

AN ABSTRACT OF THE THESIS OF

Donald Watson Christensen for the degree of Doctor of Education  
in Education presented on January 27, 1976

Title: AN EVALUATION AND CRITERIA FOR IMPLEMENTATION  
OF A RECREATIONAL MOTORBOAT EDUCATIONAL-  
LICENSING PRACTICE IN OREGON

Abstract approved: Redacted for Privacy  
Dr. William R. Fielder

In recent years almost all states have legislated educational and licensing programs to protect the welfare and property of citizens engaged in outdoor recreational pursuits. Such programs exist for automobile, motorcycle, airplane, and snowmobile operators. However, boating continues to be one of the major recreational outdoor activities where operators of vessels do not need to take course work or to demonstrate operating competencies prior to manning a boat.

Because of rising accident rates, accident fatalities, and citizen concern, Oregon legislatures have provided for educational-licensing programs in many recreational activities.

The purpose of this study was to examine accident and fatality statistics before and after the adoption of licensing and educational programs for snowmobiling, motorcycling, and hunting so as to

derive from these data recommendations for an educational-licensing program for recreational motorboat operators in Oregon.

Accident and fatality statistics gathered by the Oregon Marine Board during calendar year 1973 were analyzed. A sample of marine citations written during calendar year 1973 as well as all boating accident reports filed during 1973 were studied. A data base of information was compiled by interviewing directors of the snowmobiling, motorcycling, and hunting agencies.

The data gathered from these inquiries were used to generate recommendations for possible inception of an educational-licensing program for recreational motorboat operators in Oregon.

The general findings of this study are:

1. Snowmobiling. The snowmobile educational-licensing program results are inconclusive because of limited data available.
2. Motorcycling. The motorcycle educational-licensing program results showed a decrease in both reported non-fatal accidents and fatalities after its inception.
3. Hunting. The hunter safety educational-licensing program results showed an increase in reported non-fatal accidents and a decrease in fatal accidents after starting the program.
4. Snowmobiling, Motorcycling, Hunting Director Recommendations. These agency directors indicated a preference for initiation of a recreational motorboat operator's

educational-licensing program in the belief that such a program may reduce boating accident incidence.

5. Boating. Oregon Marine Board data show declining boating citations, accidents, and fatalities, especially since passage of the Federal Boat Safety Act of 1971.
6. Boating. An examination of boating accident report forms indicates that having taken one boating safety course by operators does not greatly diminish an operator's chances of being involved in a boating accident.
7. Boating. An examination of a 10 percent sampling of all marine citations written during 1973 indicates that over 75 percent of the citations were for violations of the personal flotation device requirement and lack of required boat numbering.

Due to the inconclusive results of the data used in this study, it appears inadvisable for an initiation of an educational-licensing program for operators of recreational motorboats in Oregon at this time.

© copyrighted 1976  
by  
Donald Watson Christensen

An Evaluation and Criteria for Implementation  
of a Recreational Motorboat Educational-  
Licensing Practice in Oregon

by

Donald Watson Christensen

A THESIS

submitted to

Oregon State University

in partial fulfillment of  
the requirements for the  
degree of

Doctor of Education

June 1976

APPROVED:

*Redacted for Privacy*

---

Professor of Education  
in charge of major

*Redacted for Privacy*

---

Dean of the School of Education

*Redacted for Privacy*

---

Dean of Graduate School

Date thesis is presented 27 January 1976

Typed by Ilene Anderton for Donald Watson Christensen

## ACKNOWLEDGMENTS

The author expresses his appreciation and gratitude to Dr. William R. Fielder for his confidence in the worthiness of the study, for his indispensable guidance and encouragement, and for his patience and understanding.

I am deeply indebted to my committee: Drs. Mary Cramer, Mike Freed, David Lawson, and Roger King for their scholarly criticism and continued interest in this study.

I am very grateful to Cmdr. James Hadley, Director of the Oregon State Marine Board, for his continued support and for his agency's complete cooperation in making vital data available for statistical analysis. Appreciation is also due to those Wildlife and Motor Vehicle agency personnel who were kind enough to spare their valuable time for this study. The data these agencies provided were invaluable.

Finally, and by far the most important acknowledgement to be made, the author expresses very special appreciation and gratitude to my loving wife Jean for her consistent encouragement, cooperation, understanding, and sacrifices without which the completion of this study could not have been made. Jean shares fully in this accomplishment.

## TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
I. INTRODUCTION	1
Background Information	1
Need for Study	9
II. DESIGN OF THE STUDY	13
Purpose	13
Methods	14
Evaluative Criteria	19
Definition of Terms	20
Assumptions	21
Limitations	22
III. REVIEW OF LITERATURE	26
Boating	26
Snowmobiling	47
Motorcycling	50
Hunting	54
Summary	56
IV. FINDINGS	58
Evaluation Criteria	58
Three Agencies' Data Bases	59
Agency Administrator Recommendations	65
1973 Oregon Marine Board Data	69
Marine Citation Analysis	74
Examination of Boating Accident Reports	79
Results	84
V. RECOMMENDATIONS	87
Summary of Design of Study	87
Summary of Findings	88
Recommendations	92
Discussion and Implications	96
BIBLIOGRAPHY	102
APPENDIX A: Agency Administrator Interview Sheet	106
APPENDIX B: Boating Accident Report Form	108

## LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Five-Year Summary of Boating Accidents	8
2	Recreational Boating Fatalities in Oregon	10
3	Motorcycle Fatality Rate 1958-1973 in Oregon	62
4	Motorcycle Non-Fatality Accidents in Oregon	64
5	Hunting Fatalities in Oregon 1953-1973	66
6	Hunting Non-Fatality Accidents in Oregon	67
7	Boat Registrations in Oregon 1960-1973	71
8	Boat Accident Reports Filed in Oregon 1960-1973	72
9	Boating Fatality Rate in Oregon 1960-1973	73
10	Distribution of Ages of Cited Boat Operators	75
11	Categories and Frequencies of Violations	80
12	Age Groups of Boat Operators Filing a Boating Accident Report	82
13	Boating Education of Operators Filing a Boating Accident Report	83
14	Comparison of Motorcycle and Boat Fatalities	91

