home material from class.	• Formal Boating Course • Home Study

TABLE 28. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR LOADING RELATED ACCIDENT PROGRAM (Continued)

OBJECTIVES - ACCIDENT AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
Wave and Wake Initiators, con't.		
• To increase boaters' speed of reaction and precision of execution for maneuvers in reacting to exceptional waves and wake conditions.	1) 35 mm Slide Show and/or 16 mm Film 2) Magazine Features* published in boating, fishing, or hunting magazines; also airline magazines	• Formal Boating Course • Print Mass Media
• To encourage boaters to determine the stability of their boat during safe shore side situations.	1) Television Spot (10 sec.) using computer animation with locally produced audio track and tag* 2) Newspaper Boating Columnists: give press kit or information to established boating columnists 3) Magazine, or 4) Single concept pamphlet	• Electronic and Print Mass Media • Mass Media Point of Purchase Display; Formal Boating Course, Home Study
• To inform boaters of appropriate ways in which to change from one position to another in a small boat.	1) Newspaper Insert: Sunday supplement format in newspaper delivered on Thursday; home study course in serial or complete form; combination of programmed instruction; case study	• Home Study <u>via</u> mass media

* An illustrative production message was completed for this project. See Video Tape Supplement for the Education Alternatives for Boating Safety Programs Final Report and the repository of materials.

TABLE 28. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR LOADING RELATED ACCIDENT PROGRAM (Continued)

OBJECTIVES - ACCIDENT AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
Wave and Wake Initiators, concl'd. • To encourage boaters to determine the stability dynamics of their own boat, and to limit the operation of their boat to limits well within the margins of safety.	1) Single Concept Pamphlet* (very basic orientation)	• Print Mass Media - distribute at point of purchase display; • Formal Boating Course
OBJECTIVES - RECOVERY OF ALL PERSONS		
All Initiators • To encourage thoughtful ownership and use of PFDs for the boater.	1) Magazine Feature: state-of-the-art on PFDs published in boating enthusiast magazines* 2) Outdoor Advertising 3) Television Spot (10 sec.) using computer animation with locally produced audio track and tag*	• Electronic and Print Mass Media
• To stimulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat.	1) Super 8 mm (local productions by boating course instructor)* 2) Script given to local TV station for production using their facilities; includes information from special press kit	• Formal Boating Course • Print Mass Media

* An illustrative production message was completed for this project. See Video Tape Supplement for the Education Alternatives for Boating Safety Programs Final Report and the repository of materials.

TABLE 28. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR LOADING RELATED ACCIDENT PROGRAM (Concluded)

OBJECTIVES - RECOVERY OF ALL PERSONS	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
All Initiators, concl'd.	3) Radio Spot * (30 sec.) 4) Outdoor Advertising* 5) Television Spot (10 sec.) Computer Animation	

* An illustrative production message was completed for this project. See Video Tape Supplement for the Education Alternatives for Boating Safety Programs Final Report and the repository of materials.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS

OBJECTIVES - ACCIDENT AVOIDANCE	SELECTION RATIONALE
Wave and Wake Initiators • To maximize boaters' alertness to exceptional wave and wake conditions relative to freeboard and stability of their boat.	1) Newspaper Boating Column and Filler Press Kits • Information should be localized since weather and conditions differ in various locales; wave conditions or turbulent water often are locally variable and recognition can be made upon unique local methods; can use credibility of an established boating column or staff writer to reinforce need for alertness and give locally acceptable instructions about recognition of exceptional conditions, etc. • More than 80% of all non-advertising content in newspapers originates with the news source itself; there are more than 1200 boating columns appearing in newspapers either regularly throughout the year, or seasonally. • Cost is only for preparation of press kits. • Media survey reported in the Education Alternatives for Boating Safety Program Final Report confirms high newspaper usage by boaters. 2) 35 mm Slide Show for Formal Boating Course • Information about boat stability is fairly difficult and requires an active lecture with possible group discussion for best instruction; slides offer effective visual support if professionally prepared. • Class environment is confined and has concentrated time allotted for learning (necessary for difficult/complex information). • The slide presentation with accompanying script should offer substantial content to a boating course; the information should be of use to boaters for selecting boats that are suited to their needs, and for judging stability characteristics.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - ACCIDENT AVOIDANCE	SELECTION RATIONALE
	• Cost will not be prohibitive, about $2,000 to $3,000 to produce each show including a script for lecturer.
• To increase boaters' speed of reaction and precision of execution for maneuvers in reacting to exceptional wave and wake conditions.	1) Single Concept Pamphlet • An alternative to a structured in-class setting. • Offer good potential for learning difficult information about boat stability but lacks ways to motivate boaters to learn (tends to be a more passive media than active lecture or group discussion, etc.). • Pamphlet format can be made part of a series of pamphlets offered; boaters would be encouraged to continue home study using the complete series of pamphlets. • It is absolutely essential that these pamphlets are prepared by experienced professionals; consequently, cost will be notably higher than for present pamphlets in "Coast Guard" series. 2) 35 mm Slide Show and/or 16 mm Film for Formal Boating Course • See previous 35 mm Slide Show rationale. • If 16 mm film is used, cost will be fairly high (12,000 or more); either media must be professionally produced. • Since the message content specifies instruction on adaptive maneuvers, a conventional training film approach should be taken. • If the film was done in such a way that it could be shown without prior instruction and qualification, it might be appropriate to show film at USCG visitations. NOTE: care should be taken not to get "premature closure" on the film for the public by overexposure and thereby reduce its effectiveness.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - ACCIDENT AVOIDANCE	SELECTION RATIONALE
• To encourage boaters to determine the stability of their boat during safe shore side situations.	1) Magazine Features published in boating, fishing, or hunting magazines; also airline magazines • This version of the print mass media offers excellent potential for reaching the segment of boaters who do not identify themselves as such, but rather consider themselves hunters and/or fishermen. • Cost is moderate in that feature articles can be professionally prepared for less than $1,000. Publication is dependent upon policy of the various magazines. • Use of airline magazines provides some print media access to the boaters who are not sufficient enthusiasts to read boating magazines. 2) Television Spot (10 seconds) using computer animation for video, and either USCG or local audio track. • Message should introduce awareness on boater's part of the importance of knowing capabilities of his boat prior to an emergency; procedures for determining the stability characteristics are disseminated in print media or in formal boating classes. • Computer animations are sufficiently attractive that they should receive prime time access as PSAs, i.e., TV stations will be likely to use them at times when large audiences are viewing programs. 3) Magazine or Single Concept Pamphlet • Magazine article on how to assess stability of a boat in a safe, competent way provides materials for home study and at the marina, etc. • Single concept pamphlet on same subject provides material for use in formal boating courses or for home study. • Cost considerations are same as in prior discussion of pamphlets.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (Continued)

OBJECTIVES - ACCIDENT AVOIDANCE	SELECTION RATIONALE
• To inform boaters of appropriate ways in which to change from one position to another in a small boat.	1) Newspaper Insert in form of a Sunday Supplement • Conveys recreational weekend feel but is disseminated during time when weekend activities are being planned. Study time is available before the weekend. • Addresses all persons in the boating family; this objective and messages are best directed to all persons in the boat rather than just the operator since any person can inadvertently initiate an accident by inappropriate movement. • Cost is moderate in that the insert can be professionally prepared for about $1,000 and printed in inexpensive newspaper quality stock. • Programmed instruction methods ensure maximum learning for printed media format.
• To encourage boaters to determine the stability of their own boat, and to limit the operation of their boat to limits well within the margins of safety.	1) Single Concept Pamphlet • Since message content is basic and directed primarily to the first-time boat owner, this production needs great flexibility for its distribution: point of purchase display (where the boat was purchased), where it is licensed, or at formal boating courses. • Pamphlet format can be made part of a series of pamphlets offered; boaters would be encouraged to continue home study using the complete series of pamphlets. • It is absolutely essential that these pamphlets are prepared by experienced professionals; consequently, cost will be notably higher than for other "CG" series pamphlets.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
• To encourage thoughtful ownership and use of PFDs for the boater.	1) Magazine Feature • This print mass media message offers good potential to inform the committed boating enthusiast about current issues and developments in PFD research, including availability and effectiveness; media survey reported in the Education Alternatives for Boating Safety Programs Final Report indicates that "informed boaters" are excellent sources for disseminating information It is likely that an article about PFDs targeted to less informed and less committed boaters would have not had the effectiveness of the informed opinions of a first hand knowledgeable person. • See other rationale for magazines covering cost, production, and publication.
• To stimulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat.	1) Outdoor Advertising • Will keep PFD ownership and use at forefront of boating public's awareness. • Cost is relatively small for a single panel buy at approximately $200 per month. Art work and printing of panels is approximately $200. 2) Television Spot (10 sec.) using computer animation for video and either national or local copy for audio tracks • Computer animation should get prime time access as PSAs. • Will keep PFD ownership and use at forefront of boating public's awareness. • May interest local boating clubs in sponsoring the preparation of the audio tracks, perhaps using a local broadcasting personality; since the message is clearly public service and in the interest of all boaters, there would be good public relations value in participation in the spot.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
	3) Super 8 mm (local production by boating course instructor) • No cost to USCG other than encouragement/incentive to boating organizations offering formal boating courses. • Local production is necessary since water temperature, boating traffic, maximum distances from shore, etc. vary locally. Super 8 can offer an interesting visual supplement to a very important message in the educational program. 4) Script given to Local TV Station for production using their facilities • Script and accompanying press kit should be prepared by professional agency with experience in boating and TV production; consequently, cost for script alone will be fairly high. Production and broadcasting are not to be financial concern for USCG other than to provide the technical information and incentive. • Local emphasis to message can be achieved; familiar terrain and shoreline can be used to create interest value and more important, to facilitate boaters' ability to use the message during a crisis in the water (familiarity increases transfer of information from the message to the opportunity for its use. 5) Radio Spot (10 and 30 seconds) • Cost: can be broadcast as PSAs; inexpensive to produce. • Will disseminate message to boater while enroute to the outing, or will reach boater while actually on the water.

TABLE 29. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (concluded)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
	6) Outdoor Advertising • Will disseminate message to boater and others in the boating party enroute to the outing. • Cost: see previous discussion. • Can be coordinated easily with complementary radio PSAs to add to overall effectiveness. 7) Television Spot (10 seconds) • Computer animation ensures prime time access as a PSA. • Can announce the offering of a boating course where messages will be disseminated by instructors in class. • Can keep thoughtful alternatives at forefront of boating public's awareness. 8) Advertising Specialties (*floating key chains and reflective stickers of the educational program logos*) • Floating key chains can communicate (subtly) the safety that is available by using flotation during the aftermath of a boating accident. • After an accident, reflective stickers may remind boaters of prior instruction on how to stabilize the situation and how to proceed with rescue (in the moments of collecting floating objects, etc.); in addition, the reflective surface may facilitate recovery of items in the darkness or speed the location of the distressed party by another rescue boat.

8.4 Coordination of Production and Dissemination of Loading Related Educational Materials

The planning, production, and delivery of the educational messages require disciplined coordination if they are to be effective. This coordination is on three levels, systematic planning of content for the educational program using rigorous research methods to identify the exact intentions and scope of the program, the production of educational messages themselves which are tied into a common educational program using conventional strategies for that purpose, and the delivery of the messages which are timed according to requirements specified in the overall educational program.

The planning of content for the educational program is reported in depth in the first section of this report. In this project coordination of the production for the illustrative educational messages was accomplished by adhering to well defined guidelines. It was requested that all contractors producing messages conform to production specifications for this plan and whenever time permitted, these specifications were rigorously enforced. The intent of these guidelines was to achieve continuity among messages so that they would be perceived by boaters as related to the same comprehensive educational program. It is the collective or cumulative effect of these messages that produces the major effectiveness of this program. The production guidelines actually given to the participating contractors are as follows:*

1) All messages are to reflect the combined tone of recreational quality and authenticity of content and sources.

2) Use similar illustration style and photography style. (Samples of illustrations, drawn by a commercial artist were prepared early in the program.) Photograpns are to reflect an orientation of vicarious participation in the action wherever possible; i.e., photos should be shot from audiences' "point of view."

3) Use similar type fonts where possible; the preferred type fonts were optima and garamond.

* There is always a problem of enforcement of these kinds of guidelines. It is suggested that the administrator of the educational program provide this information to the contractor at the onset of the production, and maintain sufficient contact during the production period that necessary revisions in the production are kept inconsequentially small.

AD-A069 117 WYLE LABS HUNTSVILLE ALA F/G 13/10
PLEASURE BOAT LOADING RELATED ACCIDENT EDUCATION.(U)
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UNCLASSIFIED MSR-78-09 USCG-D-52-78 NL

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4) Use similar paragraphing and copy styles for both print and electronic media; paragraphing is to be short and well defined in order to invite reading; extensive use of titles or headings was recommended; copy style is to use repetition and question/answer format where content and media permitted. Two repetitive devices were recommended:

"As a boater ..." initiating paragraphs
"Remember ..." initiating reiterated materials.

5) Use the educational program graphic symbols (logos).

6) Use the educational program colors (international orange, blue, and white) on covers for pamphlets, in illustrations, in photographs, on advertising specialities, etc.

7) All messages were to be consistent with the theme of the educational program, i.e.:

It was emphasized and strictly enforced that the production messages did not make direct reference to boating safety. Rather, contractors were to make references to competent seamanship, knowledgeability, and boater expertness and skill. It was taken that a boater who is knowledgeable and skilled will be the more competent operator and less likely to be involved in an accident. Further, this boater is more likely to survive an accident if it does happen, and to facilitate the survival of others.

The coordination of timing for an actual educational program is suggested where two or more messages are to be disseminated at complementary times. Other timing would be suggested by accident statistics, boating events that attract attention in and of themselves, and by USCG policy and judgment. Since no messages in this project were actually delivered, emphasis was on the research and production of prototype messages rather than on aspects of program coordination.

8.5 Production of Prototype Messages

Several messages were produced as illustrative educational materials. In some cases, these are exemplary, in others, they should be revised or redone if actually used. Since the work of production was accomplished by 10 different contractors in only six months, quality for the finished program was obviously going to vary. In some cases, preferred production contractors could not be used because of the time demands for finishing this project. Critiques of the materials are not available; however, those materials of sufficient quality for broadcasting or publishing are readily identifiable. It should be noted that as a general rule the younger artists, animators and writers used for the program proved to be easy to work with, produced excellent quality work, and priced their work moderately.

The messages included for the illustrative production were chosen to provide an assortment of media, educational methods, and production format for this project (and in conjuction with the collision education project). An itemization of the materials prepared for the loading related educational program and the producing contractors is given in Table 30.

Most of the prototype production materials are available for inspection and study. They are also "showcased" in the context of an actual educational program in the video tape supplement to the Educational Alternatives for Boating Safety Programs report. It should be noted that the programs presented in this loading related accident education report, in the Pleasure Boat Collision Education report and in the Educational Alternatives for Boating Safety Programs report are one and the same program, and are recommended as a comprehensive USCG effort. However, any participation on the part of state or local agencies or private organizations in an actual operational educational program would be strictly voluntary. The intentions of the recommended program are to provide the best possible resources for conducting a nationwide boating educational program that is designed to reduce loading related and collision boating accidents and fatalities. Excepting the obvious mass media production, these resources are to circulate among persons and organizations interested in conducting local educational programs (only at their request). Mass media efforts can be initiated on the part of the Coast Guard without any notable interference with local or private educational programs. In addition, the mass media should have the effect of generating local interest in participating actively in the educational program.

TABLE 30. EDUCATIONAL MATERIALS PRODUCED FOR THE LOADING RELATED ACCIDENT EDUCATIONAL PROGRAM WITH PARTICIPATING CONTRACTORS

PRODUCTION	CONTRACTORS
Graphic symbols (logos) See Appendix I-1	Porter Smith-Thayer/Porter Graphics 14-1/2 S. Court Street, Athens, OH 45701
Single concept pamphlet "Small Boat Stability" for the fifth objective in Table 1 See Appendix I-2.	Written by B. Hayes and J. Murray (consultant) Ohio University, Athens, OH 45701 Printed by Union Press Inc., 17 W. Washington St., Athens, OH 45701
(2) 10 second Television spots using computer animation logo. See Appendix I-3 for script; video tapes (2 in. and 3/4 in.) are on file.	Written by E. Sager Produced by Computer Image Corporation (2475 West Second St., Suite 4, Denver, CO 80223) with P. Zimmerman, D. Holman, J. Berman (consultant) (Ohio University, Athens, OH 45701), and E. Sager
Radio spots to be coordinated with outdoor advertising. See Appendix I-4 for script; audio tapes are on file	Written and read by J. Kell at WAAY radio, 1015 Country Rd., Huntsville, AL 35804
Outdoor Advertising artwork for 2 panels. See video tape supplement to the Educational Alternatives for Boating Safety Program Final Report	D. Jennings, Creative Display, Inc. (301 Pratt Ave., Huntsville, AL 35804) and W. Johnson, WAAY Radio (1015 Country Rd., Huntsville, AL 35804)
Super 8 mm film (actually produced in 16 mm to insure sufficient quality for video tape for supplement to the final report for Educational Alternatives for Boating Safety Program. See Appendix I-5 for script; film is on file.	Written by J. Bowman, Filmed by Arbus Films (8005 Navios Drive., Huntsville, AL 35802) and Wyle Laboratories, Huntsville facility.
Advertising specialities (including those selected for collision education). See Appendix I-6 and video tape supplement for the Educational Alternatives for Boating Safety Program	The Riley Company (925 Henderson Rd. NW, Huntsville, AL 35805) and Pro Screen Company (1310 Buford St., P. O. Box 3374 Huntsville, AL 35810

TABLE 30. EDUCATIONAL MATERIALS PRODUCED FOR THE LOADING RELATED ACCIDENT EDUCATIONAL PROGRAM WITH PARTICIPATING CONTRACTORS, Concluded

PRODUCTION	CONTRACTORS
Newspaper Supplement Insert. See Appendix I-7 for copy only; "paste-up" is on file.	F. Ainsworth, Outdoor Empire Publishing (511 Eastlake Avenue, E., P. O. Box C-19000, Seattle, WA 98109
Newspaper Filler. See Appendix I-8.	J. Murray (Ohio University, Athens, OH 45701) with E. Sager
Magazine feature on PFD ownership and use. See Appendix I-9 for copy only; "paste-up" is on file.	F. Ainsworth, Outdoor Empire Publishing (511 Eastlake Ave. E., P. O. Box C-19000, Seattle, WA 98109)
Magazine feature on adaptive maneuvers for hunting and fishing sportsmen. See Appendix I-10 for copy only; "paste-up" is on file.	F. Ainsworth, Outdoor Empire Publishing (511 Eastlake Ave. E., P. O. Box C-19000, Seattle, WA 98109)

REFERENCES

1. Lancaster, G., C. Stiehl, T. Doll, and R. MacNeill, Recreational Boat Safe Loading-Operator Study. Final Report. Wyle Laboratories for the U.S. Coast Guard. October 1976.

2. Wulfsberg, R.M. and D.A.Lang, Recreational Boating in the Continental United States in 1973: The Nationwide Boating Survey . Final Report to the U.S. Coast Guard. October 1974, NTIS No. AD-A000 471.

3. Crow, E.L., F.A. Davis, and M.W. Maxfield. Statistics Manual. U.S. Naval Ordnance Test Station, NAVORD Report 3369-NOTS948. Republished, New York: Dover Publishing Inc., 1960.

4. Clevenger, T., Audience Analysis. New York: The Bobbs-Merrill Company, 1966, p.43.

5. Zimbardo, P. and E. Ebbesen, Influencing Attitudes and Changing Behavior. Reading, Mass.: Addison-Wesley Publishing, 1969, pp. 6-8.