AN EVALUATION AND CRITERIA FOR IMPLEMENTATION  
OF A RECREATIONAL MOTORBOAT EDUCATIONAL-  
LICENSING PRACTICE IN OREGON

I. INTRODUCTION

Background Information

Boating is a popular recreational activity as evidenced by the increased boat registration of the ten-year period from 1964 through 1973 during which boat registration increased from 40,000 to 100,000 units in Oregon. Unlike Automobile driving, motorcycling, airplane flying, snowmobiling, and hunting, boating is not a licensed activity for recreationists. Anyone may use a recreational boat on the waters of the State of Oregon without being licensed as an operator.

Local, state, and national concerns are mounting each year about the increasing accident and fatality numbers attendant to recreational boating. An example of this concern stems from the results of a Coast Guard survey of boatmen in the 5th District, Norfolk, Virginia. The results of this survey indicate that about 80 percent of all boat operators surveyed have had no instruction in boat operation, rules of the seaways, or safe boating competency.

During 1973 in the United States a record high of 1,754 boating deaths was tabulated by the Coast Guard. Three general types of

casualties account for 75 percent of the total. Fatalities due to capsizing numbered 796; falls overboard incidents numbered 390; and collision with another vessel and with fixed objects numbered 132. The remaining 25 percent of fatalities was attributed to grounding, flooding, sinking, fire or explosion, striking floating object, struck by boat or propeller, and other types of accidents.

An examination of the Coast Guard's annual compendium (Boating Statistics, CG-357) of boating activities and accidents shows that both boating activities and boating-related accident and fatality percentages are growing. Boating fatalities increased 18 percent from 1972 (1,437) to 1973 (1,754). However, during 1974 (1,446) fatalities decreased by 18 percent. This may have come about due to scarcity of fuel and rising petroleum costs. Other related contributing factors must be considered in analyzing this data. For example, the Coast Guard estimate of boats increased from 7.6 million to 8 million during 1973. A possible interpretation of this approximate six percent increase in boats is that more opportunities existed for violations of regulations which resulted in accidents and fatalities.

Another contributing factor is that accident reporting requirements changed July 1, 1973. In addition to the Federal Boating Act of 1958 requirements of a written report whenever a boating accident results in a death, property damage in excess of \$100, or

an injury causing incapacitation in excess of 72 hours, the Federal Boat Safety Act of 1971 requires a written report for loss of consciousness, medical treatment or disability in excess of 24 hours, or the disappearance of a body. Further, any person violating the requirements is liable to a civil penalty of not more than \$500 for each violation.

Other factors influencing the interpretation of the Coast Guard's accident statistics include number of boating days per month and seasonal weather variables. Weather and season are two obvious variables that affect the number of boatmen in the water and the conditions under which their boating will take place.

Absolute numbers of boats is also an important variable in interpreting marine accidents statistics. For example, in 1961 the Coast Guard estimate of boats was 5.5 million. That year there were 1,218 boating-related fatalities. In 1973 the estimate of boats was 8 million and there were 1,754 boating-related fatalities. The year 1973 showed 536 more deaths for an increase of 44 percent, but there was also an increase of 2.5 million additional boats, an increase of 45 percent for that year.

These burgeoning numbers of boats and boating-related fatalities are being carefully monitored by the Coast Guard and law enforcement agencies and to some extent by legislators and voluntary educational organizations for the purpose of evaluating the danger

level to citizens and their property. These valuations may have implications for boating education and possibly operator licensing. The 1971 updated quarterly report published by the Coast Guard estimated that numbers of recreational boats would increase from 7 million in 1970 to 8.5 million in 1975 and to 9.9 million in 1980. Similarly, recreational boat operators would increase from an estimated 16 million in 1970 to 20 million in 1975 and to over 23 million in 1980. Even greater numbers of participants are involved when one considers that usually two or three passengers are aboard when either powered or non-powered recreational boats are in use. Based on this the Coast Guard predicts that recreational boatmen, operators, and passengers are expected to increase from 44 million in 1970 to 48 million in 1975 and to 53 million in 1980.

With the activities of millions of boatmen in 1970 and the prediction of increasing numbers of both boats and enthusiasts in the near future, members of the 92nd Congress enacted the most comprehensive legislation to date. With the passage of Public Law 92-75 on August 10, 1971, the Federal Boat Safety Act of 1971 took effect. The purpose of this Act was:

To improve boating safety and to foster greater development, use, and enjoyment of all the waters of the United States by encouraging and assisting participation by the several States, the boating industry, and the boating public in development of more comprehensive boating safety programs (Public Law 92-75, 1971, p. 1)

On page nine of this Act, Section 22, authority was granted the States to pass laws requiring boat operators to hold a valid safety certificate. It stated:

When a State is the issuing authority it may require that the operator of a numbered vessel hold a valid safety certificate issued under terms and conditions set by the issuing authority (Public Law 92-75, p. 9).

During the 1973 regular session, the Oregon Legislative Assembly approved House Bill 5021. Item three of Section One of the Bill, which provided the Funding of the Oregon Marine Board for its various activities and functions, specified a budget item of \$6,000 for a Boat Operator's Licensing Study. That study has not yet been completed and so its findings and recommendations are not available.

Due to interest in the above study, House Bill 5021, and because the Oregon Marine Board is not authorized to conduct boating safety classes, both Houses of the 1975 Oregon Assembly passed House Bill 2591 which provided that the State Marine Board establish and implement boating safety educational programs. Funding with passage of this bill will provide for an educational officer and program.

In addition to these 1973 and 1975 legislative acts in Oregon, voluntary educational groups expend considerable effort and money to provide free and inexpensive boating education programs. During

calendar year 1971 the Coast Guard reported that the United States Power Squadrons enrolled 80,000 people nationally in their free Boating course. The Red Cross enrolled 45,000 and the Coast Guard Auxiliary enrolled 236,000 people nationally in similar educational programs (Boating Statistics, CG-357, 1971, p. 58). Several other groups like the Armed Forces, peace officer units, scouting groups, and schools hold boating instruction classes.

Although there is considerable Federal and State Legislative activity in addition to the work of volunteer agencies, a considerable number of law enforcement personnel hold that some minimum standards of boating knowledge would be in the boating public's best interest. A study for the Oregon Marine Board by McLean and Crick (1973) on aspects of the Marine law enforcement program states:

It may be expected that there will be increasing use of Oregon waterways by pleasure boaters from neighboring states as boat registrations in those states also increase. It is the authors' judgement that this challenge can be more effectively met by increased emphasis on formal programs which both emphasize and train boaters in the importance of boating safety. During interviews with marine law enforcement personnel, overwhelming endorsement was found for steps in this direction (p. 30).

From Congress on the Federal level to state representatives on the local level to peace officers delegated to enforce marine laws, there is a growing interest in and concern about recreational boat operator educational programs. At the fall 1973 conference of the

Coast Guard Auxiliary held in California, Admiral Chester R.

Bender, USCG, stated,

I have said before and I say again, unless we can achieve a better record of reaching a large share of the boating public with some form of boating safety education, we will have to consider mandatory education or licensing (Thompson, 1973, p. 86).

An examination of Coast Guard boating accident data for the years 1969 through 1973 in Boating Statistics 1973, CG-357 shows a continuing increase in the fatality rate per 100,000 registered boats in the United States (see Table 1, page 8). During this recent five-year period, it can be seen that both the absolute numbers as well as the fatality rates increased gradually between 1969 and 1973, with the exception of a slight decrease in the fatality rate during 1972.

These accelerating fatality rates are accompanied by increasing numbers of injuries and property damage amounts. A five-year summary of boating accidents, vessels involved, and a national Coast Guard estimate of boat numbers are all on the increase. Property damage nearly doubled during this five-year period, according to data in Table 1.

Similar increases may be noted in Oregon where boat registrations are increasing rapidly. There were 58,871 registered boats in Oregon in 1966 compared to over 105,000 in 1974, according to Oregon Marine Board Director James Hadley. It should be

Table 1. A five-year summary of boating accidents, number injured, vessels involved, fatalities, USCG estimate of boats, and property damage reported to USCG.

Year	Boating Accidents	Boatmen Injured	Vessels Involved	Fatalities	USCG Estimate of Boats	Property Damage
1969	4067	1004	5239	1350	6,700,000	\$ 6,371,900
1970	3803	780	4762	1418	7,000,000	8,173,000
1971	3909	897	4915	1582	7,300,000	9,022,000
1972	3942	829	5044	1437	7,600,000	7,107,000
1973	5322	1599	6738	1754	8,000,000	11,376,600

Note: This compilation of data from Boating Statistics 1973, CG-357, pp. 6, 13, 14.

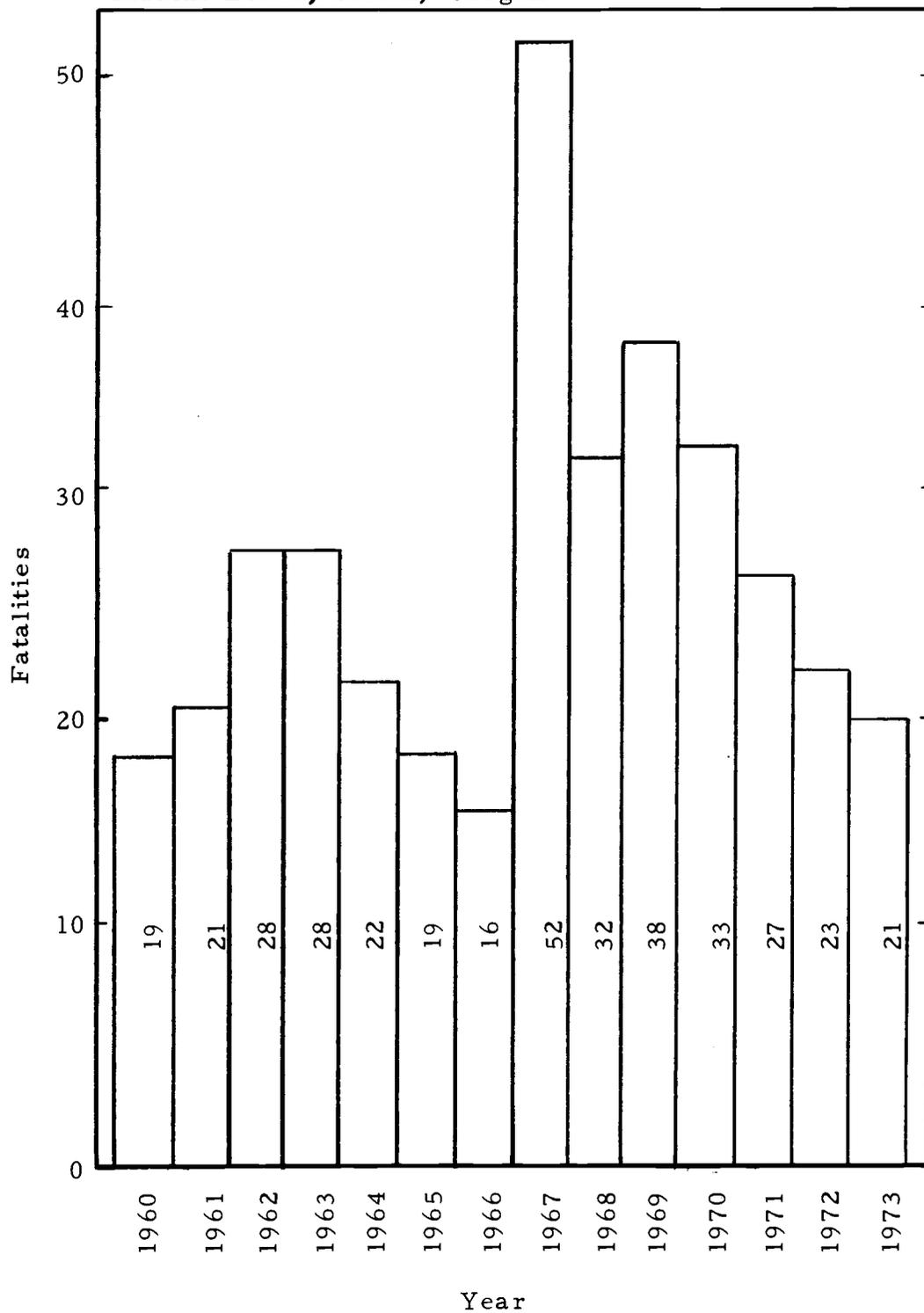
pointed out that unpowered sailboats less than twelve feet in length, unpowered rowboats and similar watercraft, and canoes, dinghies, and kayaks are not required to be registered. A complete count of all watercraft in the State of Oregon would show many more boats than the approximately 105,000 that are registered. According to Jim Hadley, Director of Oregon Marine Board, accurate records were first kept in Oregon in 1960 and have continued to the present. It can be seen that the total number of fatalities per year fluctuates from a low of 16 in 1966 to a record high of 52 in 1967. Weather and sea conditions probably influence fatal accident incidence. Since 1969, with the second highest number of 38 fatalities, the numbers have been declining to a low of 21 in 1973, according to data collected from Annual Reports of the Oregon Marine Board and reported in Table 2.