6. Allport, G.W., Becoming. New Haven: Yale University Press, 1955.

7. Horrocks, J.E., Assessment of Behavior. Columbus, Ohio: Chas. E. Merrill Books, Inc., 1964, p.493.

8. Hovland, J. and I.L.Janis (eds.), Personality and Persuasibility. New Haven: Yale University Press, 1959, p.69.

9. McGuire, F.L., Methodological and Psycho-Social Variables in Accident Research. Los Angeles: University of California Press, 1971.

10. Rotter, J.B., "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs. 1966, 80, Whole No. 609, pp.1-8.

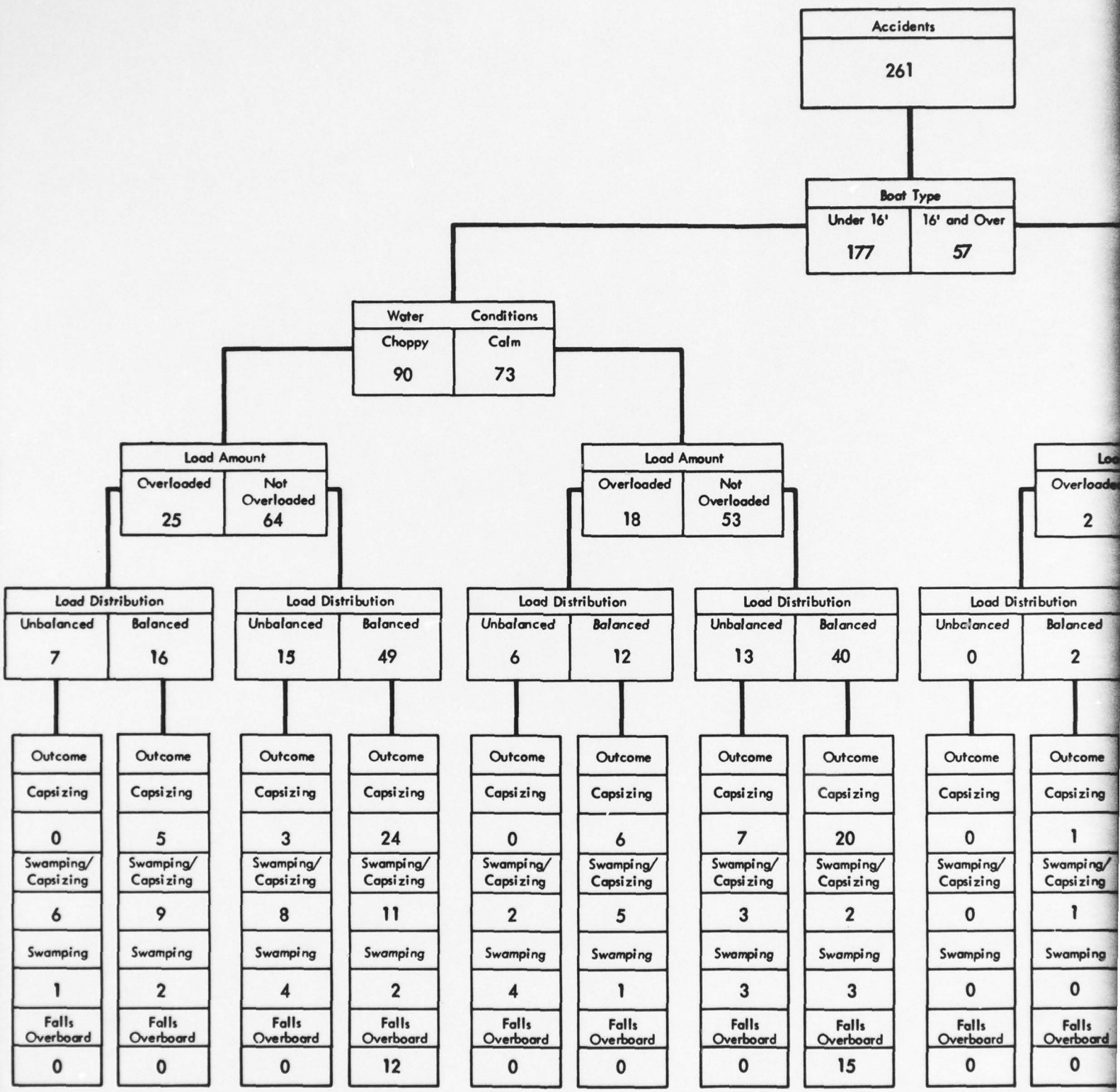
11. Berkowitz, N.W. and G.H.Wolkon, "A Forced Choice Form for the F Scale - Free of Acquiescent Response Set," Sociometry. 1964. pp. 27,54-65.

12. Robinson, J.P., R.Athanasiou, and K.B. Head, Measures of Occupational Attitudes and Occupational Characteristics. Ann Arbor, Michigan: University of Michigan, 1969, p.433.

13. Kibler, R., J.D. Cegala, D.T. Miles, and L.L. Barker, Objectives for Instruc- and Evaluation. Boston: Allyn and Bacon, Inc., 1974.

14. Handbook of Super 8 Production. New York: Media Horizons Press, 1976 (United Business Publications, Dept. MD77C, 750 3rd Avenue, New York, N.Y. 10017).

15. Hope Reports Video II. Vol. 3, 1974 Series. Rochester, N.Y.: Hope Reports, Inc., 1975.


Accidents
261
Boat Type
Under 16'
177
16' and Over
57
Water Conditions
Choppy
90
Calm
73
Load Amount
Overloaded
25
Not Overloaded
64
Load Amount
Overloaded
18
Not Overloaded
53
Load Distribution
Unbalanced
7
Balanced
16
Load Distribution
Unbalanced
15
Balanced
49
Load Distribution
Unbalanced
6
Balanced
12
Load Distribution
Unbalanced
13
Balanced
40
Load Distribution
Unbalanced
0
Balanced
2
Outcome
Capsizing
0
Swamping/ Capsizing
6
Swamping
1
Falls Overboard
0
Outcome
Capsizing
5
Swamping/ Capsizing
9
Swamping
2
Falls Overboard
0
Outcome
Capsizing
3
Swamping/ Capsizing
8
Swamping
4
Falls Overboard
0
Outcome
Capsizing
24
Swamping/ Capsizing
11
Swamping
2
Falls Overboard
12
Outcome
Capsizing
0
Swamping/ Capsizing
2
Swamping
4
Falls Overboard
0
Outcome
Capsizing
6
Swamping/ Capsizing
5
Swamping
1
Falls Overboard
0
Outcome
Capsizing
7
Swamping/ Capsizing
3
Swamping
3
Falls Overboard
0
Outcome
Capsizing
20
Swamping/ Capsizing
2
Swamping
3
Falls Overboard
15
Outcome
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Swamping
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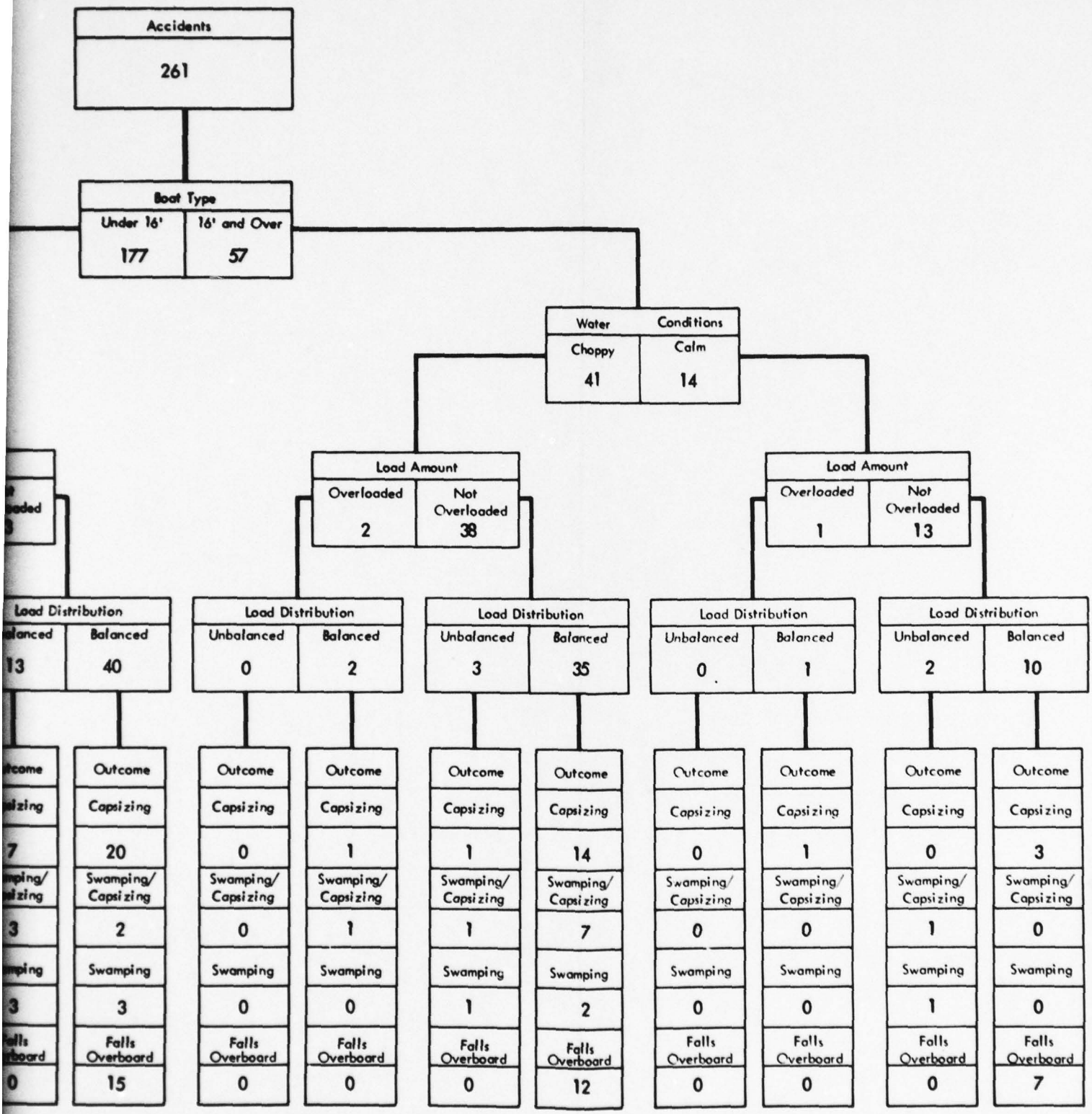
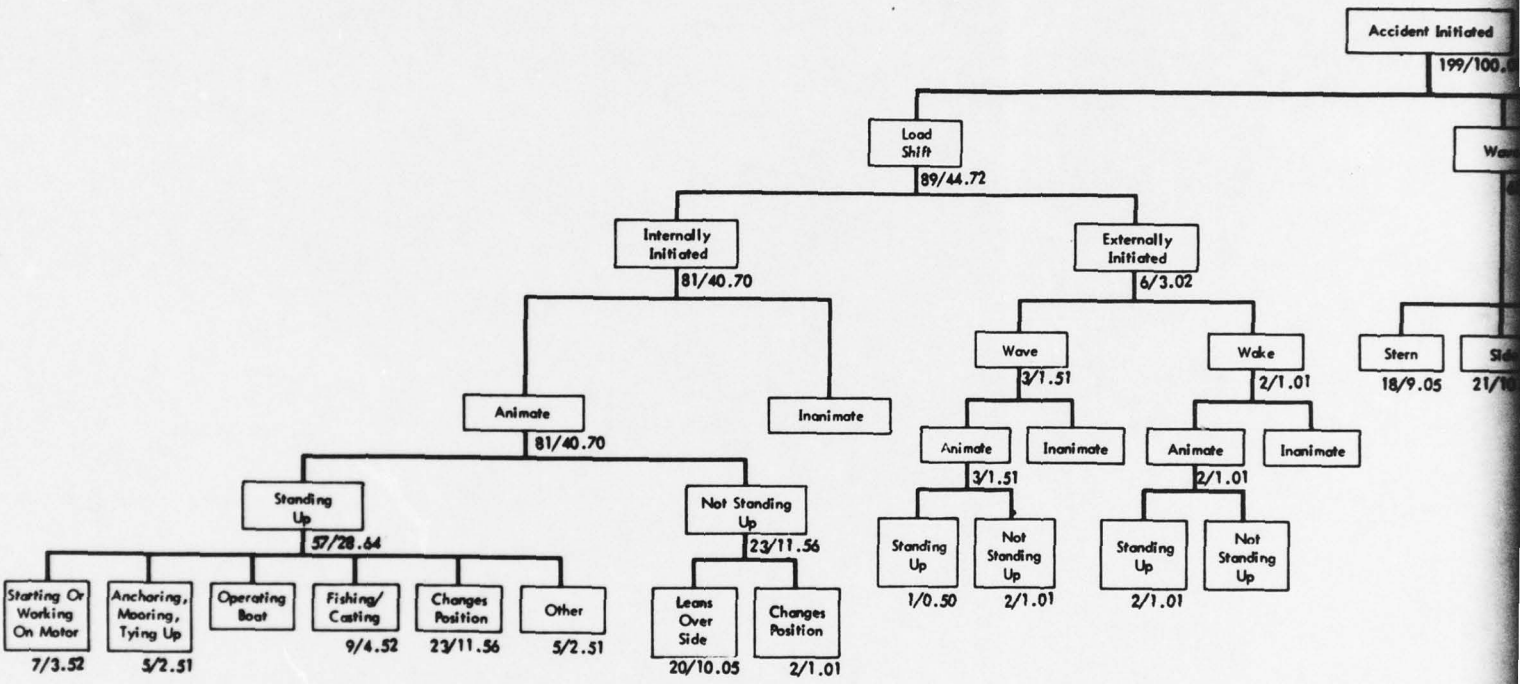
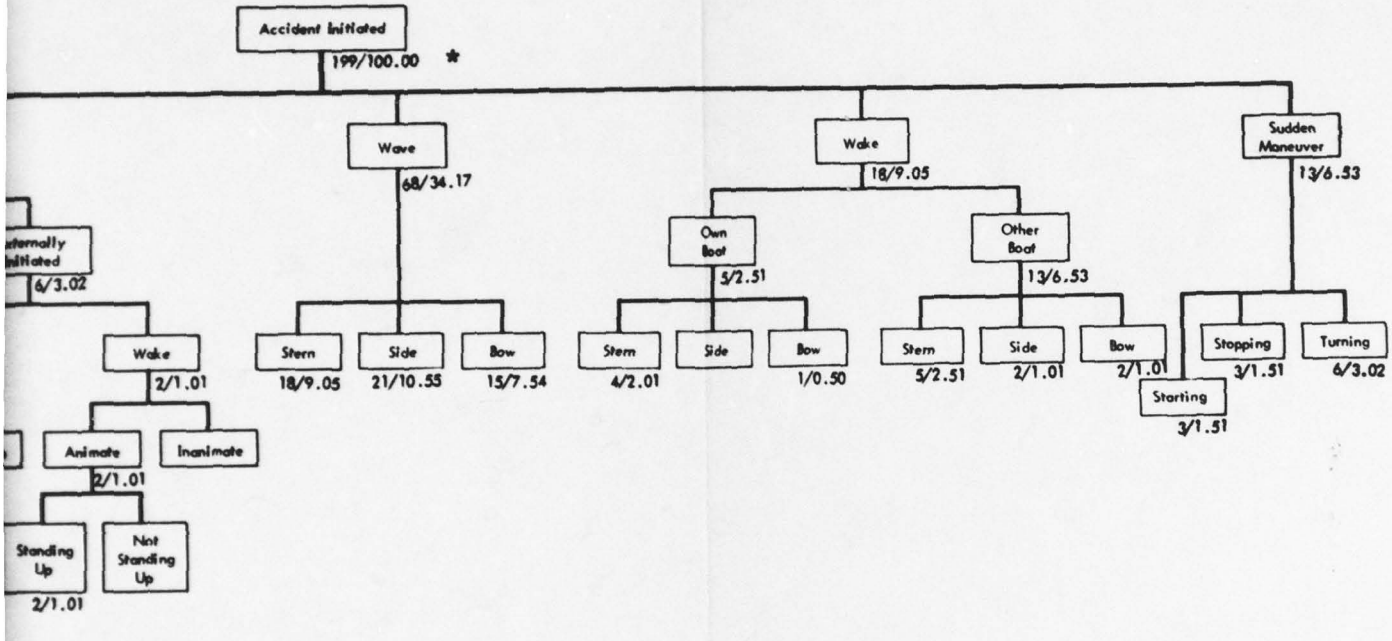


APPENDIX A. CAUSE IDENTIFICATION TREE FOR PRE-ACCIDENT CONDITIONS FOR ALL LOADING RELATED ACCIDENTS

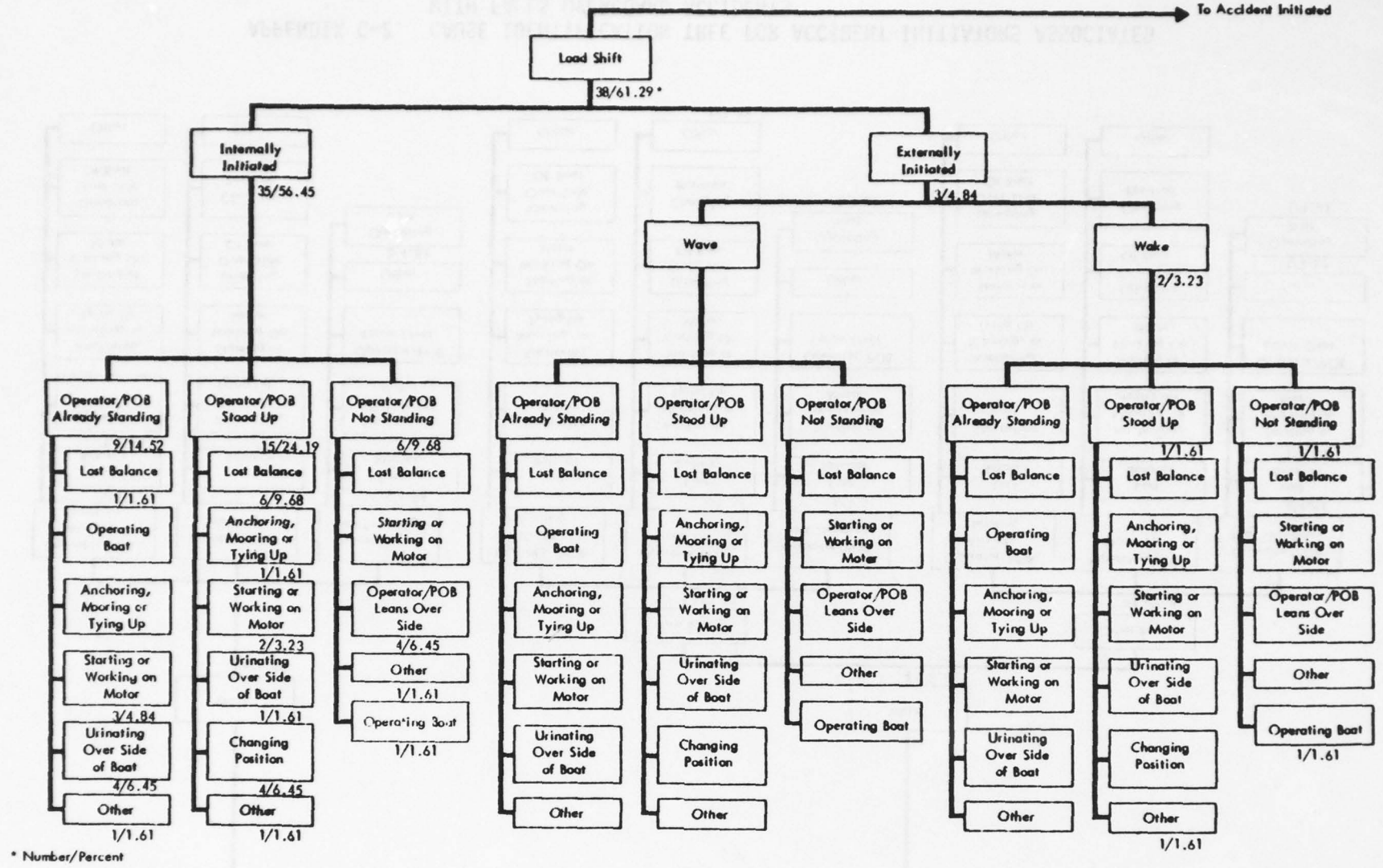


*NUMBER/PERCENT



APPENDIX B. CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH CAPSIZING, SWAMPING LEADING TO CAPSIZING, AND SWAMPING ACCIDENTS