#### Need for Study

The operation of most modes of travel today is controlled by means of State and Federal regulations, State license for the vehicle and State license of the operator. For example, motorcycles, snowmobiles, and in a sense highpowered guns used by youthful hunters are all regulated, licensed, and the operators permitted to engage in these forms of recreation only after demonstrating basic, minimum competencies. If an operator cannot meet certain

Table 2. Recreational boating fatalities in Oregon 1960 through 1973.

\*Data Collected from Annual Reports of the Oregon State Marine Board, Salem, Oregon



minimum standards of excellence, he is denied use of that recreational equipment.

Why are recreational motorboat operators not controlled by means of permits or licensing? Is there no need of competency demonstration for safe operation of motorboats? Could the costs of legislating, educating, and licensing recreational motorboat operators be justified by means of projected data estimates drawn from other educating-licensing agency statistics?

These questions are worthy of answers to help in determining whether or not operator licensing is necessary at this time. Further, in the light of increasing boat registrations, numerous capsizings, and lives lost, there is a need for a study to develop recommendations leading to sound policy for the establishment of criteria for educating and licensing recreational motorboat operators in Oregon. This study will utilize the experience of the snowmobile licensing program, the motorcycle licensing endorsement program, and the hunter-safety program to determine the probable effectiveness of such programs if applied to recreational motorboating.

Oregon residents have traditionally responded to public concern over accident rates adopting licensing legislation, vehicle inspection legislation, insurance legislation, and education legislation. This has been done with motorcycles, hunting, and snowmobiles. However, no one has studied either these educational or

licensing programs to determine their effectiveness. Before boating safety legislation is routinely adopted by the State of Oregon, there is a need to examine critically the effectiveness of prior legislated programs, presently in force, in terms of their contribution to the safety of related recreational pursuits, i. e., snowmobiling, motor-cycling, and hunting.

## II. DESIGN OF THE STUDY

### Purpose

The purpose of this study is to determine and recommend educational and or licensing policy for recreational boating operator programs. It is the further purpose of the study to derive these policies by a critical assessment of the effectiveness of similar legislated programs in three allied recreational pursuits: snowmobiling, motorcycling, and hunting.

An examination of accident and fatality data collected both before and after inception of licensing programs of snowmobiling, motorcycling, and hunting should provide answers to the questions: Are such legislated programs effective? If so, to what extent? Will a recreational motorboat educational-licensing program likely be effective in reducing the present accident and fatality incidence?

A related inquiry of this study examines whether or not motorboat operators without a boating safety course have substantially more reportable accidents than those operators having enrolled in at least one course. The results of this phase of the study may have a bearing on the recommendations. Whether having taken a boating instruction course or not may be reflected in an operator's behavior while piloting a boat.

As some boatmen are unaware that they should file a boating accident report form for some types of accidents, many accidents go unreported according to officials of the Oregon Marine Board. All 122 boating accident report forms filed with the Oregon Marine Board during 1973 will be examined as a part of this study. If it can be shown statistically that more than 50 percent of those involved in an accident had no boating instruction, a positive relationship between instruction and accident incidence is suggested.

### Methods

This study examines the educational-licensing programs of three related recreational-oriented agencies presently functioning in Oregon. A summary analysis of the data base of Oregon's snow-mobile educational-licensing program, motorcycle educational-licensing program, and hunter safety educational-licensing program will be prepared as a basis for proposing recommendations for recreational motorboat educational-licensing of operators in Oregon. If the collected data do not clearly show that behavior change on the part of operators of recreational vehicles reduces fatality and non-fatality incidence, a mandatory educational-licensing program will not be recommended for boat operators.

All non-fatal accident and fatality data will be obtained from the three cooperating agencies, i. e., Department of Motor Vehicles

for snowmobiling and motorcycling and the Wildlife Commission for hunting. Data showing participation in these three by means of licenses issued to operators and in the cases of snowmobiling and motorcycling licenses for the vehicles themselves will be collected. These data will be analyzed and compared to one another on a pro rata basis to determine trends and changes in accident frequency both prior to inception of the educational-licensing program and after the program has been in force for a period of years. Tables will be constructed to show graphically what has or has not happened since legislated programs were implemented.