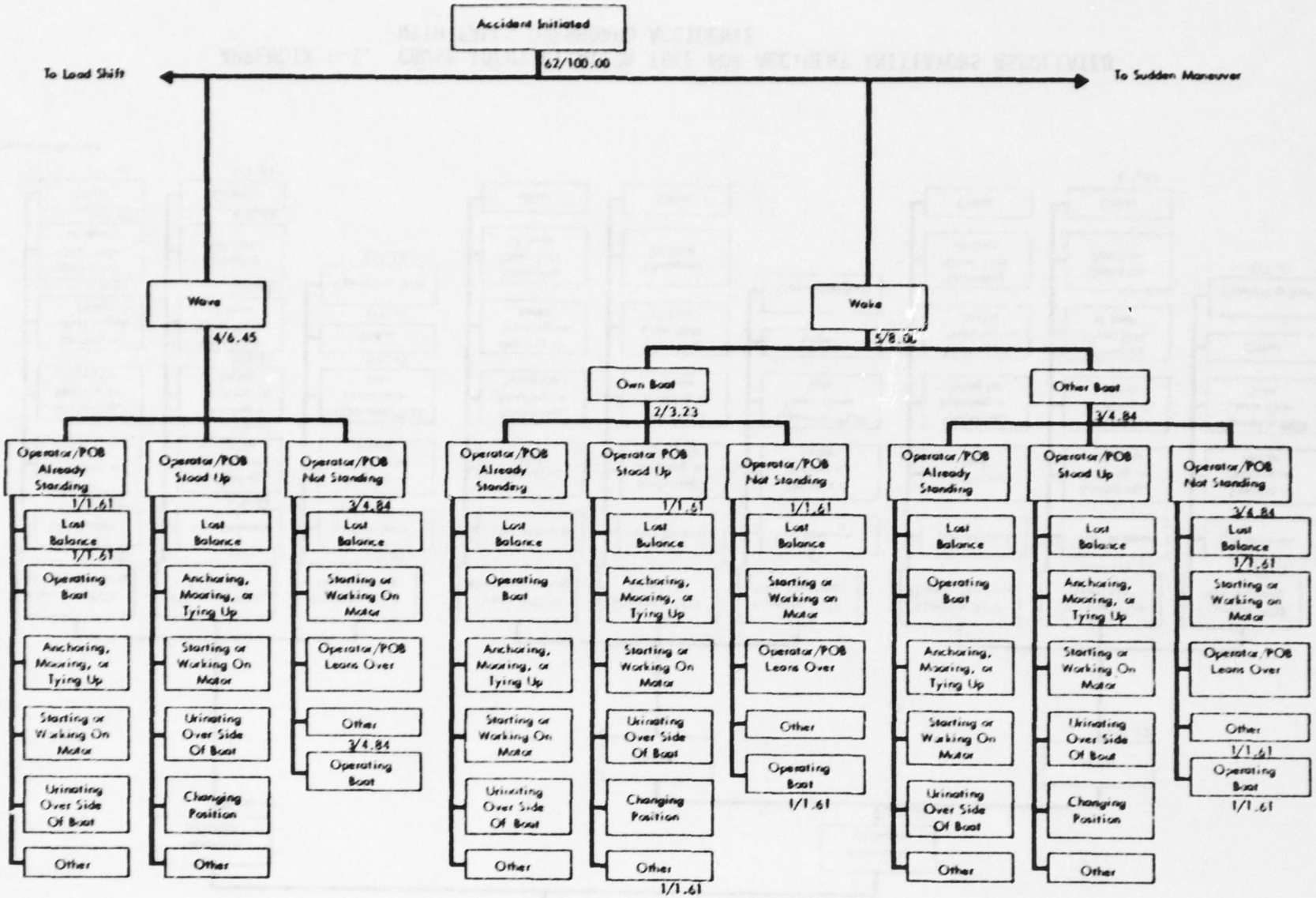
2



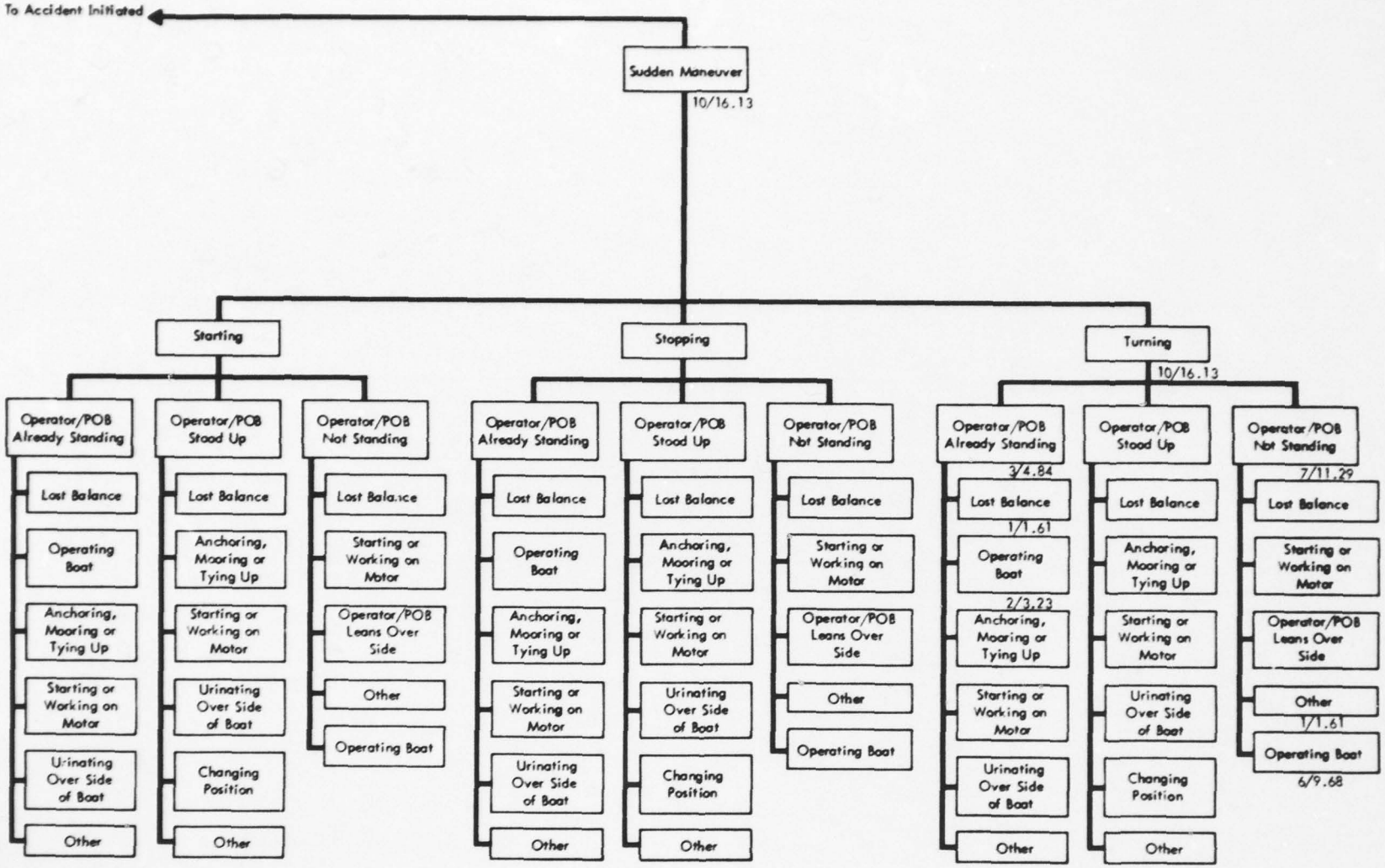
* Number/Percent

C-1

APPENDIX C-1. CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH FALLS OVERBOARD ACCIDENTS



APPENDIX C-2. CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH FALLS OVERBOARD ACCIDENTS



APPENDIX C-3. CAUSE IDENTIFICATION TREE FOR ACCIDENT INITIATORS ASSOCIATED WITH FALLS OVERBOARD ACCIDENTS

APPENDIX D. INSTRUCTIONS AND ATTITUDE/MEDIA PREFERENCE QUESTIONNAIRE

INSTRUCTIONS FOR ADMINISTERING THE ATTITUDE AND MEDIA PREFERENCE STUDY AT THE MUSCLE SHOALS AND MEMPHIS BOAT SHOWS

If possible, give this attitude/media questionnaire out to every other person consenting to participate in the Wyle study. That is, alternate this questionnaire with the personality inventory prepared by T. Doll. Also, distribute the questionnaire at various times for the duration of the boat shows. This will permit us to make some inferences about the representativeness of respondents for the general attendence of the boat shows.

In talking with prospective respondents, please identify the study as a fact-finding study about boaters in general. Actually, this is the kind of study that often precedes the planning of an advertising campaign. If possible, do not tell respondents that this study is for a safe boating educational effort -- it is likely that this knowledge will bias the response to the measurement items.

In the event that you are asked who is doing the study, please answer, "Wyle Laboratories for research purposes." If a respondent persists, say, "The U.S. Coast Guard is funding the project." If a prospective respondent requires more information before he will consent to participate, terminate the request.

Before each respondent actually begins the questionnaire, be certain to review the following points:

- the reference to "high performance boats" in the questionnaire means racing boats or drag boats, not ski boats
- emphasize the qualification word "primarily" in the first three attitude items
- remind respondents to mark only one answer for each of the media preference items.

BOATING INFORMATION FORM — WYLE LABORATORIES

The purpose of this study is to learn more about the opinions held by the general population of recreational boaters. In order to do this, we need to know about boaters, their boating activities, and some of their personal attitudes toward various subjects. It should take only about 10 minutes of your time.

Please answer the questions in order and read the instructions for each section before beginning that particular section. Do not put your name on the form. That way your answers will be completely anonymous. The results of the study are to be tabulated for the entire group of respondents. When you finish, deposit the questionnaire directly in the box marked "Completed Questionnaires."

Thank you for your time and effort.

BOATING INFORMATION FORM — WYLE LABORATORIES

INSTRUCTIONS: The questionnaire consists of three parts. Part I concerns information about you as a boater. Parts II and III concern your attitudes and opinions on several topics.

PART I: Please answer <u>every</u> question below as accurately as possible. Your answers will not be identified by name.

GENERAL INFORMATION:

Age: _____ yrs Sex (Circle one): M F

Marital Status (Circle one): Single Married Divorced Widowed Separated

EDUCATION:

Check the highest educational level which you have completed:

Eight years of school or less	_____
More than eight years of school	_____
Graduated from high school	_____
Completed business or trade school course	_____
Completed at least one year of college	_____
Received Associate's (two year) college degree	_____
Received Bachelor's (four year) college degree	_____
Received Master's degree	_____
Have completed study beyond Master's level	_____

OCCUPATION:

What is your present or most recent occupation? _____

How many jobs have you held in the last five years? (Count part-time work only if you did not hold a full-time job during the same period. Promotions or changes of duties within the same organization count as only <u>one</u> job.) _____

BOATS YOU USE:

Describe the boats in which you have done most of your boating:	Boat Most Used (Not necessarily the boat you use now)	Second Most Used Boat
<u>Overall Length (check one)</u>:		
Under 14 ft long	_____	_____
At least 14 ft but under 16 ft	_____	_____
At least 16 ft but under 18 ft	_____	_____
At least 18 ft but under 20 ft	_____	_____
At least 20 ft but under 22 ft	_____	_____
At least 22 ft but under 26 ft	_____	_____
26 ft or over	_____	_____
<u>Type of Boat (check one)</u>:		
Johnboat, rowboat, dinghy, inflatable, etc.	_____	_____
Open runabout, ski boat, bowrider, bass boat, etc.	_____	_____
High performance boat (racer, drag boat)	_____	_____
Cabin cruiser, large cruiser, houseboat, motor-sailer, etc.	_____	_____
Sailboat	_____	_____
Canoe, kayak, etc., and others	_____	_____

BOATING ACTIVITY:

How often on the average did you go out in a boat during the last two boating seasons? (Check one in each column)

	Last Season (1976)	The Season Before Last (1975)
Did not go out	_____	_____
Less than once a month	_____	_____
One-two times a month	_____	_____
Just under once a week	_____	_____
About once a week, or slightly more	_____	_____
About twice a week	_____	_____
Three or more times a week	_____	_____

Of all the boat outings you have been on, how much of the time have you been the operator of the boat? (Check one)

- Infrequently (less than 20% of the time) . _____
- Occasionally (20-40% of the time) ..... _____
- About one-half of the time 40-60%) ..... _____
- Most of the time (60-80%) ..... _____
- Almost all the time (Over 80%) ..... _____

BOATING MISHAPS:

Have you even been involved in any of the following kinds of boating mishaps? (Check as many as apply)

- Boat hit a floating or submerged object hard enough to cause at least minor damage to the hull ..... _____
- Boat became grounded ..... _____
- A passenger fell overboard ..... _____
- Boat collided with or was struck by another boat or fixed object hard enough to cause at least minor damage ..... _____
- A person was struck by the boat or the propeller ..... _____
- Fire or explosion aboard the boat ..... _____
- Boat became swamped or flooded with water ..... _____
- Boat capsized (or flipped over) ..... _____

Were you operating the boat at the time when any of the above mishaps occurred? (Circle one) Yes No

Did any of the mishaps above involve (Check as many as apply):

- Over $100 total property damage ..... _____
- Injuries to anyone requiring hospitalization or a physicians attention ..... _____
- Loss of a person's life ..... _____

PART II: Listed below are several statements about boating concerning your personal opinions and attitudes. Please read each of the statements, then place a check mark in the space next to the answer that best describes how you feel about the statement.

1 Safe boating is primarily the responsibility of manufactures of boats and boating equipment.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

2. Safe boating is primarily the responsibility of all persons who operate boats.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

3. Safe boating is primarily the responsibility of the Coast Guard and other government enforcement agencies.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

4. Boating mishaps are usually the result of bad luck rather than poor operator judgment or inadequate operator skill.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

5. The person who is the more competent boater will most likely have taken a formal boating course in order to learn about boating.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

6. The person who is the more competent boater will most likely have learned about boating from experience.

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

7. The person who is the most competent boater will have a "natural ability" for boat operation and seamanship (regardless of boating courses or boating experience).

_____ Strongly Agree
_____ Somewhat Agree
_____ Somewhat Disagree
_____ Strongly Disagree

PART III: Listed below are several questions about various sources of news and information used by all people. Please place a check mark in the space next to your answer and check only one answer for each question.

1. We'd like to know where you usually get most of your information about what is going on in the world.

_____ From newspapers
_____ From television
_____ From radio
_____ From magazines
_____ From talking to people (friends)

2. If you got conflicting or different information, which version would you be most inclined to believe?

_____ Radio
_____ Magazines
_____ Television
_____ Newspapers
_____ From talking with people (friends)

3. Which of the versions would you be least inclined to believe?

_____ Magazines
_____ Radio
_____ Talking with people (friends)
_____ Television
_____ Newspapers

4. Suppose that you could continue to have only one of the following ways of getting information. Which one would you most want?

_____ Talking with people (friends)
_____ Radio
_____ Television
_____ Newspapers
_____ Magazines

5. Next, would you tell us where you get most of your information about boating/boating-safety?

_____ Radio and television
_____ "Informed" people such as marina operators, boating equipment dealers, friends with boating experience
_____ Boating magazines, boating columns in newspapers, books about boating
_____ Brochures and phamplets about boating
_____ Formal organizations such as Coast Guard Auxiliary, Power Squadron, yacht and boat clubs
_____ Other (please specify) _____

6. If you get conflicting or different information concerning boating/boating-safety, which version would you be most likely to believe?

_____ Radio and television
_____ "Informed people such as marina operators, boating equipment dealers, friends with boating experience
_____ Boating magazines, boating columns in newspapers, books about boating
_____ Brochures and phamplets about boating
_____ Formal organizations such as Coast Guard Auxiliary, Power Squadron, yacht and boat clubs
_____ Other (please specify) _____

7. Which of the versions would you be least likely to believe?

_____ Radio and television
_____ "Informed people such as marina operators, boating equipment dealers, friends with boating experience
_____ Boating magazines, boating columns in newspapers, books about boating
_____ Brochures and phamplets about boating
_____ Formal organizations such as Coast Guard Auxiliary, Power Squadron, yacht and boat clubs
_____ Other (please specify) _____

8. Suppose that you could determine to have only one of the following ways of getting boating/boating-safety information. Which one would you most want?

_____ Radio and television
_____ "Informed" people such as marina operators, boating equipment dealers, friends with boating experience
_____ Boating magazines, boating columns in newspapers, books about boating
_____ Brochures and phamplets about boating
_____ Formal organizations such as Coast Guard Auxiliary, Power Squadron, yacht and boat clubs
_____ Other (please specify) _____

APPENDIX E - PERSONALITY SURVEY MEASUREMENT INSTRUMENT

PLEASE HELP PROMOTE BOATING SAFETY

The purpose of this study is to get the boating safety message across more effectively to more boaters. In order to do this, we need to know about boaters, their activities, and their personal attitudes and opinions. You can help promote boating safety by filling out this questionnaire. Please go through the questions quickly - just give the first answer that comes to mind. It should take you only about ten minutes. Your answers will be completely anonymous. The results are fed into a computer and results are tabulated only for the entire group of respondents. You may omit any question you feel is too personal. When you finish, deposit the questionnaire directly in the box marked "Completed Questionnaires."

BOATING SAFETY INTERVIEW FORM
CONDUCTED BY WYLE LABORATORIES FOR THE UNITED STATES COAST GUARD

INSTRUCTIONS: The questionnaire consists of three parts. Part I concerns information about you, the boater, and your boating activities. Parts II and III concern your personal attitudes and opinions on a variety of topics.

PART I: Please answer every question below as accurately as possible. Your answers will not be identified by name.

GENERAL INFORMATION:

Age: _____ yrs Sex (Circle one): M F

Marital Status (Circle one): Single Married Divorced Widowed Separated

EDUCATION:

Check the highest educational level which you have completed:

- Eight years of school or less ..... _____
- More than eight years of school ..... _____
- Graduated from high school ..... _____
- Completed business or trade school course ..... _____
- Completed at least one year of college ..... _____
- Received Associate's (two year) college degree ..... _____
- Received Bachelor's (four year) college degree ..... _____
- Received Master's degree ..... _____
- Have completed study beyond Master's level ..... _____

OCCUPATION:

What is your present or most recent occupation? _____

How many jobs have you held in the last five years? (*Count part-time work only if you did not hold a full-time job during the same period. Promotions or changes of duties within the same organization count as only one job.*) _____

HOME AND CAR:

Do you own a home? (Circle one) Yes No

How many automobile accidents have you been involved in over the past five years? (Include all accidents regardless of whether you or other drivers were at fault.) _____

How many automobile traffic citations have you received over the last three year period? (Include parking tickets and standing violations as well as moving violations.) _____

BOATS YOU USE:

Describe the boats in which you have done most of your boating:

	Boat Most Used (Not necessarily the boat you use now)	Second - Most Used Boat
Overall Length (check one):		
Under 14 ft long	_____	_____
At least 14 ft but under 16 ft	_____	_____
At least 16 ft but under 18 ft	_____	_____
At least 18 ft but under 20 ft	_____	_____
At least 20 ft but under 22 ft	_____	_____
At least 22 ft but under 26 ft	_____	_____
26 ft or over	_____	_____
Type of Boat (check one):		
Jonnboat, rowboat, dinghy, inflatable, etc.	_____	_____
Open runabout, bowrider, bass boat, etc.	_____	_____
High performance boat	_____	_____
Cabin cruiser, large cruiser, houseboat, motor-sailer, etc. ..	_____	_____
Sailboat	_____	_____
Canoe, kayak, etc., and others	_____	_____

BOATING ACTIVITY:

How often on the average did you go out in a boat during the last two boating seasons? (Check one in each column)

	Last Season (1976)	The Season Before Last (1975)
Did not go out		
Less than once a month		
One-two times a month		
Just under once a week		
About once a week, or slightly more		
About twice a week		
Three or more times a week		

During your lifetime, how many years have you gone boating regularly (averaging at least once a month in season)? (Check one)

- I've never been a regular boater
- Boated regularly for only one year
- Boated regularly for two or three years
- Boated regularly for more than three years

Of all the boat outings you have been on, how much of the time have you been the operator of the boat? (Check one)

- Infrequently (less than 20% of the time)
- Occasionally (20-40% of the time)
- About one-half of the time 40-60%)
- Most of the time (60-80%)
- Almost all the time (Over 80%)

BOATING MISHAPS:

Have you ever been involved in any of the following kinds of boating mishaps? (Check as many as apply)

- Boat hit a floating or submerged object hard enough to cause at least minor damage to the hull
- Boat became grounded
- A passenger fell overboard
- Boat collided with or was struck by another boat or fixed object hard enough to cause at least minor damage
- A person was struck by the boat or the propeller
- Fire or explosion aboard the boat
- Boat became swamped or flooded with water
- Boat capsized (or flipped over)

Were you operating the boat at the time when any of the above mishaps occurred? (Circle one) Yes No

Did any of the mishaps above involve (Check as many as apply):

- Over $100 total property damage
- Injuries to anyone requiring hospitalization or a physicians attention
- Loss of a person's life

SOURCES OF BOATING INFORMATION:

This question deals with the believability of various sources of boating information. Indicate how believable (credible) the various sources are for you personally using: (3) for "extremely believable" (2) for usually believable and (1) for not very believable.

Television		Boat dealers and marina operators	
Radio		Informed personal friends and acquaintances	
Newspapers		Operational manuals supplied with boating equipment	
USCG publications			
Boating magazines		Other (Please specify)	

Part II: Listed below are 40 statements concerning your personal opinions and attitudes. Read each item and place a check mark on one of the lines below the statement. Check the alternative which best describes your personal attitude on each statement. Be sure to answer every item.

1. I like poetry.
   _____ True
   _____ False
2. I like to attend lectures on serious subjects.
   _____ True
   _____ False
3. I like to read about history.
   _____ True
   _____ False
4. I like collecting flowers or growing house plants.
   _____ True
   _____ False
5. I would rather see movies of beautiful scenes in various countries than see movies of horse racing.
   _____ True
   _____ False
6. I would rather have a beautiful body than to be extra intelligent.
   _____ True
   _____ False
7. My reaction to the term "scientific investigation" is:
   _____ Pleasant
   _____ Unpleasant or indifferent
8. I never feel like picking a fist fight with someone.
   _____ True
   _____ False
9. I would rather be:
   _____ An Ambassador
   _____ A government employee
10. I am easily downed in an argument.
    _____ True
    _____ False
11. I would like to be an auto racer.
    _____ True
    _____ False
12. I think I would like the kind of work a forest ranger does.
    _____ True
    _____ False
13. I would rather be in charge of a school for feeble-minded children than be a warden of a prison.
    _____ True
    _____ False
14. I seldom worry about my health.
    _____ True
    _____ False
15. I have very few quarrels with members of my family.
    _____ True
    _____ False
16. My parents were divorced or separated.
    _____ True
    _____ False
17. Do you get impatient to the point of fury when someone delays you?
    _____ Yes
    _____ Occasionally
    _____ No
18. Do people say you are a person who will have his own way?
    _____ Yes
    _____ Occasionally
    _____ No
19. Do you suspect that people who seem friendly to you are sometimes disloyal behind your back?
    _____ Yes
    _____ Occasionally
    _____ No
20. Do you have almost uncontrollable fears or distastes for some things; for example, an animal, a particular place, etc.?
    _____ Yes
    _____ Sometimes
    _____ No
21. Do you feel critical of many people's work?
    _____ Yes
    _____ Occasionally
    _____ No
22. Are you annoyed by people who say they can do things better than others?
    _____ Yes
    _____ Occasionally
    _____ No
23. Do you often have to hold yourself back from trying to straighten out other people's problems?
    _____ Yes
    _____ Sometimes
    _____ No
24. Do you think that every story should point to a moral?
    _____ Yes
    _____ Sometimes
    _____ No
25. Are you always a sound sleeper, who does not walk or talk in his sleep?
    _____ Yes
    _____ In Between
    _____ No

26. Can you, if necessary, lie to a stranger and keep a straight face?

_____ Yes
_____ Occasionally
_____ No

27. Do you think that many foreign countries are actually more friendly than we suppose?

_____ Yes
_____ Sometimes
_____ No

28. Do you think that much modern, so-called "progressive" education, is not as good as the old common sense idea of "spare the rod and spoil the child"?

_____ Yes
_____ Sometimes
_____ No

29. Is your health a bit uncertain, sometimes forcing you unexpectedly to alter your plans?

_____ Yes
_____ Occasionally
_____ No

30. Would you enjoy being waited on by personal servants?

_____ Yes
_____ Sometimes
_____ No

31. Do you think that even when it becomes embarrassing, most witnesses tell the truth?

_____ Yes
_____ In Between
_____ No

32. Would you rather spend an evening:

_____ In a hard game of cards
_____ In Between
_____ Looking at photos of past vacations

33. Do you always have plenty of energy at those times when you most need it?

_____ Yes
_____ In Between
_____ No

34. Would you feel embarrassed joining a nudist colony?

_____ Yes
_____ In Between
_____ No

35. If a neighbor keeps cheating you over small things, do you feel it is better to humor him than show him up?

_____ Yes
_____ Occasionally
_____ No

36. When, in your opinion, someone shows bad manners, do you:

_____ Say nothing, because you are probably being fussy
_____ In Between
_____ Let the person see clearly what you think

37. When you see "sloppy," untidy people, do you:

_____ Accept it
_____ In Between
_____ Feel disgusted and annoyed

38. Do you sometimes try too much to be nice to waiters and waitresses?

_____ Yes
_____ Occasionally
_____ No

39. Do you smile to yourself at the big differences between what people do and what they say they do?

_____ Yes
_____ Occasionally
_____ No

40. Do you find that you need to avoid excitement because it wears you out?

_____ Yes
_____ Occasionally
_____ No

NEWS AND ENTERTAINMENT SOURCES:

How much time do you spend watching TV, listening to radio, and reading newspapers and magazines on a typical weekday?

	More Than Two Hours	Between One-Half to Two Hours	One-Half Hour or Less
Television	_____	_____	_____
Radio	_____	_____	_____

	Read Regularly	Read Occasionally	Rarely or Never
Newspapers	_____	_____	_____
Magazines	_____	_____	_____

PART III: Read each pair of statements below and decide which statement in each pair ("a" or "b") you agree with the most. Place a check mark in the space to the right of that statement. Please make only one choice for each pair and do not omit any pair.

1. a. Many of the unhappy things in people's lives are partly due to bad luck ..... _____
   b. People's misfortunes result from the mistakes they make ..... _____

2. a. In the long run people get the respect they deserve in this world ..... _____
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries . _____

3. a. Without the right breaks one cannot be an effective leader ..... _____
   b. Capable people who fail to become leaders have not taken advantage of their opportunities .. _____

4. a. No matter how hard you try, some people just don't like you ..... _____
   b. People who can't get others to like them don't understand how to get along with others ..... _____

5. a. Becoming a success is a matter of hard work; luck has little or nothing to do with it ..... _____
   b. Getting a good job depends mainly on being in the right place at the right time ..... _____

6. a. The average citizen can have an influence in government decisions ..... _____
   b. This world is run by the few people in power, and there is not much the little guy can do about it ..... _____

7. a. When I make plans, I am almost certain that I can make them work ..... _____
   b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyway ..... _____

8. a. In my case getting what I want has little or nothing to do with luck ..... _____
   b. Many times we might just as well decide what to do by flipping a coin ..... _____

9. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first ..... _____
   b. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it ..... _____

10. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control ..... _____
    b. By taking an active part in political and social affairs the people can control world events ..... _____

11. a. Most people don't realize the extent to which their lives are controlled by accidental happenings ..... _____
    b. There really is no such thing as "luck" ..... _____

12. a. It is hard to know whether or not a person really likes you ..... _____
    b. How many friends you have depends on how nice a person you are ..... _____

13. a. With enough effort we can wipe out political corruption ..... _____
    b. It is difficult for people to have much control over the things politicians do in office ... _____

14. a. Many times I feel that I have little influence over the things that happen to me ..... _____
    b. It is impossible for me to believe that chance or luck plays an important role in my life .. _____

15. a. People are lonely because they don't try to be friendly ..... _____
    b. There's not much use in trying too hard to please people: if they like you, they like you .. _____

16. a. What happens to me is my own doing ..... _____
    b. Sometimes I feel that I don't have enough control over the direction my life is taking ..... _____

17. a. It is highly unlikely that astrology will ever be able to explain anything ..... _____
    b. Someday it will probably be shown that astrology can explain a lot of things ..... _____

18. a. If it weren't for the rebellious ideas of youth there would be less progress in the world .. _____
    b. Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down ..... _____

19. a. It would be a good thing if people spent more time thinking and talking about ideas just for the fun of it ..... _____
    b. If people would talk less and work more, everybody would be better off ..... _____

20. a. What a youth needs most is strict discipline, rugged determination, and the will to work and fight for family and country ..... _____
    b. In the long run it is better for our country if young people are allowed a great deal of personal freedom and are not strictly disciplined ..... _____

21. a. Nowadays more and more people are prying into matters that should remain personal and private ..... _____
    b. There are times when it is necessary to probe into even the most personal and private matters ..... _____

22. a. The businessman and the manufacturer are much more important to society than the artist and the professor ..... _____
    b. The artist and the professor are probably more important to society than the businessman ... _____

23. a. Obedience and respect for authority are the most important virtues children should learn ... _____
    b. One of the most important things children should learn is when to disobey authorities ..... _____

24. a. Most honest people admit to themselves that they have sometimes hated their parents ..... _____
    b. There is hardly anything lower than a person who does not feel great love, gratitude, and respect for his parents ..... _____

25. a. The wild sex life of the old Greeks and Romans was tame compared to some of the goings-on in this country, even in places where people might least expect it ..... _____
    b. In spite of what you read about the wild sex life of people in important places, the real story is about the same in any group of people ..... _____

26. a. When a person has a problem or worry, it is best to face it and try to think it through, even if it is so upsetting that it keeps him from concentrating on other things ..... _____
    b. When a person has a problem or worry, it is best for him not to think about it, but to keep busy with more cheerful things ..... _____

APPENDIX F-1. PERSONALITY STUDY: SUMMARY OF DEMOGRAPHIC INFORMATION FOR RESPONDENTS FOR NUMBER OF JOBS HELD, NUMBER OF AUTOMOBILE ACCIDENTS, AND NUMBER OF TRAFFIC CITATIONS DURING THE PAST FIVE YEARS

RESPONDENT CHARACTERISTIC	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*
Number of Jobs Held		
0	2	1.5
1	71	51.8
2	37	27.0
3	15	10.9
4	5	3.6
>4	7	5.1
Missing	54	
Number of Automobile Accidents		
0	117	63.9
1	46	25.1
2	17	9.3
3	2	1.1
5	1	0.5
Missing	8	
Number of Traffic Citations		
0	114	62.6
1	40	22.0
2	21	11.5
3	5	2.7
4	1	0.5
7	1	0.5
Missing	9	

* Percentages are based on the total number of cases for which the information under consideration was available.

APPENDIX F-2. PERSONALITY STUDY: SUMMARY OF BOAT LENGTH AND TYPE FOR THE MOST USED AND SECOND-MOST USED BOAT FOR RESPONDENTS

BOAT LENGTH (ft)	MOST USED BOAT		SECOND BOAT	
	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS *	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS *
<14	16	8.8	25	26.0
14-16	64	35.4	25	26.0
16-18	58	32.0	22	22.9
18-20	17	9.4	10	10.4
20-22	1	0.6	1	1.0
22-26	10	5.5	3	3.1
>26	15	8.3	10	10.4
Missing	10		95	
BOAT TYPE				
Johnboat, Rowboat, Dinghy, Inflatable, etc.	23	13.5	21	25.3
Open Runabout, Bowrider, Bass Boat, etc.	97	57.1	31	37.3
High Performance Boat	17	10.0	7	8.4
Cabin Cruiser, Large Cruiser, Houseboat, Motor-Sailer, etc.	19	11.2	10	12.0
Sailboat	9	5.3	5	6.0
Canoe, Kayak, etc. and Others	5	2.9	9	10.8
Missing			108	

* Percentages are based on the total number of cases for which the information under consideration was available.

APPENDIX F-3. PERSONALITY STUDY: SUMMARY OF INFORMATION ON BOATING ACTIVITY OF RESPONDENTS

AVERAGE NUMBER OF OUTINGS	LAST SEASON (1976)		SEASON BEFORE LAST (1975)	
	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*
None	14	7.7	10	6.6
Less than once a month	22	12.2	21	13.9
1-2 times a month	33	18.2	28	18.5
Just under once a week	29	16.0	14	9.3
About once a week, or slightly more	31	17.1	31	20.5
About twice a week	16	8.8	20	13.2
3 or more times a week	36	19.9	27	17.9
Missing	10		40	

NUMBER OF YEARS RESPONDENT HAS BEEN A REGULAR BOATER	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS*
Never	21	11.6
One year	9	5.0
2 or 3 years	33	18.2
More than 3 years	118	65.2
Missing	10	

RESPONDENT WAS THE OPERATOR ON BOAT OUTINGS	FREQUENCY OF RESPONDENTS	PERCENTAGE OF RESPONDENTS *
Less than 20%	38	21.2
20-40%	12	6.7
40-60%	24	13.4
60-80%	41	22.9
Over 80%	64	35.8
Missing	12	

* Percentages are based on the total number of cases for which the information under consideration was available.

APPENDIX G. PERSONALITY STUDY: SUMMARY OF RESPONDENTS' ACCIDENT HISTORIES - TYPES OF BOATING ACCIDENTS IN WHICH RESPONDENTS HAVE BEEN INVOLVED

Type of Accident	Frequency of Respondents	Percentage of Respondents*
Boat hit a floating or submerged object hard enough to cause at least minor damage to the hull	31	16.2
Boat became grounded	46	24.1
A passenger fell overboard	17	8.9
Boat collided with or was struck by another boat or fixed object hard enough to cause at least minor damage	9	4.7
A person was struck by the boat or the propeller	1	0.5
Fire or explosion aboard the boat	9	4.7
Boat became swamped or flooded with water	16	8.4
Boat capsized (or flipped over)	13	6.8
RESPONDENT AS OPERATOR AT THE TIME OF THE ACCIDENT		
Yes	57	29.8
No	35	18.3
Missing	99**	51.8
SEVERITY OF THE ACCIDENT		
Over $100 total property damage	17	8.9
Injuries to anyone requiring hospitalization or a physician's attention	2	1.0
Loss of a person's life	1	0.5

* Based on the total number of respondents to the survey (191).

** Includes one case where respondent had not checked any accident category, yet answered "yes" to the question of whether he had been the operator.

APPENDIX H - SAMPLE FROM BOOKLET FOR DETERMINATION OF OPERATOR ALTERNATIVES

Introduction to the Educational Objectives Task

The plan for preparing the statement of objectives includes two steps. First, the pre-accident conditions and primary accident initiators will be linked to the boat operators' decisions and behavior prior to and during the accidents. This procedure may call for additional analyses of the accident data, but this is only a contingency at this time. Various occurrences of the accidents in the accident data base, and the relevant decisions and behavior will be identified as specifically as possible. In addition, the conditions within which the accidents tended to occur will be specifically identified, where relevant. The second step for preparing the objectives will be the incorporation of the accident and operator information into several statements (probably declarative) that specify exactly what behavior the operational programs should address. Alternatives for operator behavior may include the following items:

- avoidance of conditions in which the high frequency accidents tend to occur
- how to handle the operation of the boat in such a way that the loading related accident does not occur
- how to stabilize the crisis after the loading related accident has occurred
- how to prevent fatalities after the loading related accident has occurred.

INSTRUCTIONS FOR DETERMINING EDUCATIONAL OBJECTIVES FOR BOATER TRAINING

This task calls for the evaluation of certain aspects of the operation of recreational boats. You are being asked to review several reports each of which deals with a separate boating accident. The accidents are grouped according to the kind of accident that occurred and according to the general cause of the accident. For example, one group of accidents to be reviewed is "swampings" caused by the wake of a passing boat.

You are asked to determine exactly what the operator of the boat involved in the accident could have done to avoid the accident - <u>what he should have done</u> or <u>what he should have known</u>. The only constraint on selecting the alternative actions for the operator is to offer a plausible decision or action that is consistent with the conditions in which the accident occurred. You should find a great many duplications in your judgments since these accidents are already grouped according to accident type and accident cause. If you can not decide on a realistic alternative action or decision, go on to the next accident report. The alternatives should be readily available if enough information is given in the accident report. If the operator chose the right alternative, but it was not successful in avoiding the accident, go ahead and list it as an alternative.

Jot down your alternative for the operator on the worksheets provided. Please indicate the Wyle serial number for the accident report in the column to the left. Be sure you are recording the information on the worksheet for that particular accident type and accident cause. The statements you make concerning the operators' alternatives for each accident type and accident cause will then be processed, grouped into one or two overall solutions for the accidents, and rewritten as objectives for an educational program directed to recreational boaters.

WORKSHEET FOR EDUCATIONAL OBJECTIVES

ACCIDENT TYPE:

ACCIDENT CAUSE:

WYLE SERIAL NUMBERS FOR ACCIDENT REPORTS	BOAT OPERATOR ALTERNATIVE ACTIONS AND DECISIONS THAT WOULD AVOID THE ACCIDENTS (Indicate duplications using slash [/] tally marks)

General endorsing logo for all the educational materials - used for official messages, and used in conjunction with other typical logos to authenticate content at end of materials.

Identification logo for educational materials concerning smaller boats including johnboats, outboard runabouts, and inboard/outdrive runabouts.

Identification logo for educational materials concerning larger boats including cabin and offshore cruisers.

Identification logo for educational materials concerning sailboats and more sophisticated aspects of seamanship.