The tables will utilize raw data covering the years 1953 to 1962, a ten-year period immediately prior to the enactment of a required hunter-safety certificate program, and the years from 1962 through 1973, which is the time span since the program was implemented. 1974 data were not released at the time the tables were constructed.

Raw data for the motorcycle tables will include the years 1958 to 1965, which covers the years records were kept prior to the motorcycle license requirement. Data from 1965 through 1973 will be used to cover the years after the licensing program. Data covering 1974 was not available at time tables were constructed.

No data are available from the Motor Vehicle Division for snowmobiles prior to the licensing requirement in 1972. Limited

data are available from 1972 to 1974.

A data base of information collected from the directors of the snowmobiling, motorcycling, and hunting agencies will be used in generating recommendations. An example of the agency administrator interview sheet may be found in Appendix A.

Boating data will be collected from the Oregon Marine Board covering the years 1960, the earliest date that accurate records were kept, through 1973, the year of recent complete data collection for table construction. An examination of such data as boating accident reports, fatality reports, non-fatal accidents, written warning and citation reports, and registration data will be used to compile tables and to compare with other recreational areas' trends to see effects of educational-licensing programs with an outdoor activity that requires no education or licensing of operators.

Another area of boating data to be examined is a ten percent sample of all marine citations issued by law enforcement personnel during 1973. Because a detailed, in-depth analysis of all 2,270 marine citations written during 1973 would be beyond the scope of this study, a mode of selection called systematic sampling was used. In this sampling process ten numbers ranging from one through ten were placed in an urn. These were mixed prior to drawing one number. The number drawn was 10. Every tenth citation was used in this phase of the study. As the purpose of this part of the study

was to give some idea about the nature of the reasons why the citations were written, as well as age of operator and body of water he was boating on, ten percent appears to be a reasonable percentage.

The data collected from the snowmobile program, motor-cycling program, and hunter safety program must show that a 50 percent or greater behavior change has been achieved in terms of reduced recorded fatalities and non-fatal accidents.

It is assumed that elements of danger exist when people operate machines. Safety-oriented programs have been legislated to minimize the occurrence of accidents and fatalities, not only to the vehicle's operator and passengers but also to innocent non-participants. To expect a 100 percent decline in accident and fatality incidence is untenable because of the spectrum of cognitive and affective abilities operators bring to a vehicle's operation. If it could be shown that the machine itself were at fault, a figure near 100 percent may be tenable. However, according to data collected by the Coast Guard and tabulated in their annual reports, almost all accidents and fatalities are caused by operator judgment. An example of this is that annually accidents result from the operation of defective boats, power plants, and components. Yet the overt act on the part of an operator directly caused the accident. A specific figure from the 1975 Oregon boating season data shows that 11 people died in whitewater and drifting activities. As there are no

industry standards on safe floatable drifting devices, operator judgment is completely relied on. States attempt to protect these boatmen's lives with life jacket regulations, but, unfortunately, it often goes unheeded. Operator-caused boating fatalities result. Over 30 percent of boating fatalities in 1975 were in this category.

On the other hand, a figure near zero percent decline in accidents after initiation of an educational-licensing practice would be untenable, also. With the expenditure of time and money for programs, reasonable cost beneficial declines should be expected. What is tenable is a reduction factor reflecting a conservative posture that recognizes the effects accruing from product improvement, government-imposed guidelines, media-proliferated educational announcements, state and federal regulations, educational programs, licensing requirements and participant appeal for a greater use of common sense and judgment--neither of which may be legislated. For all these reasons a 50 percent reduction in accidents and fatalities after a program is in effect appears to be a reasonable, arbitrary stipulation of this study. In this study it shall be assumed that 50 percent is a significant accident reduction factor. A reduction of fatalities of this magnitude, it is assumed, would be conclusive evidence of a program's effectiveness.

Analysis of the accident data will be done on a pro rata basis of operator participation, that is, the number of operators in

proportion to the number of registered units, i. e., numbers of registered snowmobiles, motorcycles, hunting licenses issued, or boats numbered by the State of Oregon.

### Evaluative Criteria

The evaluative criteria of this study include the following:

- 1) a study of the data base information relating to fatal and non-fatal accidents of the snowmobiling, motorcycling, and hunting educational-licensing practices;
- 2) recommendations from administrators of hunter safety, motorcycle, and snowmobile educational-licensing practices;
- 3) an examination of data collected during calendar year 1973 by the Oregon Marine Board;
- 4) an examination of a random sampling of all marine citations issued during 1973;
- 5) an analysis of all boating accident reports filed with the Oregon Marine Board to determine the accident-involvement relationship between motorboat operators with and without classroom boating instruction;
- 6) and a report of the findings on the statement that fatality rates decrease by 50 percent or more after enactment of

an educational-licensing practice in two of the three educational-licensing practices studied.

### Definition of Terms

For the purposes of this study several key terms are defined as follows:

Boat means every description of watercraft, other than a seaplane, used or capable of being used as a means of transportation on the water. This includes canoes, kayaks, and inflatable rafts.

Certificate is a document testifying to a fact of accomplishment of someone. It is a written testimonial.

Educational Program is systematic instruction in which knowledge, facts, and skills are conveyed, shared, and discussed. It is comprised of an instructor, materials focusing on a subject, and student activities.

Educational-Licensing Program involves a specified period of formal instruction followed by an examination to indicate degree of competency mastered by an applicant for a license. Said license would be issued when minimum expectancies had been met.

Licensing is the act of officially and legally granting someone permission to do a specific act or own something. Operator licensing permits qualified applicants to drive specified vehicles.