Identification logo for educational materials concerning navigation and piloting.

ARE YOU ON THE LEVEL?

SMALL BOAT STABILITY

Do I Need This Booklet?

This booklet is intended for you the boater who are just beginning to enjoy recreational boating. The facts in this booklet are selected to suggest ways for dealing with loading and operating small boats.

Here is what you will find inside:

- why your boat is stable or not stable;
- what factors affect "rolling" of a boat;
- what are some tricks for loading your boat so that it is as seaworthy as possible;
- how to determine "freeboard" of your boat and how freeboat is affected by load and water conditions;
- some things to consider about stability while operating your boat.

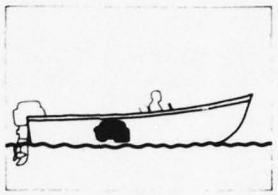
You may find it more convenient to begin by reading through a list of words and their definitions at the back of this booklet. These words are used all through the booklet and may have their own meaning when used in boating.

What Do You Mean by Boat Stability?

A boat's stability is equated with balance. It is affected by boat size and type of hull, by the distribution of load the boat will carry, by trim and motion of the boat, and by movements of persons within the boat.

Some of the movements which will affect your boat's stability are standing, casting while fishing, and moving from one position to another in the boat. While you can move fairly freely on larger boats, movement around small boats must involve thinking on everyone's part. Many small boats will capsize (turn over) without adequate warning.

- **Remember, all movements by persons should be made slowly with the intent of keeping the boat in balance. It is important to keep the boat in balance fore and aft as well as side to side to maintain the most stability possible.**

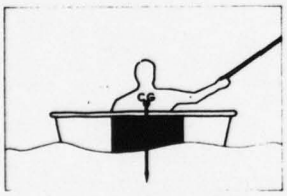


This boat is trimmed and in a balanced position.

Here is how the
equipment or pe

This boat is
more easily
turns either

This boat is
can more e
swamp (flo
ability is low

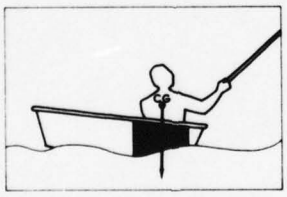


Weight low and evenly distributed.

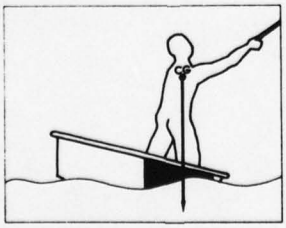
CG (Center of Gravity) is low - amount of roll will be less and rate of roll will be slower.

Placing weight to one side of the center line of a boat (or shifting the weight horizontally) will make the boat roll to one side. Increasing the height of the center of gravity such as standing (or shifting the weight vertically) will also cause the boat to roll and become less stable.

- Remember, any movement can affect your boat's stability, so move about slowly and carefully in the boat.



Weight unevenly distributed horizontally. (CG too far to one side of center)

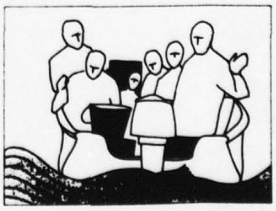


Weight distributed too high vertically. (CG too high above boat - rate of roll will be faster and less controlled)

How Do I Load My Boat So That It Is Trimmed and Stable?

Loading and capacity primarily refer to the weight of persons, fuel, gear, etc., that can be carried safely.

The number of seats in a boat is *not* an indication of the number of persons it can carry safely. The number of people a boat can safely carry depends on such characteristics as the hull volume, and the size of the boat. Normally, seating is designed to provide a variety of seating positions.



This boat is overloaded for its size.

Overloading beyond hull capacity will cause the boat to sit lower in the water which will have an effect of unpredictability on stability. The boat low in the water also increases the danger of even small waves and wakes coming in over the sides or over the stern.

Boats under 20 fe
must now display
which states the
that can be safely

Capacity

Capac

...t Stability?

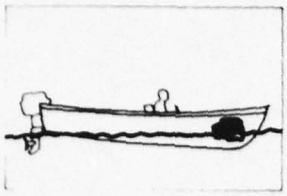
...balance. It is affected ...by the distribution of ...ht and motion of the ...ents within the boat.

...will affect your boat's ...ble fishing and moving ...n the boat. While you ...ger boats, movement ...thinking on everyone's ...point (turn over) with-

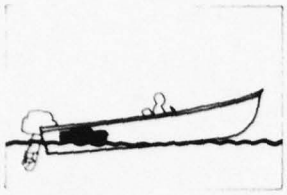
...by persons should be ...h of keeping the boat in ...ep the boat in balance ...to side to maintain the

...and in a balanced

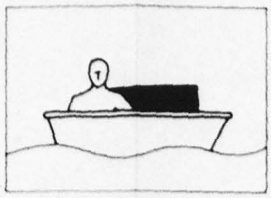
Here is how the small boat is affected by loading of equipment or persons.



This boat is "down by the bow," and is more easily capsized when the operator turns either left or right.

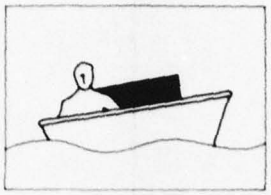


This boat is "down by the stern." Water can more easily enter from the stern and swamp (flood) the boat. Operator visability is lowered.



Trimmed

This boat is *trimmed* and in a balanced position.



Untrimmed

This boat is off balance "heeled to starboard."

What Factors Affect Roll Stability of a Boat?

Roll is one of several natural motions of a boat. It is the side to side rotation of the boat in the water, and varies considerably for different types of hulls.

The rolling of a boat results from two natural forces acting on the boat - buoyancy and gravity. It is the combination of these forces that causes the boat to roll.

Buoyance is the upward force that allows the boat to float. Gravity is the downward force that keeps the boat in the water.

A boat can be made more stable by keeping the load and persons down low inside the boat. This has the effect of lowering the center of gravity.

The center of gravity is a point where the weight of the boat and the weight of everything on board could be placed to produce the same effect on stability as if the weight were distributed throughout the boat. Both horizontal and vertical distribution of weight in the boat help establish the center of gravity.

Roll stability is greatly affected by the height of the center of gravity so it is important to know where this is with respect to the boat, water conditions, load, and passengers.

...oat So That It Is

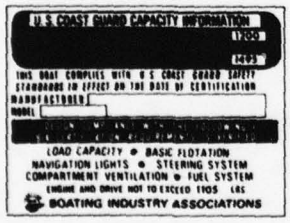
...ally refer to the weight of ...at can be carried safely.

...oat is *not* an indication of ...n carry safely. The number ...ly carry depends on such ...olume, and the size of the ...esigned to provide a variety

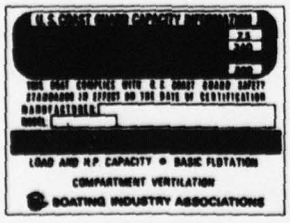
...aded for its size.

...apacity will cause the boat to ...ich will have an effect of ... The boat low in the water ...even small waves and wakes ...over the stern.

Boats under 20 feet in length with a few exceptions must now display a U.S. Coast Guard capacity plate which states the total weight and weight of persons that can be safely carried on board.



Capacity plate for inboards, etc.



Capacity plate for outboards.

If a capacity plate is not displayed in your boat, a rough estimate for determining the number of persons you can safely carry in good weather conditions is obtained by multiplying the overall length of the boat (L) by the maximum width of the boat (W) and dividing by 15. If the answer is a whole number and a fraction, round it down to the nearest whole number.

For example, if your boat is 18 feet long and five-and-a-half feet wide, in good weather and water conditions, you could safely carry six people weighing an average of 150 pounds each.

$$\frac{L \times W}{15} = \frac{18 \times 5.5}{15} = 6.6 = 6 \text{ persons}$$

Remember, this number is determined assuming that the engine is of the recommended size, that there is a normal amount of fuel aboard, and normal amounts of equipment and supplies on board. For rough weather conditions, it is important to carry considerably less than the maximum allowable weight.

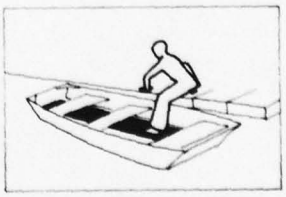
When actually loading your boat, there are several things to keep in mind. First, when arranging the equipment and gear within the boat, try to keep an aisle clear down the center so that you won't have to step near the sides of the boat when moving from one position to another.

Be sure that the equipment which is not needed for the moment is stowed out of the way to make as much clear space as possible.

Remember to keep PFDs (Personal Flotation Devices) and a fire extinguisher readily accessible.

Also, fasten down your gear in order to prevent it from moving about during the ride. Many boats have been capsized when loose gear shifted and changed the center of gravity in the boat.

When getting in, remember to step as close to the center of a small boat as possible. Stay low in the boat and have someone on the dock hand gear to you to load after you are already in.



Stay low and step into the center of the boat.

APPENDIX I-2. SINGLE CONCEPT PAMPHLET, "SMALL BOAT STABILITY" (EXPERIMENTAL MATERIAL FROM EDUCATIONAL ALTERNATIVES FOR BOATING SAFETY PROGRAM AND ILLUSTRATIVE MATERIAL FOR LOADING RELATED EDUCATIONAL PROGRAM)

Have someone on the dock hand you your gear.

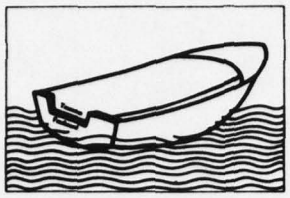
When all supplies and equipment have been loaded and secured, your passengers may board. Hold the boat steady for them and make sure they sit so that the boat is stable and balanced.

You might remind your passengers to remain seated. They should move only when you reduce your speed or stop. The forward motion of the boat does change its stability characteristics.

- Remember, careful loading and the safety of the passengers is *your* responsibility.

What Is Freeboard and How Can I Determine It?

Freeboard is the vertical distance from the waterline to the boat's lowest edge above the water where water can enter inside the boat. This is usually the position on the transom where the outboard motor is mounted.



Freeboard

Tp maintain the boat's stability and maximum freeboard, you should always load your boat so that the weight is distributed evenly not only from fore and aft, but from side to side.

In loading your boat, you should consider how weight affects stability even though it is correctly distributed. Equally important is that the more weight you put into your boat the lower it will be in the water (the boat will have less freeboard.) That is, with more weight, there is less distance from the waterline to the lowest edge of the boat which will let water inside.

Many boats with low freeboard have swamped from waves or wakes and from persons suddenly moving to the back of the boat.

Overloading your boat will reduce its freeboard.

It is up to you to decide whether or not you should carry the full amount of recommended weight depending upon the weather and water conditions, etc.

Make sure you do not exceed
outboard motor since too
the freeboard and will
lems at high speed.

Too large a motor
board.

You can see that low freeboa
able weather and water
passing boats could produce

After you have loaded your
are aboard, a good practice
board.

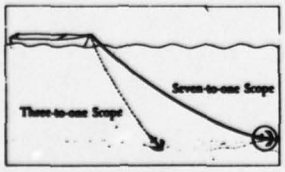
You should consider any
movements since these, too,

- Remember, a boat with
swamped than a boat

When anchoring, here are some things to consider. First, make certain that your anchor line is long enough to make the anchor fast (secure). If the line is too short, the anchor's holding power will be insufficient and the boat will drift. This is especially hazardous when anchoring overnight where no one is awake to watch if the anchor begins to drag.

Another very important aspect of line length is that when the limit of a short line is reached, the boat could suddenly capsize. This is especially important in rivers where the current is constantly exerting force on the anchor line.

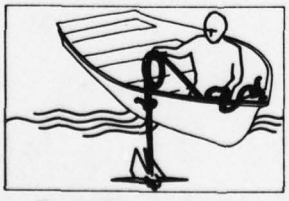
The safe ratio of anchor line-to-water depth, or scope, is seven-to-one. For example, if the water depth is 20 feet, then your line should be 140 feet.



Seven-to-one scope is best.

Remember, any weight or downward tug on the anchor can pull the boat down further into the water. A ratio of five-to-one may be adequate, but a ratio of three-to-one can be dangerous.

To anchor your boat, secure the line to some part of the boat at the forward end. Then, guide your boat slowly to the spot where you wish to anchor and, from the bow, carefully lower the anchor until it hits the bottom. Never throw or heave the anchor out of the boat.



Always lower the anchor from the bow.

Make sure the anchor digs in or sets. The line can then be played out with the boat running slowly in reverse until the length of line is about seven times the depth of the water. Recheck to see that the line is secure and shut off the motor.

Be prepared to cut the line in an emergency. Floating or submerged objects in the current can strike the anchor line and pull the bow lower in the water.

When recovering the anchor, the same hazards hold and you should exercise just as much caution. To free the anchor, always "run up" over it with the motor or oars. Never pull the boat up to the anchor using the anchor line. The anchor should be pulled up slowly from the bottom.

Where Can I Find Out More About Boat Operation?

This pamphlet has discussed a few of the questions you or your passengers may have had about boating. If you have other questions about the operation of your boat, contact a local United States Coast Guard Auxiliary flotilla or United States Power Squadron unit. They offer classes and they can make a lot of information available to you.

- Remember, when you go out in a boat, your passengers and other boats are assuming that you're a boater. And that implies that you know things like *rules of the road*, what distress signals mean, and many other things not commonly found on land.

Because if you're a boater.
you're obligated to know, you know.

Defini

AFT - the rear area or ste
of the boat (where the
ed) is usually the fart

BOW - the forward end o

CAPACITY PLATE - a pla
maximum weight cap
power rating.

CAPSIZING - a turning
from a rolling motion.

CENTER OF GRAVITY
point where the total
everything aboard cou
the same effect on the
evenly distributed.

FORE (or forward) - the
bow is the foremost p

FREEBOARD - the vertic
to the lowest part of
enter inside the boat.

HULL - the main body of
often used in small
round bottom, and

Make sure you do not exceed the recommended size of outboard motor since too large a motor will reduce the freeboard and will create serious operating problems at high speed.

Too large a motor will reduce your freeboard.

You can see that low freeboard coupled with unfavorable weather and water conditions or wakes from passing boats could produce flooding of the boat.

After you have loaded your boat and all your passengers are aboard, a good practice is to check on your freeboard.

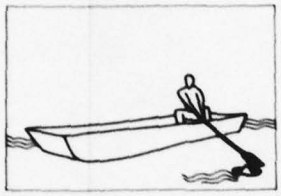
You should consider any necessary passenger or cargo movements since these, too, will affect your freeboard.

- Remember, a boat with low freeboard is more easily swamped than a boat with higher freeboard.

What Other Kinds of Things Might I Be Doing That Would Affect the Stability of My Boat?

Virtually any type of activity or movement in a boat, and particularly a small boat, will to some extent affect its stability. These movements include such things as moving from one position to another within the boat, fishing and hunting activities, anchoring activities, making adjustments to the outboard motor or emergency repairs, getting in and out of the boat, and recovering objects or persons from the water.

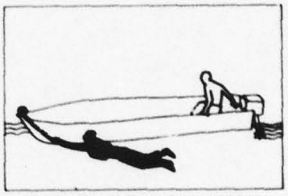
To recover any object from the water, bring the boat as close to the object as possible. Avoid leaning over the edge of the boat since this reduces its stability the same as unbalanced loading. If your weight is extended over the edge, your chances of going overboard as the boat rolls are likely.



Use a paddle to help recover objects from the water.

If you need to recover a person from the water, be especially careful considering the lowering of the freeboard and the balance of the boat. Freeboard may be less affected by pulling the victim in over the bow. Pulling a victim in over the side can easily swamp or capsize the boat.

Usually the most stable place for a victim to get aboard is the stern. But the stern also has the least freeboard and already bears the weight of an outboard motor. It is a matter of your judgement here. You may find it safer for all persons concerned to leave the person in the water, especially if you are close to shore. Secure them to the forward part of the boat, and slowly tow them to shallow water. Always watch out for the propeller when a person is in the water near the boat.



Tow the person from the front of the boat.

Definitions

AFT - the rear area or stern of a boat. The transom of the boat (where the outboard motor is mounted) is usually the farthest aft part of the boat.

BOW - the forward end or front of a boat.

CAPACITY PLATE - a plate or label in a boat giving maximum weight capacity and maximum horsepower rating.

CAPSIZING - a turning over of the boat, resulting from a rolling motion.

CENTER OF GRAVITY (CG) - the hypothetical point where the total weight of the craft and everything aboard could be centered to produce the same effect on the hull as if the weight were evenly distributed.

FORE (or forward) - the front area of a boat. The bow is the foremost part of the boat.

FREEBOARD - the vertical distance from the water to the lowest part of the boat where water can enter inside the boat.

HULL - the main body of a boat. Some hull designs often used in small boats include flat bottom, round bottom, and semi-V hulls.

COAST GUARD

APPENDIX I-2. (concluded)

APPENDIX I-3. SCRIPT FOR TELEVISION SPOTS (10 SECONDS EACH) USING COMPUTER ANIMATION OF EDUCATIONAL LOGOS*

Example using Sailboat Logo Animation:

"DO YOU KNOW IF YOUR BOAT WILL FLOAT WHEN SWAMPED FOR CAPSIZED? HAVE YOU VERIFIED IT UNDER CONTROLLED CONDITIONS? CHECK YOUR BOAT FOR ITS OWN FLOTATION CHARACTERISTICS."

Example using General Endorsing Logo Animation:

"DO YOU KNOW IF YOUR PFDS WILL SUPPORT THE SAME WEIGHT AS LAST YEAR? PFDS LOSE BUOYANCY AS THEY AGE. TRY YOUR PFDS BEFORE BOATING THIS SEASON."

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* Audio track prepared by the Coast Guard can be included; however, an alternative utilization of the computer animations is to have messages written locally in conjunction with the national program objectives. Audio track is then recorded at a local television station.

APPENDIX I-4. SCRIPT FOR RADIO SPOT (30 SECONDS)

(SFX: OUTBOARD MOTOR REVS UP ..... DRIVES OFF INTO DISTANCE)
IF YOU'RE A BOATER,THIS SOUND IS MUSIC TO YOUR EARS. THIS SOUND SHOULD STRIKE TERROR IN YOUR HEART...(SOUNDS OF HEAVY WATER SLOSHING AND WOMEN AND CHILDREN'S SCREAMS)...WOULD YOU KNOW EXACTLY WHAT TO DO IN CASE YOUR BOAT CAPSIZES? IF NOT,BE SURE TO FAMILIARIZE YOURSELF AND EVERYONE THAT RIDES IN YOUR BOAT WITH SAFETY PROCEDURES TO FOLLOW IN CASE YOUR BOAT SWAMPS OR CAPSIZES. ALWAYS STAY WITH YOUR OVERTURNED BOAT AND DON'T PANIC. FOR MORE INFORMATION ON BOATING, CONTACT THE COAST GUARD AT 1-800-594-6000.

APPENDIX I-5. SCRIPT PREPARED BY LOCAL POWER SQUADRON MEMBER J. BOWMAN FOR USE WITH SUPER 8 FILM IN POWER SQUADRON COURSE

REMEMBER THE TWO FISHERMEN AT DECATUR A COUPLE OF YEARS AGO...AND THE KID WHO DROWNED BELOW THE GUNTERSVILLE DAM? HERE ON THE TENNESSEE RIVER AND LAKES WE HAVE OUR SHARE OF CAPSIZING, SWAMPING ACCIDENTS.

DID YOU KNOW THAT NATIONALLY NEARLY A THOUSAND PEOPLE DIE EVERY YEAR AS A RESULT OF THESE TYPE ACCIDENTS?

DID YOU KNOW THAT EVEN THOUGH YOU ARE MUCH SAFER (AND MUCH MORE LIKELY TO SURVIVE) STAYING WITH YOUR BOAT MOST PEOPLE SWIM AWAY?

DID YOU KNOW THAT THIN, YOUNG HEALTHY MALES ARE IN MORE DANGER IN COLD WATER THAN HEAVIER PEOPLE?

DID YOU KNOW THAT MANY, MANY PEOPLE DROWN TRYING TO SWIM ONLY A FEW HUNDRED FEET TO SHORE?

FINALLY, DID YOU KNOW THAT THE FEDERAL LAW DEMANDS THAT ALL BOATS UNDER 20 FEET IN LENGTH BE CERTIFIED TO FLOAT - EVEN WHEN FILLED WITH WATER AND THAT YOU ARE RESPONSIBLE FOR YOUR BOAT AND PASSENGERS' SAFETY?

EVERY BOAT OWNER SHOULD BE KEENLY AWARE OF THE FOLLOWING:

HOW FAR FROM SHORE HE IS APT TO BE WHERE HE BOATS.

HAVE A DEVELOPED MENTAL PLAN OF ACTION IN CASE OF SWAMPING OR CAPSIZING.

IMPLEMENT THAT PLAN IN SUCH AN EMERGENCY.

HERE ARE SOME THINGS TO REMEMBER:

IF YOU CAN'T SEE INDIVIDUAL LEAVES ON A TREE, IT IS PROBABLY TOO FAR TO SWIM.

UNLESS YOU ARE IN VERY COLD WATER, OR IT IS NIGHT OR NO ONE CAN BE EXPECTED TO COME BY, YOU SHOULD NEVER TRY TO LEAVE YOUR BOAT.

IF YOU ARE IN THE WATER, USE YOUR PFD TO HELP KEEP WARM - DON'T MOVE ABOUT.

IF YOU MUST SWIM, TAKE YOUR TIME - YOUR STRENGTH CAN DISAPPEAR RAPIDLY. TAKE A FLOTATION DEVICE WITH YOU BY ALL MEANS.

KEEP A FLASHLIGHT OR FLARES AND A FLAG WITH YOU FOR SIGNALLING.

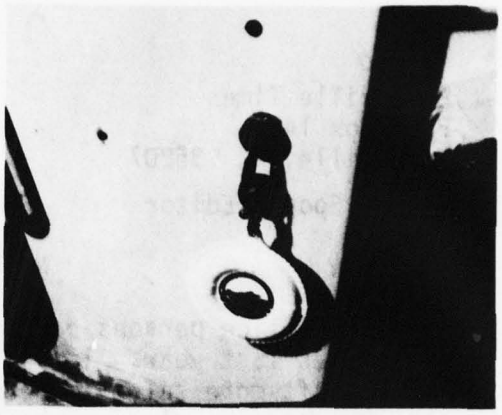
GAS TANKS, COOLERS, SEAT CUSHIONS - MOST ANYTHING (EXCEPT THE ANCHOR) WILL FLOAT - USE IT.

KEEP CALM, KEEP OTHERS CALM, STICK TO YOUR PLAN.

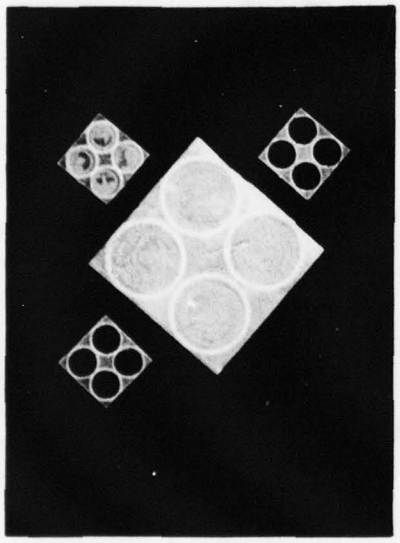
REMEMBER TOO, AS A BOAT OWNER YOU ARE OBLIGATED TO KNOW THESE THINGS.

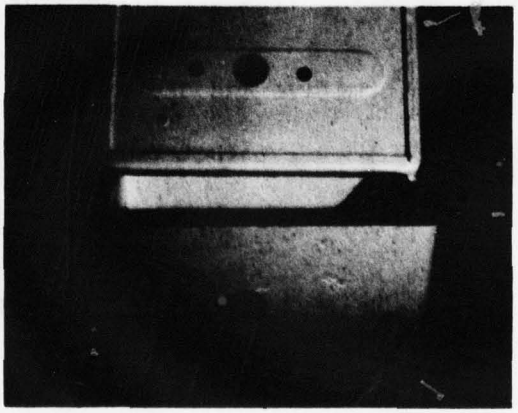
APPENDIX I-6. PHOTOS OF ADVERTISING SPECIALTIES
FOR LOADING RELATED ACCIDENT EDUCATION -
FLOATING KEY CHAINS WITH EDUCATIONAL PROGRAM LOGOS
AND REFLECTIVE STICKERS

Sample floating key chains for boat ignitions:



Sample of reflective stickers:





APPENDIX I-7. COPY FOR NEWSPAPER SUPPLEMENT INSERT

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD
WASHINGTON, D.C. 20590
PHONE:

• 1 December 1977

Huntsville Times
P.O. Box 1487
Huntsville, AL 35807

Attn: Sports Editor

NOTE TO EDITOR

Over 50 million persons participated in recreational boating activities last year. In an effort to help boaters operate their craft more safely and enjoy the pleasures of boating the enclosed articles are being made available for use in your publication.

The features may be used in whole or in part since the subjects are designed for maximum versatility. Long articles may be cut and printed in sections beginning at each subhead. The Test Your Knowledge sections are programmed to obtain the highest number of correct responses whether used in conjunction with the stories or alone. Boating Tips are fillers of varying length.

We hope you find them informative and useful.

Sincerely,

John Doe
USCG Office of Boating Safety

JD/fo

(Definitions of load related terms - included to insure the reader's understanding of the terms used in the articles and as a means of reinforcing the concepts).

BOATING TIPS

Nautical terms can be confusing to the novice boater. Here's a short list of common boating terms to spice up your 'ol salt vocabulary.

ABOARD - On, in or into a boat.

AFLOAT - On the water.

AFT - Near the stern.

AGROUND - Touching bottom.

AMIDSHIP - Describing the midsection of a vessel, with reference to either length or width.

ANCHOR - A forging or casting shaped to grip the sea bottom and, by means of a cable or rope, hold a boat in a desired position.

ASTERN - Toward the stern.

BAIL (BALE) - To remove water from the boat by pump or bailer.

BEAM - A vessel's width amidship, imaginary line amidship at right angles to the keel.

BOW - The forward part or front of the boat.

CAPACITY RATING PLATE - Gives maximum weight, capacity and horsepower rating.

CAPSIZE - To turn over.

CENTER OF GRAVITY (CG) - The hypothetical point where the total weight of the craft and everything aboard could be centered to produce the same effect on the hull as if the weight were evenly distributed.

DECK - Any permanent covering over a compartment, hull or any part thereof.

DINGHY - A small open boat.

DISPLACEMENT HULL - Type of hull that plows through the water even when more power is added.

DRAFT - The depth of the vessel below the waterline, measured vertically to the lowest part of the hull.

FORWARD - Toward the bow.

FREEBOARD - The vertical distance measured on a boat's side amidships from the water line to the gunwale (the lowest part of the boat where the water can enter inside the boat).

GUNWALE - The upper edge of the boat's side. (Pronounced gun-nel.)

HELM - The wheel or tiller by which a ship is steered.

HULL - The body of a boat.

KEEL - A permanently positioned, principal fore-and-aft backbone member of the boat's hull used for stability and ballast.

KNOT - A unit of speed equal to one nautical mile (6,076.10 feet) an hour.

LEE - The side opposite to that from which the wind blows.

LEEWARD - Situated on the side turned away from the wind. (Opposite of windward.)

LEEWAY - The amount a boat is carried leeward by the wind's force.

LOADING - The placement and arrangement of supplies, people and gear aboard a boat.

MOORING - The anchor, charin, buoy, pennant, etcetera by which a boat is permanently ancnored in one location.

MOTOR - A source of mechanical power.

MOTORBOAT - Any watercraft propelled by machinery, whether or not such machinery is the principal source of propulsion.

OAR - A long wooden instrument with a flat blade at one end, used for propelling boats.

PFD - Personal Flotation Device.

PITCH - The fore or aft movement as the bow and stern rise and fall due to wave action.

PLANING HULL - Type of hull that is shaped to glide easily across the water at high speeds.

PROPELLER - Piece of equipment connected to the lowest part of the drive shaft on all motors. It spins to move the boat.

ROLL - The sideward motion of the boat caused by wind and waves.

ROLL STABILITY - A balancing of side to side rotational motion of the boat in the water.

RUDDER - A device used for steering and maneuvering, usually flat sheet metal attached to a stern or rudder post - not necessary on outboards because the motor can be moved to change direction of thrust.

BOATING TIPS (concluded)

SCOPE - The length of anchor line. 7 to 1 scope means the length of anchor line from the boat to the anchor is seven times the water depth.

STERN - The back part of after end of a boat.

STOW - To pack cargo or equipment.

SWAMPING - Flooding the boat with water.

TILLER - A boar or handle for turning a boat's rudder or a outboard motor.

TRANSOM - The traverse planking which forms the afterend of a small square-ended boat. Outboard motors are usually attached to the transom.

TRIM - To arrange weight in a vessel in such a manner as to obtain the desired draft at bow and stern.

UNDERWAY - Vessel in motion, i.e., when not moored, at anchor or aground.

VESSEL - Every kind of watercraft, other than a seaplane on the water, used or capable of being used as a means of transportation on the water.

WAKE - Moving waves, track or path that a boat leaves behind when it is moving across the water.

WAY - Movement of a vessel through the water. Technically UNDERWAY. The common usage is interpreted as movement through the water: HEADWAY when going forward and STERNWAY when going backwards or astern.

YAW - The side-to-side deviation of a boat from its course caused by bad steering or heavy seas.

PERFORMANCE, POWER AND CAPACITY

Versatile Boats and Motors Provide Many Options for Buyer Consideration.

One of the first questions asked when the boat buyer begins his search is "Which boat is the right one for me?" Of the 341,000 outboard boats sold last year, the most popular was in the 14 foot range with a 40 horse motor. The popularity of a detachable lightweight motor on a trailerable boat is based on its versatility, dependability, relative low cost and operating simplicity.

When looking at the vast array of boats on the market, there are two basic performance types to consider: the planing hull and the displacement hull. The decision to further examine the various types of planing hulls which skim over the water's surface or the displacement hulls which plow through the water must be based upon the boat's ultimate use, individual preference, type of propulsion and of course, the cost.

Let's examine the characteristics of the six basic planing and displacement hull designs.

Flat bottom boats plane easily. Skiffs, johnboats, prams, deluxe houseboats, runabouts and hydroplanes are potentially very fast boats. But they are dangerous and very hard riding at high

speeds in rough water. Continuous severe pounding could damage the hull unless speed is reduced to displacement speed. They are not as seaworthy as similiar size displacement hulls and should be used near shore in relatively smooth and protected waters.

V-bottom and deep-V hulls are also designed to plane at high speeds. They may be either planing or displacement hulls depending on the design of the bow section which may range from shallow, flared-V to a deep-V. In both instances, the V flattens out along the bottom which increases seaworthiness and improves the quality of the ride.

Round bottom boats, such as canoes, move easily at slow speeds. They have a tendency to roll unless there is a large flat area near the stern. Boats with round bottoms and displacment hulls are very seaworthy when properly handled under the conditions for which they were designed.

A catamaran hull is very stable twin-hulled design that can be either planing or displacement depending on the shape of the two hulls. Power boats usually have planing type bottoms and sailboats normally have displacement bottoms.

The cathedral hull, a combination deep-V and catamaran, is very popular in many fiberglass cruisers. The twin tunnels along each side of the main kelp trap the spray when planing over waves and help cushion the ride.

Each different boat design has its own hull speed, that is, the safest speed at which that particular type of hull is designed to operate. In boats with displacement hulls, the hull speed is limited to 1.32 times the square root of the length of the waterline. Thus, a boat with a waterline length of 25 feet would have a hull speed of about 7 knots. (One knot is equal to the speed of one nautical mile - 6,076.10 feet - per hour.)

With displacement hulls, there is very little actual speed increase to be realized above the maximum hull speed, even when horsepower is increased. Adding extra horsepower only creates more drag, increases fuel consumption and makes the boat more difficult to control.

In comparison, conventional planing hulls are designed to perform at maximum efficiency when operating at high speeds. During peak performance, the wake spreads behind the boat with the thrust downward and outwards. Under low planing speeds, the excessive wake is evident by the

water displaced along the sides of the boat.

There's another formula to estimate the approximate speed of boats with planing and semi-displacement hulls where only moderate horsepower is required to lift the hull out of the water as the speed increases. It's called the 30/30 rule:

1 HP will push 30 pounds, 30 mph
10 HP will push 300 pounds, 30 mph
100 HP will push 3000 pounds, 30 mph

Any change in weight equal to one tenth (1/10) the boat's total weight will change the speed 2 mph. For instance, if you added 300 pounds to the 3000 pound boat. the speed would drop to 28 mph. Conversely, if you removed 300 pounds from the 3000 pound boat, the speed would increase to 32 mph. When estimating speed, gross weight (weight of the hull, motor, passengers and equipment combined) should be used.

The 30/30 rule is good for calculating any speed of a planing hull between 20 and 40 mph. Below 20 mph, the hull assumes displacement characteristics and above 40 mph, it tends to "break-out" and assumes race boat characteristics as air is forced under the hull.

There is another way to estimate optimum speed using the propeller pitch method:

Speed (mph) = Prop. pitch (inches) - 1 - 25% (slip) for every thousand propeller RPM

For example, if your propeller has a pitch of 17 inches, your boat's speed will be 17 minus one, or 16 less 25% (4) equals 12 mph for every thousand propeller RPM and 36 mph at 3000 propeller RPM.

The propeller pitch has one distressing disadvantage, you need to know the propeller RPM and not engine RPM as shown on the tachometer. If your dealer can tell you what the gear ratio is, you can calculate propeller RPM from engine RPM; e.g., in a 2:1 gear ratio the propeller will turn at one half the speed of the engine.

When a boat with a displacement hull moves faster than the water it displaces can return to fill the void, a powerful suction will cause the stern to ride low in the water. If the boat is overloaded, it will respond slugishly to rudder control and wave action. The inertia of the weight of the bow or stern will slow the boat's reaction to waves and water may be taken onboard.

To avoid overloading your boat or purchasing one that won't hold your family, here's how to estimate the safe weight load for a small craft. First, determine the length of your boat by

measuring it from one end to the other in a straight line parallel to the centerline of the boat and the water's surface. The transom well is within the hull and should be included in the length measurement. Do not include anything such as an outboard motor or bowsprit which extends beyond the hull.

Then multiply the boat's length (in feet and tenths of feet) by the beam (width) and multiply the product by the minimum effective depth of 7.5.

$L \cdot B \cdot 7.5 =$ Safe Load

The result of these calculations is the approximate number of pounds of gear and passengers the boat can safely carry under normal operating conditions.

Most boats under 20 feet have a capacity rating plate attached to the transom (that part of the stern which supports the motor) and located in full view of the operator's station. The rating plate information is very helpful when purchasing the proper size outboard motor to match a particular boat, since it gives maximum load and horsepower ratings. Do not exceed the manufacturer's recommendations, since the boat's performance and handling characteristics would be adversely affected. The ratings are based upon field testing of the equipment under normal operating conditions and calculations of the weight

carrying capacity formula described below.

If your boat doesn't have a capacity rating plate or if you want to estimate the load potential of a prospective purchase, here's a simple way to determine the maximum number of passengers the boat can safely carry.

Multiply the Length by the Beam (width) and divide by 15:

$$\frac{L \cdot B}{15} = \text{Number of passengers.}$$

Using this formula, a boat 15 feet long and three feet wide could carry three persons safely. If your answer results in a fraction, adjust the passenger load to the next lowest whole person. Remember counting the number of seats in a boat does not indicate safe carrying capacity!

As with all formulas, this is merely a guide for the operator to apply to a particular loading situation. Weight distribution, operating conditions, boat design and the operator's experience must also be taken into account. Never overload your boat with passengers or gear. It is safer to make two trips than to make one dangerous trip that could result in disaster. The amount of time saved is not worth risking an accident.

BOARDING LIKE AN EXPERT: 18 TIPS TO MAKE YOU LOOK GOOD

The way you board your craft will show just how much you really know about boating. Here are a few boarding and equipment loading tips to make you and your crew look like experts.

- Before stepping aboard check all mooring lines to be sure they are secure and will hold the boat steady.
- If boarding from a dock or low pier, step aboard as near to the center as possible.
- Keep your hands free, make sure your footing is firm, bend low and grasp the gunwale for balance.
- If you have to load and attach an outboard motor, have someone hand it to you from the dock. Set it down on the stern floorboards and hook up the safety chain from the motor to the boat. Clamp the engine bracket down tight, then double check the safety chain to be sure it's tight and out of the way.
- Have extra gear handed to you and stow it safely out of the way.
- Maintain as much clear deck space as possible - remember the old saying;
  "A place for everything, and everything in its place."
- Arrange gear so that a center aisle along the keep is kept clear. That

way no one will have to step near the sides when changing positions.

- Tie down any heavy gear to prevent possible load shift when underway.
- Make sure all PFDs and fire extinguishers are readily accessible. The PFDs should be stowed within arms reach of everyone's seat if they aren't being worn.
- Once all the supplies and gear are stowed, steady the boat and help the other passengers climb on board.
- Don't let passengers jump or leap from the pier. Instruct them to transfer their weight smoothly while keeping their center of gravity as low as possible.
- Make sure passenger weight is balanced before casting off. Tell passengers to remain seated and to use caution if moving about while the boat is underway.
- Ask passengers to tell you if they want to change seats. This will help to maintain proper load balance and avoid the problem of several passengers trying to simultaneously move about unannounced.
- Passengers should remain seated while underway. Avoid all careless horseplay. Rocking, splashing, arms and legs dangling overboard, riding on decks and gunwales or even leaning over the bow could cause someone to fall overboard.

BOARDING LIKE AN EXPERT: 18 TIPS TO MAKE YOU LOOK GOOD (concluded)

- All passenger weight should be concentrated along the centerline, if possible. Try to evenly distribute weight so the boat is properly trimmed and balanced.
- Check the boat's freeboard when everyone is on board. Too much weight means too little freeboard and the possibility of water flooding over the transom and swamping the boat. NEVER OVERLAD THE BOAT!
- Make sure the maximum capacity requirements have not been exceeded. An overloaded boat is dangerous and in some states illegal.
- Before shifting positions, cut the motor to idle and have the passengers change seats, one at a time, moving low and using the gunwales for support. Everyone else should remain seated and watch, shifting their weight to counterbalance the weight change as needed.

Now that you know the right way to load and board, take a look around the dock and see how many "boaters" don't.

THE CENTER OF GRAVITY

How often have you told your passengers to sit down and stay seated while underway only to have them furl their brow and silently wonder why? Have you ever given much thought to what really causes a boat to tip over? Probably not, because most boaters believe it will never happen to them.

Here's the technical explanation so the next time someone asks you how a boat capsizes you can confidently explain the facts of floating to your landlubber friends.

Every boat has a center of gravity established by the vertical and horizontal distribution of the weight of its load. The boat's actual center of gravity is that point where the total weight mass of the craft and its load could hypothetically be centered in one spot, yet still produce the same effect on the hull. The stability of a boat is directly related to the hull shape beneath the waterline and to the height of the center of gravity. When the center of gravity shifts due to weight moving to another position, the hull's shape changes underwater and becomes less stable.