Motorboat means any boat propelled by machinery, whether

or not machinery is the principal source of propulsion. Steam, diesel, gasoline, and electricity-powered machines are all applicable. When a sailboat, regardless of length, uses auxiliary power, it is considered to be a motorboat.

Operate means to navigate or otherwise use a vessel.

Operator means the person at the helm. The helmsman has the responsibility for the operation of the boat, the behavior of its passengers, and for the waves and wake created by the boat. The person at the helm, steering wheel, is legally responsible for the boat while it is adrift or underway.

Owner means a person, other than a lienor, having property in or title to a vessel.

Recreational means activity commonly engaged in during one's leisure time, for example weekends, vacations, hours other than working hours.

#### Assumptions

This study assumes that statistics, information, and recommendations made by agencies and their directors and specialists are accurate. It is further assumed that the directors are well prepared, knowledgeable, and competent individuals in their fields.

This study assumes that there is a reasonable and logical relationship between the accident and fatality incidence factor in

recreational motorboating and in the following outdoor recreational activities. An educational-licensing program is in effect for snowmobiling for those operators not possessing a valid vehicle driver's license from the Oregon Department of Motor Vehicles. In motorcycling a valid vehicle driver's license is a prerequisite to the motorcycle endorsement which can be earned by passing a written and operating examination. And in the area of hunting all hunters less than 18 years of age must have taken an educational course and passed a written examination to receive the hunter safety certificate.

Educational-licensing programs have been in effect since 1972 in snowmobiling, 1965 in motorcycling, and 1959 in hunting. It seems reasonable that experiences and data from these recreational areas may have transfer value for a recreational motorboat operator program in Oregon.

It is assumed in this study that 50 percent improvement in accident and fatality rates is reasonable and is significantly conclusive in demonstrating a reduction of casualties with the inception of an educational-licensing practice.

#### Limitations

Economic, weather, recreational interests, government intervention of standards, and industry product improvements are variables that may strongly influence the behavior of recreationists.

However, these factors have not been controlled in this study and are therefore limitations to the use and interpretations of findings.

Any one of the above variables could radically change accident and fatality statistics in any given year. An example of the weather variable can be seen in the boating-fatality data for 1967 when 52 boatmen lost their lives in Oregon. It may be speculated that this sharp rise from 16 fatalities the previous year was largely due to a hot, very dry summer in the Willamette Valley. This kind of Willamette Valley weather results in greater than usual fog along Oregon's coastline. Hot valley weather in 1967 resulted in more people boating in coastal waters under fog conditions, which are conducive to marine accidents.

An example of product improvement which may have reduced casualties can be seen in the production of motorcycles. Federal regulations are in the developmental process now for certification standards for various motorcycle components. Tony Murphy, Director of Technical Standards of the Motorcycle Industry Council, states that this is being done with the full cooperation of the industry. Motorcycles now being produced have the machine's operating levers and pedals located in the same place, i. e., clutch on the left and brake on the right. A possible reason for this regulatory standardization is to minimize the possibility of operational confusion when an operator changes from one machine to another machine. No

data have been published to date to indicate possible effectiveness of standardization of parts and motorcycle design in reducing accidents.

Another limitation inherent in this study is that the data did not permit a separation of educational effects from licensing effects. Which of these programs, education or licensing, had the most bearing on reducing fatal and non-fatal accidents can not be determined by the procedures employed in this study.

This study will not be concerned with the operators of sailboats without auxiliary power, canoes, kayaks, rowboats, and other watercraft not propelled by machinery. Machinery is defined as any mechanically driven apparatus to propel a boat. Commonly, this applies to diesel and gasoline-fueled engines, electric motors, and steam engines.

Also not included will be the marine regulations established by several agencies, i. e., State Marine Board, local jurisdictions for special laws on bodies of water, privately held waters with special regulations like Lake Oswego, to control the behavior of and operating procedures of motorboat operators of recreational watercraft. Boat traffic patterns, speed limits, and operating distances from shore and other considerations in this category.

Another area not included will be those existing licensing laws dealing with the physical condition of the various watercraft

themselves. By paying a fee and perhaps permitting a boat inspection, the owner is able to operate his watercraft on certain State and Federal waters. There is no mechanism in the boat licensing laws that covers operating the recreational boat in a safe manner.

This study will not examine the operations of commercial watercraft such as tugboats, commercial fishing boats, and charter boats. The thrust of this study shall be in the area of recreational activities and not those associated with commercial or vocational pursuits. There already exist agency policies on the educational-licensing practices of most commercial boating ventures.

Neither will this study focus on marine law enforcement boat and equipment structure and engineering, educational setting and instructors of other agency educational-licensing programs, or other states' motorcycle, snowmobile, and hunter safety programs due to uncontrollable variables. This study will examine current agency educational-licensing practices only in Oregon.

This study will not examine boating safety educational-licensing practices by other state agencies other than the State of Oregon.

### III. REVIEW OF LITERATURE

#### Boating

Interest in education for boating skills and safety goes back many years as evidenced by the numbers of individuals enrolled in courses offered by national organizations. For example, the United States Power Squadrons (USPS) is an international non-profit educational organization that exists to promote boating safety not only to its members but also to the public. For over sixty years USPS has offered free instruction to the public. Nationally, approximately 80,000 people enrolled in the basic course in 1971.

Originally known as the Coast Guard Reserve, the United States Coast Guard Auxiliary (USCG Auxiliary) was founded in 1939. It is a volunteer, non-military group composed of small-boat owners from all the states who cooperate with the Coast Guard in furthering its maritime safety programs. Approximately 235,000 people took advantage of one of the Auxiliaries' various free courses offered nationally in 1971.

The American Red Cross, too, maintains boating safety programs. In 1971 Red Cross instructors enrolled about 45,000 students nationally in their classes.

These three national organizations offer most of the basic

courses in boating and water safety. No reliable attendance numbers are available for classes offered through public and private schools, the Armed Forces, state agencies, boat clubs, and law enforcement units.

Until the Motorboat Act of 1940 (Public Law 484) was enacted by the Federal Government in 1940, there were few rules and regulations in most jurisdictions. Numbers of boats and operators were comparatively few in number. There were no massive problems that called for agency regulations. During the late 1930's the number of motorboats and the horsepower rating of outboards had increased substantially. Users of the waterways called for some guidelines and controls, and Congress adopted Public Law 484 in 1940. This law provided for a classification system.

This Act also set forth the required equipment that each class of boat had to carry. The licensing of operators of family pleasure boats was exempt, but operators of boats for hire were required to be licensed.

Further, this Act provided both civil and criminal sanction for operators who used boats in a reckless or negligent manner. Operators of boats involved in collisions were required to assist the victims and to file an accident report with an appropriate agency.

The Federal Boating Act of 1958 (Public Law 85-911) called for each state to number recreational boats and to establish state

regulations. Each state's system had to meet the approval of the Secretary of the Treasury, which had the responsibility of the Coast Guard at that time. Except for some special exemptions, all boats propelled by machinery of more than ten horsepower had to be numbered.

Licensing of operators was not mentioned in this Act. Its principal objective was to secure the cooperation and coordination of the various states in the interest of uniformity of boating laws. The Act declares:

It is hereby declared to be the policy of Congress and the purpose of this Act to improve boating safety and to foster greater development, use, and enjoyment of all the waters of the United States by encouraging and assisting participation by the several States, the boating industry, and the boating public in development of more comprehensive boating safety programs; by authorizing the establishment of national construction and performance standards for boats and associated equipment; and by creating more elexible regulatory authority concerning the use of boats and equipment. It is further declared to be the policy of Congress to encourage greater and continuing uniformity of boating laws and regulations as among the several jurisdictions, and closer cooperation and assistance between the Federal Government and the several States in developing, administering, and enforcing Federal and State laws and regulations pertaining to boating safety (Public Law 92-75, 1971, p. 1).

The Federal Boat Safety Act of 1971's 41 Sections include two that relate to boating safety programs. Section 22 is titled "Safety Certificates." It states,

When a State is the issuing authority it may require that

the operator of a numbered vessel hold a valid safety certificate issued under terms and conditions set by the issuing authority (Public Law 92-75, 1971, p. 9).

In this section the Act permits the various states to require an operator to possess a boating safety certificate. An exception would be those states like Washington State which are under Coast Guard jurisdictional authority.

Section 26 is titled "Boating Safety Program Content. "

It reads in part:

(The Secretary shall accept a State boating safety program which) provides for boating safety education programs; designates the State authority or agency which will administer the boating safety program and the allocated Federal funds (Public Law 92-75, 1971, p. 9).

These sections may be interpreted to be an openness of the Federal Government to state initiation of programs for operator licensing and boating safety. In fact, since the Congress of the United States first passed the Motorboat Act of 1940, it has strived to impose necessary regulations for improving marine safety. The results of all three Acts (1940, 1958, 1971) have been implemented to save lives and property.

Arguments have continued between proponents and opponents of operator licensing for many years. The differences of opinion have stemmed from such ideas as licensing will reduce accidents, licensing without education will only benefit the states monetarily,

licensing is an infringement on one's freedom to recreate himself, and licensing is too expensive in personnel and money for the results likely to be obtained. Could it be construed that Coast Guard spokesmen have contributed to the controversy by taking different positions from time to time? For example, at a National Safety Congress meeting in Chicago, 1971, Rear Admiral Austin C. Wagner said:

(The Coast Guard could) plug the operator ignorance gap in boating safety by developing a self-study course which, if successful, could be made available to states as the basis for issuance of a safety certificate of license ("Stem to Stern," Ensign, p. 9).

This stance towards operator licensing was further developed by Wagner's "Envisioned Licensing Program," in which he states the following points:

- 1) (This would be) a Federal Program administered by the States,
- 2) it would apply to operators of all types of boats,
- 3) the States would have two years to implement the program,
- 4) there would be two programs, one for youths and another for adults,
- 5) and the main plan of instruction would be flexible to meet individual state needs ("Stem to Stern," Ensign, p. 9).

This posture was further supported by Admiral Chester R.

Bender's 1973 statement made at the fall 1973 Conference of the

USCG Auxiliary held in Marriott Inn, Berkeley, California, when he said:

Unless we can achieve a better record of reaching a large share of the boating public with some form of boating safety education, we will have to consider mandatory education of licensing (Thompson, 1973, p. 86).

A possible interpretation of the Coast Guard's position is to wait and see the outcome of State applications of the Federal Boat Safety Act of 1971. Perhaps through state efforts to patrol waterways and enforce existing marine laws, enough pressure may be exerted to reduce accident and fatality incidence.

Another act by the Coast Guard that caused a misunderstanding with the States' boating law administrators was a Coast Guard sponsored study titled "Survey of Opinion of Owners of Recreational Boats on Questions of Licensing" released April 16, 1970. The Coast Guard's support of this study appeared to indicate a more than passing interest in licensing. The boating law administrators were not and are not interested in licensing procedures. More recently the Coast Guard entered into a grant agreement with University Sciences Forum (Grant Agreement CG 4804, released March 1974) to determine the present feasibility of a national boat operator's licensing program and allied cost factors if such a program were implemented. The various State boating law administrators did not support this study because they felt the Federal Boat Safety Act

of 1971 should be given a fair period of time to implement new programs for boating safety. The direction the Coast Guard was apparently moving in regard to operator licensing was not acceptable. The boating law administrators were primarily interested in the findings of their own research title, Study Project Comprising Three Surveys. The Coast Guard had entered into a grant agreement on this project too.