THE CENTER OF GRAVITY (concluded)

Thus, different types of hulls respond differently to load shift. All hulls will roll, that is they will rock from side to side, in direct response to changes in gravity and buoyancy. Gravity holds the boat down in the water and buoyancy pushes the boat up so it floats.

When the center of gravity is low, such as when everyone is seated and their weight is evenly distributed, the boat is fairly stable, and will not roll as much nor as often compared to when the center of gravity is raised high above the waterline. This happens everytime someone stands and changes positions. The center of gravity is higher, and since the boat is more unstable, it is more likely to roll. If the person standing were to shift his weight drastically or fall off balance, the rate of the roll would be faster and less controlled. The chance of the boat rolling and tipping, throwing the passenger overboard has greatly increased.

That's why you, as the skipper, should caution your passengers to remain seated while underway and stay low when changing positions.

TEST YOUR KNOWLEDGE

1. _____ hulls skim over the water's surface.
2. Round bottom canoes have _____ hulls which plow through the water.
3. A johnboat and an hydroplane both have planing hulls which make them dangerous at _____.
4. Adding extra horsepower to a boat with a displacement hull creates more drag, _____ fuel consumption and makes the boat hard to _____.
5. In comparison, a planing hull requires _____ horsepower to perform at maximum efficiency.
6. How would you calculate the approximate number of pounds a boat can safely carry? Hint:

   _____ _____

   · _____ = Safe Load
7. If you wanted to know the maximum load and horsepower rating for a boat you would read the _____ _____ ususally found on the _____.
8. If your boat doesn't have a capacity rating plate on the transom, what formula would you use to determine the number of passengers it could safely carry?

TEST YOUR KNOWLEDGE (concluded)

9. If your boat is 12 feet long and has a five foot beam, how many passengers will it safely carry?
   Hint: $\frac{L \cdot B}{15} =$

10. Counting the number of seats in a boat _____ indicate safe carrying capacity.

TRIM YOUR BOAT AND YOUR FUEL BILL

If a quick check at the gas dock indicates your fuel consumption seems higher than normal, check your boat's trim -- it may need adjusting.

Trim is not the ornamentation or racing stripe design edging the bow. Trim means the arrangement of load weight in a way to obtain the desired draft at the bow and stern. For efficient performance, a boat's trim must be properly adjusted. The easiest way to understand how to correctly trim your boat is to experiment with load shifts.

Here's how. simply rearrange passengers and equipment until your boat can plane easily at its optimum speed. The bow will be raised just high enough not to block your view and the hull will skim lightly over the water's surface. By adjusting the load weight backwards and then forwards, or even shifting from side to side, you will be able to detect substantial differences in the ease and efficiency of your boat's performance. While experimenting, as when cruising, never exceed the capacity limitations of your craft.

Besides shifting the load factor, there are several other ways to adjust your boat's trim. First make certain the

power package matches the manufacturer's specifications. If the motor is too large and heavy for the particular boat, it will force the bow up into the air and cause the stern to ride low in the water. This can be dangerous because it reduces stability and freeboard (the distance between the water and the top of the boat's side). Heavy motors also add extra stress to the hull and transom and could reduce structural strength if not designed to fit the boat. Over-powering is very dangerous and causes inefficient engine operating which wastes fuel.

Some outboards with high performance engines have a remote control hydraulic tilting mechanism that allows the skipper to adjust the trim while underway. Being able to adjust the engine angle and balance the craft at the push of a button means a safer, more efficient and comfortable ride for everyone onboard.

For most of us operating with the typical outboard motor, adjusting the trim is a different operation entirely. The trimming device on an outboard motor is a mounting bracket with five holes for a tilt pin. The location of the pin determines the angle between the boat's engine and the transom.

Usually when the motor is in proper running position, the drive shaft is straight up and down; not canted in toward the stern nor angled away from it. If the boat is properly loaded and the drive unit is too close to the transom, it will cause the boat to run with its bow down and plow into the waves. The stern will be raised slightly out of the water and steering will be difficult. However, if the boat's stern is heavily loaded (but not exceeding capacity limitation) and the water calm, moving the tilt pin to a forward hole would correctly adjust the trim for that type of load condition.

If the boat is carrying a normally balanced load and the shaft is tilted too far away from the transom, the boat's bow will ride out of the water and not steer properly. Operating a boat "down by the stern" could cause the following wake to go over the stern and flood the boat if you were forced to suddenly shut the engine down. But if you are carrying a heavy load forward in the bow (not exceeding capacity limitation), setting the tilt pin in the aftermost hole could provide proper trim adjustment.

On large boats where the propeller angle is fixed, the hydraulic trim tab on the transom controls the angle of

the craft's stern in the water. As the boat's speed increases, the trim tabs exert downward pressure on the water and lift the stern to prevent it from settling too far down. Like the outboard's tilt pin, when properly adjusted for the load and water conditions hydraulic trim tabs can boost a boat's speed and efficiency and save some money of your fuel bills, too.

WATCH THE WEATHER

Survival Skill for the Boater

Fresh air, a mirrorlike sea, the tranquility of gently pulsating swells, everchanging hues of translucent green and blue entice many a boater far from shore. But be wary - nature can create an instant nightmare of raging winds and pounding crests of phenomenal force and you could be trapped - fighting the elements!

Weather and water conditions are critical to the safety and stability of small boats. The best way to handle a small boat in bad weather is to avoid it - if you can. The other way is to always be prepared for the worst. Unless you know how to get maximum performance out of your boat under all conditions, stay close to shore. It's a good idea to leave a float plan with a friend, telling when you expect to return. Then if something happens, search and rescue operations can being. (Don't forget to cancel that float plan if you return early!)

Before you have to face strong winds, heavy seas and tricky currents, experiment with your craft in calm water to learn its idiosyncracies.

Know how and why the propeller and rudder make the boat respond in a certain way. Watch how different trims and load

balance affect your boat's performance. Gradually get the feel of your craft in varying wind and weather conditions. As your operating skills improve so will your confidence in the boat's performance.

Always listen to the weather forecasts and check the barometer before leaving home. Low barometer readings usually mean stormy weather approaching. High barometer readings are associated with clearing or fair weather. How fast a storm is approaching and its intensity are indicated by the amount of fall in the barometer reading. If there is a strong chance of bad weather, cancel the cruise and stay home. If there is only a slight possibility of high winds, rough water or heavy seas, keep your load light, evenly distributed and plan to stay near shore. Even if that water is smooth, watch out for rising offshore winds which could cause rough water conditions.

Generally if the wind shifts clockwise (North through East, South and West), it is a sign of good weather. But if the wind "backs", or shifts counter-clockwise (North through West, South and East), bad weather may be coming. Clouds with flat bottoms or anvil-shaped tops forming near the horizon usually indicate an upcoming squall. If you see threatening clouds approaching, plan ahead to

make sure you can reach shore safely before bad weather and water conditions exceed the safe operating limits of your boat. In the event your motor is not operating properly or you are low on fuel, head for shore fast.

If you do get caught in a storm, there are a few things you can do to help insure your chances of survival. First, get everyone, including yourself, into a wearable personal flotation device. Wearable PFDs allow everyone to keep his hands free, so he can keep a hand on the boat when the going gets rough. Place other throwable flotation devices, such as buoyant cushions and ring buoys, where they are immediately available in case anyone falls overboard.

To avoid falling overboard, have everyone sit on the deck or as low on the seats as possible. Keeping his center of gravity low and concentrating the weight in the center helps the boat to return upright after a strong roll. Also, the bow and stern will have more buoyancy to ride up and down without getting buried in the waves.

Check your fuel level. If one tank is nearly empty, switch to a full one since you may not be able to shift in rough water, and you don't want to be

without power. If you have more than one fuel tank and one is located higher than the other, always use up the fuel in the higher one first. Why? Because a 50 gallon tank weighs 325 pounds and your boat could become unstable if the weight is first reduced below the waterline.

Be sure to close all hatches, windows, portholes, and doors to keep the water and spray out of the boat. If you have portable items on board, such as gasoline cans, anchors, and ice chests, lash them down tightly near where they are to be used, but not underfoot.

Here are a few hints on how to properly handle your boat in heavy seas. When heading into the waves, adjust the boat's speed to just below the speed where the engine begins to plane. This helps to keep the hull deep enough in the water, so the rudder and propeller can still be effective while lifting the bow just enough to prevent being buried in the oncoming wave.

Whenever possible, try to ride the waves crest and still maintain sufficient hull contact with the water to counteract the wind's tendency to blow the boat sideways and out of control. If the waves are heavy, steer the boat so the bow takes the waves slightly to the left

or right. This maneuver is called quartering.

Adjust the trim and use only enough power to keep the boat heading into the waves. If necessary, readjust the power so the waves don't pound the hull. Keep the boat from taking waves cross-ways or over the stern. It could take on water and swamp.

Running before heavy seas can be very dangerous, especially for outboards with low transoms. If yours is low, it would be best to run the bow into the wind and ride out the storm. If you absolutely must run with the wind and your boat has a high stern and plenty of free-board, keep an eye on the waves follow-ing you.

To avoid broaching - being swept sideways and possibly rolled - keep the stern square to the big waves. If experiencing severe conditions, quarter the stern slighting at an angle to the approaching wave. That way less of the transom is exposed to the full force of the wave. This keeps the stern from being lifted so high that the bow is forced down into the water. If the boat is quartered properly, the sea will lift the stern and pass harmlessly under the boat.

Should your engine lose power, the sea will immediately force your boat sideways into the trough (the area between the waves). This is extremely dangerous, since the force of the waves are now pounding the weakest part of the boat, the sides, instead of the bow. In such an emergency, use a sea anchor or substitute a bucket and tie your anchor line to the handle or to anything that can be thrown out to create a drag. Be sure the other end of the 40-50 foot line is securely tied to the bow of the boat. The sea anchor's extra drag will rpovide considerable resistance to prevent the waves from forcing the boat into a trough. The sea anchor will hold the bow into the oncoming waves the same way an anchor keeps the bow pointed into the current when you anchor in a fast flowing river.

If your craft begins taking on water, start bailing. Either turn on the bilge pumps or have your passengers take turns with manual pumps or buckets. Should the boat begin to sink, never hesitate to lighten the load by tossing out excess baggage.

In an emergency, always try to remain calm and keep everyone seated low in the boat.

BOATING TIP

Overloading is the major cause of fatalities in boating. Know how to determine the safe load capacity and recommended horsepower for your boat. Read the capacity rating plate located on the transom of your boat. It indicates:

(1) The <u>total weight</u> your boat can safely carry. This includes your motor, passengers, equipment and even your hunting dog.

(2) The maximum number of 150 pound passengers that can be carried safely. If you exceed this weight load -- you could get into trouble.

(3) The maximum horsepower your boat can safely handle. Using twice as big a motor won't make you go faster. (But it may make you <u>go under</u> faster!) So follow the manufacturer's recommendations and match your boat and motor for the required use. But remember one thing, those recommendations do not relieve you, the skipper, of the responsibiility for exercising good judgment and common sense.

Safe boating is not merely a matter of luck. It is the combination of careful and systematic preparation in anticipation of possible problems. To be a good, responsible skipper, you must automatically know what to do and how to do it.

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
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NEWSPAPER FILLER MATERIAL: "BOATING TIPS"

Weather Cues

As a boater, you need to be sensitive to weather cues. For instance, wind shifts can mean that a sudden change of weather is on the way and static on the AM radio could mean that there are thunderstorms nearby.

###

Boating in Foul Weather

As a boater, you should know what to do when caught in foul weather. First, get everyone into his lifejacket and keep them seated. Reduce speed, secure all loose items, keep the boat free of water, and angle into the waves as you proceed to the nearest safe shore.

###

Small Craft Advisories

As a boater, you should know how to read weather information posted at local marinas or launch sites. For instance, a red pennant displayed by day or a red light over a white light by night, is an alert that wind and/or water conditions are potentially dangerous to small craft.

Although you may see these advisories displayed in what appears to be good boating weather and may be tempted to ignore them, don't! Experienced boaters take these advisories seriously and stay very close to sheltered water if they do proceed out.

###

APPENDIX I-9. COPY FOR FEATURE INTENDED FOR BOATING MAGAZINES

ABC's of PFD's

PFD's are the most important piece of safety equipment a boater can have on board. Unfortunately they are often the most non-used, misused or abused items aboard.

By Fay Ainsworth

Smiling flight attendants brief airline passengers about emergency procedures prior to takeoff. Overseas passengers are reminded that inflatable life vests or flotation cushions are stowed under the seat, readily available for any over-the-water emergency.

Even before leaving the dock, cruise ship passengers go through a life boat drill to acquaint them with emergency exit routes, lifeboat stations and the location of their life preservers. Each passenger must don and adjust his personal life vest to prepare him in the event of need.

Commercial whitewater raft trips assign and fit a special Type V Personal Flotation Device to each river runner. Complete adjustments are made on dry land and parents are warned not to allow their children near the raft without their life jackets, even when the raft is tied to shore!

Why all the precautions? Because commercial airlines, cruise lines and river outfitters have to comply with special laws and they want to maintain their current high safety records.

But what about you, the recreational boater? When was the last time you showed your passengers where the life preservers were stowed? Did you help them correctly adjust the fit? If you are like many boaters, you probably neglected to even mention the fact that you had them on board in the event of an emergency.

Nationwide statistics show that 1,264 persons died last year as a result of pleasure boating accidents. The majority of the victims did not have or were not wearing a personal flotation device (PFD) when the accident occured. Studies show that if PFDs had been available fatalities could have been reduced.

Why are PFDs so important? Let's review some common questions and find out.

What is a PFD?

A PFD or Personal Flotation Device is the name given to the more familiar life jacket or life preserver. A recreational boater (that's anyone who doesn't carry paying passengers) is required to obey certain U.S. Coast Guard regulations covering the type and use of PFDs when boating on waters under Federal jurisdiction.

What are those regulations?

If your boat is 16 feet or longer you are required to carry on U.S. Coast Guard approved Type I, II, or III (wearable) PFD for each person on board. In addition, you are also required to carry on approved Type IV (throwable ring buoy or buoyant cushion).

Buy my boat is under 16 feet, are there any regulations covering smaller boats?

Yes. On smaller boats, canoes, and kayaks there must be one U.S. Coast Guard approved buoyant cushion or wearable device (Type I, II, or III PFD) of board for each person.

What do the numbers I, II, III, and IV mean?

All Personal Flotation Devices are classified by their performance types. There are five approved types acceptable for boats of specific lengths. The chart on the next page compares the advantages and disadvantages of the different types and their minimum buoyancy requirements.

What does buoyancy mean?

Buoyancy is the force required to keep something afloat. Flotation depends on reserve buoyancy, that is the excess weight it can support that exceeds the amount of weight it must support. An 'approved' PFD provides a specified amount of buoyancy or extra flotation necessary to keep a person afloat for an indefinite period of time with his head and mouth clearing the water.

What does 'approved' signify?

The United States Coast Guard Office of Boating Safety and the Office of Merchant Marine Safety are charged by congress with the responsibility for the establishment and enforcement of design, construction and manufacturing standards for Personal Flotation Devices. All types of PFDs must undergo extensive testing by independent testing laboratories to verify that certain standards have been met. When a testing organization such as Underwriters' Laboratories recommends approval of a device to the U.S. Coast Guard a manufacturer may add the USCG APPROVED/UL 'Listed' label.

Does that mean not every PFD is approved?

That's right. Only those PFDs bearing a USCG APPROVED label

qualify. Other devices such as inflatable jackets, vests and belts have not been approved because the U.S. Coast Guard has not established testing standards to certify and approve inflatables for use by recreational boaters. Remember, although inflatable devices do not yet qualify as 'approved' PFDs, there is no law to prevent you from using or keeping them on board for extra safety.

Must PFDs be worn at all times?

No. The law only requires that wearable devices must be readily accessible and that throwable devices be immediately available. Common sense suggests that children, elderly persons, handicapped persons and poor or non-swimmers should wear PFDs whenever they are near or on the water. Certain states require that PFDs be worn by children under a certain age and by all non-swimmers. Check your local boating laws to determine your state requirements.

Photo courtesy Lakeland Boating

Although this practice is not recommended, grasping an approved Type III float coat can provide support.

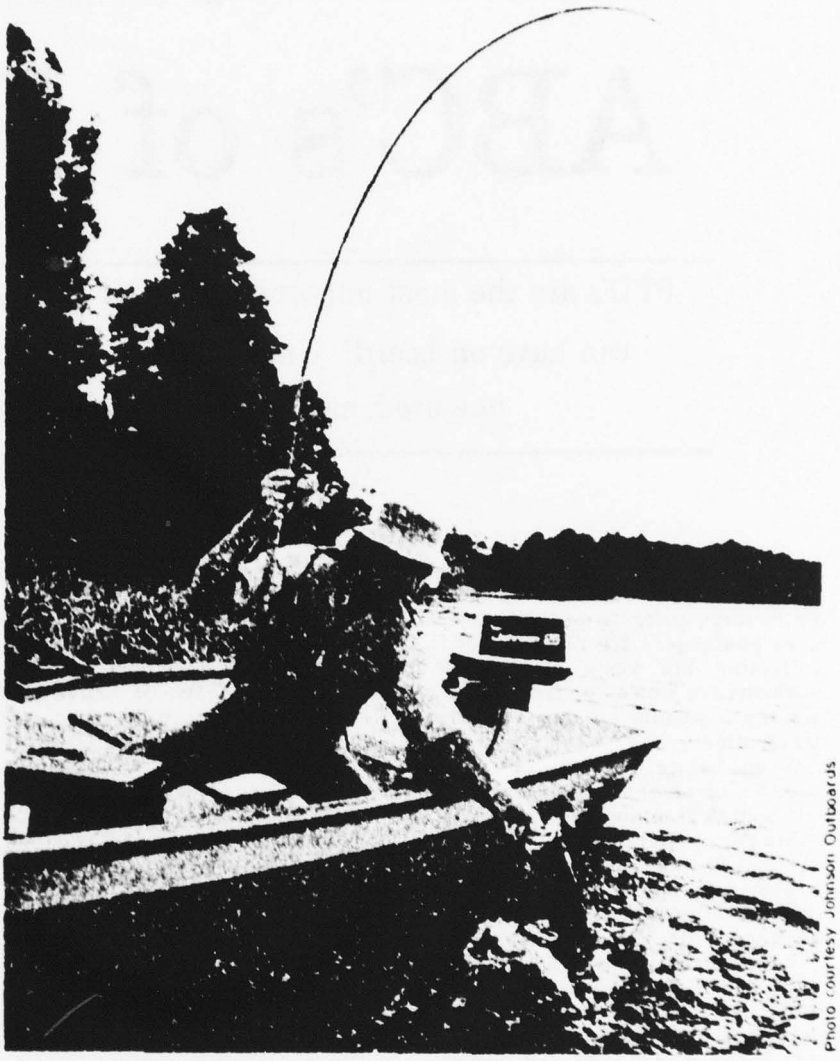


Photo courtesy Johnson Outboards

Stay seated when reeling in your catch and watch your balance. This wise angler is wearing a personal flotation device designed for fishermen. Besides being comfortable there are lots of pockets for handy storage.

How often should PFDs be replaced?

All types of PFDs should last for years if given proper care. After every cruise inspect all PFDs for rips and tears. Remove any stains such as oil, gasoline, battery acid and mildew because they can cause straps, fabric and foam to deteriorate. Make sure all buckles and zippers work properly. Pull on all straps to check that they are firmly attached. If the PFDs are wet, dry thoroughly before stowing in a dry, well ventilated place. If you have kapok filled devices on board check them carefully for hard lumps that indicate a loss of buoyancy. Use your hands to compress all sections and listen for the sound of escaping air that may indicate the protective plastic bag has been punctured. Since kapok is a vegetable fiber with a waxlike coating it will mildew and lose its natural buoyancy if water seeps inside the plastic container.

What if I find a damaged PFD?

Don't try to repair it! Discard any damaged PFDs immediately. Cut into small pieces to prevent reuse. Recently a scavenger removed manufacturer's rejects from a waste container and sewed the slashed edges together. He then offered them for sale as 'reconditioned' PFDs—at bargain prices. Don't be deceived. Buy only new, Coast Guard 'approved' PFDs. It's cheap insurance when compared to the loss of a loved one's life.

4. Mentally note how long it takes your PFD to turn you face upward. (Note: if you are wearing a Type III device the inherrent danger of its not turning an unconscious person face upward will become quite evident.) Check the PFD chart for various turning characteristics.

Here's another test to give you an idea of the flotation characteristics of the various PFDs. Experiencing the feeling of floating in a vertical or slightly backwards position may build confidence in non-swimmers and people afraid of being immersed in the water.

1. While standing in shoulder deep water, lean back and let your knees float off the bottom.

2. Now lean your head back and tuck your knees up and grasp them to your chest with your arms. Try to relax and float in this position. This fetal position helps protect the body's thermal core and helps reduce the loss of body heat by about two-thirds. In water of 35 degrees F to 50 degrees F this "self-huddle" position could save your life from hypothermia. Remember it!

While you are in the water there's one more PFD experience you should try. In order to really understand the difficulty of donning a PFD in the water—try it! It will reinforce the need to adjust PFDs and wear them before getting wet.

Type I — Foam bib life preservers are the easiest and fastest to get into while in the water. Just push your shoulders through the chest straps and your head through the neckhole. Squeeze the front chest sections together and cinch up the front straps.

Type II — Buoyant vests have two straps which makes them a little more difficult to put on in the water. After pushing your head through the neckhole, tie the neck straps and then clip the chest strap.

Type III — Marine Buoyant Devices really should be worn before entering the water and here's why. To put them on you have to put your arms through the armholes, one at a time, otherwise, you must submerge and try to come up inside the coat with your arms outspread. This isn't easy for an inexperienced swimmer!

Type IV — Although Throwable Buoyant Cushions are not designed for wearing there is a proper way to get the maximum buoyancy with the least amount of effort. First enter the water holding the cusion by one strap. **NEVER jump into the water wearing a buoyant cushion!** The impact of you and the buoyant cushion hitting the water together can be very dangerous. Once in the water insert one leg through one strap and push the cushion under your chest before placing the other strap over head and neck. **ALWAYS position the body over the cusion and never wear the cusion on your back since it will force your face into the water!** In a panic situation both arms may be placed through the grab straps and the buoyant cushion may be used as a raft when grasped to the chest.

Another method is to put one leg through the strap and then place the opposite arm through the other strap. Remember buoyant cushions are extra flotation devices designed to be thrown to someone struggling in the water. They should be stowed in a convenient and accessible place—ready for any emergency.

Practice throwing Type IV devices both with and without a 25 to foot line attached. Float an empty plastic container in the water and use it as a practice target. Have each family member practice holding the coiled line, tossing and retrieving the ring buoy or buoyant cushion. Caution everyone to be careful and not "hit" the target but to throw the device beyond the "victim" and then pull it within reach. Hitting someone in the water could be dangerous. Remind participants that although a line attached to a Type IV device may reduce the distance it can be thrown, it greatly improves the probability of rescue. Cushions or ring buoys without line attached should be thrown as close to the victim as possible. Remember not to "hit" the target.

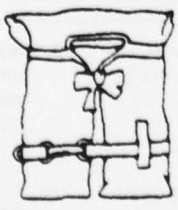
And while you're floating around in the water remember a PFD is not a substitute for good swimming ability, it is merely an aid to keep you afloat. The basic ingredient of water safety is knowing how to swim, so learn about swimming and know your limitations.

PFD's when worn can help provide you and your passengers with "protection from drowning"

TYPES OF PERSONAL FLOTATION DEVICES

TYPE I

LIFE PRESERVER



TYPE II

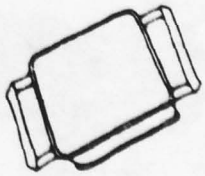
BUOYANT VEST

TYPE III

SPECIAL PURPOSE MARINE BUOYANT DEVICE

TYPE IV

RING BUOY



TYPE IV

BUOYANT CUSHION

Must water skiers comply with the PFD requirements?

Yes, any boat pulling skiers must carry one approved PFD for each skier even though the skier being towed is not in the boat. If a skier is wearing an approved PFD, it is not necessary to carry another one in the boat for him.

Are there special PFDs available for children?

Yes, they are designed for persons weighing less than 90 pounds. Within that limitation they have the same flotation capability as adult PFDs. Adults should never wear a child's device and children should never be provided with an adult size except in an emergency. A new device is not available for infants 30 pounds and under.

Why are there special PFDs for infants?

Because young children's heads are proportionately heavier than their body weight traditional types of PFD's force their faces into the water often floating them helpless in a face-down position. The new PFD has a buoyant ring which encircles the babies head. It is held secureiy in place with a vest that completely covers the child's upper torso. No matter how much wiggling goes on, the device comfortably protects the child until removed by an adult.

Photo courtesy Stearns

This new Type III device is designed to keep toddlers and babies weighing 30 pounds or less safe in or around the water.

To really understand the characteristics of PFDs you should test them before stowing them aboard.

Photo courtesy Mercury Marine

Now is the time to determine if your lifesaving equipment meets specified requirements. Let your family experience the flotation qualities of recommended lifesaving equipment. Besides having fun, they'll gain valuable experience on how to react in case there is an emergency.

On a sunny summer afternoon have each family member put on his PFD and adjust the fit. Then the fun begins:

1. Enter the water wearing the PFD. Make certain all cords, straps, and zippers are securely fastened.
2. Assume a face down position in neck deep, calm water such as swimming pool or supervised swim area.
3. Place your face in the water, exhale, and relax. Let your arms and legs go limp and pretend to be unconscious.

COMPARISON OF U.S. COAST GUARD APPROVED PERSONAL FLOTATION DEVICES

TYPE	PRIMARY USE	ADVANTAGES (Flotation - Visibility - Wearability - Comfort)	DISADVANTAGES
TYPE I **Life Preservers** Kapok filled and plastic foam bibs. Made of fibrous glass and / or unicellular foam.	Designed to turn an unconscious wearer from a face-down position in the water to a face-up or slightly backward position. Recommended for offshore cruising. Acceptable for all size boats.	Red or orange color makes for good visibility. Good flotation has more than 20 pounds of buoyancy. Five to nine pounds over minimum requirements. Keeps wearer's head and shoulders out of the water. Provides four to six inches of above the water mouth clearance for breathing. Should turn wearer face up in one to three seconds.	Bulky construction restricts normal movement out of water. Wearer's head is pushed slightly forward due to extra flotation around collar. This could become uncomfortable. Be careful that the jacket is positioned properly with the waist straps tightly cinched. Sometimes synthetic straps will slip when wet even when double knotted.
TYPE II **Buoyant Vest** Kapok or Plastic foam bibs. Foam-filled vests.	Designed to turn an unconscious person from a face-down to a face-up vertical or slightly backward position. Acceptable for all recreational boats. Recommended for closer inshore cruising.	Must have at least 15.5 pounds of buoyancy. Should turn an unconscious wearer face up in about five to six seconds.	Slightly less buoyancy than Type I. Wearer's mouth is closer to the water's surface. When the neck rests against the back cushion the shoulders barely break the water's surface. In rough water waves could occasionally cover the face. Out of the water foam bibs are less comfortable than the soft kapok bibs. Kapok bibs can cause chafing around the neck. The smooth plastic surface of the plastic bibs can become wet and uncomfortable in hot weather.
TYPE III **Special Purpose Marine Buoyant Devices** Foam-filled vests Foam ski vests Sleeved jackets or Float coast. Foam-filled vests	Designed to keep a conscious person in a vertical or slightly backward position in the water. Recommended for in-water sports, or on lakes and close inshore operation on confined bodies of water such as lakes and impoundments. Acceptable for all size boats.	Designed to be worn Type IIIs feature trim good looks, snappy colors, fashionable and functional styling. Type III devices have the same buoyancy (at least 15.5 pounds) as Type II but they have a lesser turning ability to allow for a more comfortable design. Sleeved float coats not only help keep the wearer warm out of the water but if the person goes overboard they help insulate the body against heat loss while keeping the person afloat. This built-in hypothermia protection helps to increase cold water survival time. Float coats can provide a feeling of stability while floating if the arms are held away from the body.	Wearer must be conscious and make an effort to assume a slightly backwards position since Type IIIs have a tendency to float an unconscious wearer face down. Since they are not designed to keep the wearer's head out of the water persons leaning backwards trying to maintain a relaxed floating position will often have their ears and forehead covered with water. Wearers floating in choppy waters may have only three inches of mouth clearance. Thus they should not be used by non-swimmers who might panic when their face and head is continuously immersed in water.

COMPARISON OF U.S. COAST GUARD APPROVED PERSONAL FLOTATION DEVICES

TYPE	PRIMARY USE	ADVANTAGES (Flotation - Visibility - Wearability - Comfort)	DISADVANTAGES
TYPE III (Con't.)		The foam filled sports vests and float coats are popular year a-round. The variety of functional designs some with extra pockets and special camoflauge colors are available for hunt-ing and fishing. For greater weara-bility during hot sum-mer days many sports vests have a full nylon mesh lining for extra body comfort. Adjustable laces allow for comfortable wear-ing over bulky clothing. Some childrens' models have leg straps to prevent the vest from riding up. An adjust-able waist strap also helps eliminate this problem.	Since sleeved jackets are diffucit to swim in, wearers may tire more easily. Float coats are too hot to wear during warm weather. They are also very heavy when climbing out of the water since they absorb excessive amounts of water. If not properly zipped and fitted to the wearer float coats will often ride up about the waist when floating. The solu-tion to this problem is to lean backwards and pull the jacket down below the waist. Type III vests with side lacing straps should be firmly tied to fit the wearer, otherwise they can slip up. Smooth plastic surfaces of ski vests may become slimy in hot weather. This discourages out-of-water wearing while boating. Some Type IIIs have poor visibility.
TYPE IV **Buoyant cushions** **Ring Buoys**	Designed as a rescue device to be thrown to a person in the water. Acceptable for boats less than 16 feet and canoes and kayaks. There must be at least one on board any boat over 16 feet.	All Coast Guard ap-proved ring buoys are fitted with a grab rope. They have good visibility since they are either white or orange. Both cushions and ring buoys are designed to be grabbed by per-sons in the water. Buoyant cushions must be at least two inches thick and have at least 225 sq. inches of top surface. Ring buoys should be mounted on brackets where they will be im-mediately available when needed.	
TYPE V **Special Purpose Devices** **not classified else-where.**	Open classification to provide consideration for approval of devices designed for a speci-fic and restricted use where circumstances indicate none of the other types are suit-able.	For example commer-cial whitewater rafts carry a special Type V vest which provides 22 pounds of buoyancy.	

APPENDIX I-10. COPY FOR FEATURE INTENDED FOR HUNTING AND FISHING MAGAZINES

Sportsmen Afloat

Some Water Survival Tips for Hunters and Fishermen

Of the hundreds of boating accidents that make up each year's depressing national statistics, it shouldn't be much of a surprise that hunters and anglers are involved in about one-third. But what might be surprising is that many sportsmen who use boats don't really consider themselves boaters at all.

Rowboats, dinghies, canoes, johnboats, prams, rafts, driftboats or any of the other various craft associated with hunting and fishing are often considered "just part of the equipment" by their users. And as long as the boats get them to where they want to go—where they can expect to find fish or game—that's all that really matters.

Though many sportsmen look at their boats as nothing more than hunting or fishing platforms, many of these people spend more time on the water than the "true boater"—the person who buys his cruiser or sailboat and enjoys spending a weekend skimming along the water just for the sake of being there.

Because hunting and fishing boats are a means to an end, rather than part of the final objective, sportsmen are often guilty of ignoring or breaking some of the most basic, common-sense, water safety rules. A fisherman heading for a spot where 3-pound rainbow are dimpling the surface or hungry walleye are smashing everything that moves can easily be preoccupied when it comes to the operation of his boat. Likewise the duck hunter wanting to get to his favorite marsh to set out his decoys long before dawn's first crack might just ignore a small detail or two that could make the difference between a successful day on the water and total disaster.

Because of the nature of his boating uses and the added equipment and techniques that play a part in the use of a boat for hunting and fishing, good boating operation just may be more important to the sportsman than he realizes. Items such as rods, fishing line, hooks, fish stringers, bait buckets, shotguns, decoys and hunting dogs complicate the situation when placed anywhere between the bow and stern. Anglers and hunters who do their trolling, casting, shooting or searching from a boat should realize that unexpected situations can and do arise.

Even the primary objectives of the outing — fish or game — can get the boater / sportsmen into big trouble in a short time. In their excitement, fishermen reaching to put the net under a hefty trout or standing to clear the line as it zig-zags toward the propeller have capsized their boats. In some cases there were fatal consequences.

Reaching out to retreive a bagged duck can have similarly disastrous results as one sportsman learned last year.

It happened on a duck-hunting trip. A bird fell far from the blind, and the hunter decided to take his dog and go after it using one of the small rowboats hidden nearby. The duck had continued to drift after it went down and was finally located near a small island. When the hunter reached for the duck which appeared to be dead, it suddenly began flapping and struggling to escape. He should have let go and tried again after the bird calmed down, but his natural instinct was to hang on and pull the struggling duck aboard. The bird was heading away from the boat, and the off-balance hunter overextended in his attempt to keep up with it. The small boat went over. Hunter, shotgun, dog and everything went into the icy water.

Luckily he was wearing a Coast Guard approved flotation jacket. But waders, heavy clothes, and ammunition were too much for it. Down he went. He remembered to bend his knees and was able to trap some air in his waders. Fortunately he surfaced near the skiff and was able to paddle a few feet and grab the boat. Should he swim for shore? Should he stay with the boat and wait for help? No, it was cold and foggy and he was far from his friends in the blind. Hypothermia or heat loss from the cold was likely to occur if he stayed in the water too long. He knew he couldn't get back into the skiff but there was an island nearby. He kicked off the extra weight and stroked his way slowly to the shore dragging the skiff along.

He made it safely to dry land but he knew he was in for trouble from hypothermia unless he got back to his friends and dry clothes. But the oars were still floating offshore. He sent his dog to fetch them and the big lab obeyed. It was slow going back to the blind and the fog was getting thicker. Ultimately he made his way back to the general area where his hunting partners were and they "hollered" him to safety. Fortunately he was able to relate this story. Others aren't so lucky as the accident reports show.

"Two persons were drift fishing from a 14-foot motorboat. One person stood up to reel a fish in and the reel on his rod broke. He at-

Danger awaits this unwary hunter if he stands to shoot and decreases the already low freeboard so that water comes in over the stern and swamps the boat. Stay seated when shooting and remember to always wear a U.S. Coast Guard approved personal flotation device such as the specially designed sportsmans vest when hunting. It could help save your life. Photo courtesy Mercury Marine.

tempted to grab the fish line and stumbled, falling over the side. He was not wearing a PFD and did not surface after falling overboard. His fishing partner did not have a PFD and did not dive in after the victim."

"Three persons on board a 12 foot motorboat were fishing too close to the lower rollers on a lock and dam. The boat was caught in the undercurrent and capsized. Two persons drowned. None of the occupants were wearing PFDs."

"Two men were fishing in a 13 foot rowboat, one man's hat blew off. He reached over the side to get it and slipped. His friend lunged to grab him and the boat capsized. They lost $600 worth of fishing equipment."

"Four men were in a 10 foot johnboat with a capacity label which read 'Person Capacity: 215 lbs.' No one wore PFDs because "no one wanted to put them on." About 100 feet from shore the boat swamped

and capsized. Two men drowned."

Accident reports like these go on and on. Many sound incredible but the tragedies are real. Capsizing, overloading, falls overboard and lack of personal flotation devices spell disaster for many sportsmen. In most instances the accidents could be avoided if good common sense were substituted for rash actions. Here are some survival tips to insure good hunting and fishing for many seasons.

●Don't overload the boat with passengers and gear. Besides being dangerous and reducing freeboard (the distance from the water to the top edge of the boat's side—the gunwale) it also makes casting difficult.

● When landing a fish or setting a decoy, stay low in the boat and don't lean over the sides. Use an oar, a rod or your net to extend your reach.

● When trolling, never leave the helm unattended, always slow the boat to idle or shut off the engine if another activity requires your attention.

● Do not sit on the back of a seat or the side of the boat while underway.

● Keep an eye on the weather and heed storm forecasts. If the weather report says "no"—don't go.

● In any boat with a low transom stay close to shore in case rough waves pour water over the stern.

● Never turn the stern into a large oncoming wave or wake. Try to avoid it or head the bow toward it.

● Avoid fast stops, starts and sharp turns when moving from one fishing spot to another.

● Train your hunting dog to lie still in the bottom of your boat. Never allow animals to wander onboard—they could fall overboard and when trying to rescue them—you could too.

● When operating a low transom boat de-accelerate and back up slowly to prevent being swamped by the stern wake surging over the transom.

● Standing is dangerous in a small boat. Keep your body's center of gravity low and along the centerline of the boat.

● Always stow gear under the seat out of the way. Never carry equipment piled high atop the seats. It raises the boat's center of gravity and makes it less manuverable and less stable.

●Never stand while casting or netting a fish. It causes the boat to be unstable. You may slip and fall overboard.

●If fishing near a high traffic area watch out for the wakes of larger boats. Whenever possible anchor your boat with the bow facing oncoming wakes.

●In a low transom boat never stand up to pull in a stuck anchor. The already shallow freeboard may be reduced to zero causing the boat to swamp. Remember always anchor the boat from the bow.

● Wear a PFD when leaning over the stern to inspect the motor or untangle fishing line.

● Do not try to change places when a small boat is underway. Head in towards shore and idle the motor. Move any rods or fishing gear out of the way to avoid tripping or entanglement. Stay low, hold the gunwale to steady your balance and step smoothly along the keel. Seated companions should counterbalance your weight shift. Remember the rule "one at a time" when changing positions.

● If a sudden thunderstorm catches you fishing in open water keep as low in the boat as possible and do not use fishing rods or other gear that may attract lightening. Try to get as close to shore as possible so that objects at a higher elevation than your boat will serve as more likely targets for the electrical discharge.

● If a fishing partner falls overboard in the excitement of trying to keep "one on" try to reach him with the tip of a fishing rod or the blade of an oar. Throw a buoyant cushion if one is handy. Pull him towards the boat. After shuting off the engine and waiting for the propelier to stop spinning, help him board over the stern. Move any gear out of the way and keep the boat balanced.

● If you have an electric start outboard use a kill switch with a lanyard attached to your belt or PFD. If you fall overboard the switch immediately stops the engine. This prevents the boat from running wild and endangering others including yourself.

● Always carry a personal flotation device for each person on board, better yet, wear it—especially if you are alone.

● If a miscalculated load shift capsizes or swamps the boat, keep calm and try to grab something that floats; an oar, ice chest, tackle box or buoyant cushion. Paddle to the boat and stay with it. If you can climb aboard even a swamped craft will support the number of passengers listed on the capacity rating plate.

● Learn to swim.

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