In Outboard Boating Club of America newsletter titled "Legislative Ledger" dated June 4, 1962, Retiring Coast Guard Commandant Admiral A. C. Richmond is quoted saying that he is opposed, "... to schemes to impose an operator's license on pleasure boatmen..." Admiral Richmond felt that a licensing program would be too costly in respect to possible reduction in accidents and fatalities. He testified before the House Merchant Marine and Fisheries Committee in May 1962. His position was supported by Admiral Edwin J. Roland who succeeded him as Commandant on June 1, 1962.

An editorial in the May 1968 edition of Boating magazine, page 45, suggests that the time to license all power-boatmen is now. The editor cited as an example of successful licensing the state of New Jersey's program, which began licensing on non-tidal waters in about 1900 as a result of State legislative action. The program consists of filing an application with a fee of \$3.00 with the State of

New Jersey annually for the license. No educational classes, examinations, or competency inventories are required for the "license." Possessors of the State license are reported to be cooperative and proud of the license. Although no accurate data can substantiate moderation in New Jersey's water-related fatalities and accidents, perhaps it drew attention to the importance of water safety and influenced people to enroll in boating classes. Chief of the Bureau of Navigation in New Jersey during 1968 was Peter J. Gannon. Chief Gannon feels that various educational programs such as the USPS Boating course and USCG Auxiliary boating courses are to be credited more than the State's licensing system.

In disagreement with the logic and purpose of New Jersey's licensing requirement for non-tidal boat operators, Merrill Morris, a newspaper reporter for The Courier-News, Plainfield, New Jersey, doubts the value of the license. In an article dated August 15, 1968, in The Courier-News Morris wrote, "... the only qualification for an applicant is that he must be alive and bring money. There is no test involved and no safety course required." Morris went on to suggest that at \$3.00 per license per year, the State of New Jersey is not apt to give up the "easy money" which amounted to \$45,000 in 1968.

In correspondence dated October 3, 1974, from Michael L. Redpath, Past President of Marine Trades Association of New Jersey, it is clear that increasing State monies by assessing fees for a

license does not promote greater boating enjoyment and safety. An unusual example of the licensing program's fallacy, which dates back to the steam days of about 1900, is the incident of a boatman who obtained a boat operator's license for his dog. Is this good licensing?

Robert Rittenhouse, former Director of the Oregon Marine Board, says that operator licensing per se is not the answer to reducing marine accidents, education is the answer. He notes that substantial numbers of boating fatalities year after year were caused by careless operators of non-powered watercraft. In 1967, for example, approximately 62 percent of the nation's boating fatalities were power-boat related. Thirty-eight percent were non-power related. According to boat accident report forms for 1967, in those cases where operator's boating experience was known, the majority of operator fatalities had over 500 hours of boat operator time. Rittenhouse (1969) also pointed out that approved lifesaving devices needed to be improved so they were not so cumbersome and unattractive. Also, at that time lifesaving devices were not required on non-motor powered boats. "The answer lies in education of the boating public, through the three E's: Education, Engineering, and Enforcement," stated Rittenhouse (1969, pp. 76-77).

On April 16, 1970, the United States General Accounting Office (GAO) released its findings from a questionnaire designed to measure a sample of boat owners' attitudes towards a licensing program. As

part of the review, the GAO examined the desirability of licensing as a means of reducing boating accidents and related search and rescue incidents. The sampling was done on a nationwide basis. On the basis of an 85.6 percent response to 25,000 questionnaires mailed, the GAO found the following information: "56 percent of recreational boat owners opposed operator licensing, 41 percent favored licensing, and 3 percent gave no definite answer" ("Survey of Opinions," 1970, p. 8).

The conclusion of this GAO survey includes this final sentence:

Considering the percentage of boatowners in favor of licensing but expressing a need for improved boating safety, it appears that the boating public might not oppose a licensing program supporting increased emphasis on an enforcement of boating laws and regulations (p. 12).

In the introduction to another study titled Feasibility and Cost Factors of a National Boat Operator Licensing Program, Rymer (1974), principal investigator of the study, states that the purpose of the study was to investigate legal implications and probable costs of a projected federal-state boat operator licensing system. The principal concern came from the increasing numbers of boating fatalities, accidents, and property damage caused by at least eight million non-registered boats and upwards of twenty million boat operators in the United States today. The premise included the idea that it may be cost effective to have a licensing system that included

completion of a boating safety course.

Rymer (1974) designed the license examination procedures along the lines of state motor vehicle operator licensing programs. He noted that as a Uniform Vehicle Code has been promulgated nationwide, so could a comparable code be developed for motorboat operator licensing. The instruction in boating safety and operation could become a part of the public school's curriculum, much as motor vehicle driving courses are now a part.

Computer simulation models were programmed to evaluate three licensing processes. These are Walk-in Licensing, On-line Licensing, and Mail Licensing. In the Walk-in Licensing process the examinee is tested in the controlled environment of a booth and given a temporary license if he passes. A central licensing bureau verifies applicant's operating history by telephone immediately. A permanent license is mailed to the applicant if no outstanding offenses are noted.

On-line Licensing process is the second method and differs from Walk-in Licensing in that the shipping and mail functions are replaced by On-line teleprocessing capabilities. A computer at a central agency handles all functions.

The third process is called Mail-Licensing process. Here, an "open-book" examination is given in an uncontrolled environment, that is there are no monitors. All transactions are handled by mail.

Computer simulation models have been developed for each of these processes using the Graphical Evaluation and Review Technique (GERT). This technique is somewhat similar to the Program Evaluation and Review Technique (PERT) in that it consists of events and activities to form a network. Network models for systems analysis have played an increasingly important role over the last five years. A principal reason for this is the relative ease with which complex systems can be modeled in network form.

GERT incorporates a network of branches (activities) and nodes (events). The description of these, plus control information, serves as input to the simulation program. Some of the findings of this feasibility study using the GERT system are as follows:

- 1) Federal and/or state legislation dealing with the licensing of pleasure boat operators is not in contravention of the letter or the spirit of the Constitution.
- 2) Licensing standards are totally feasible based on the analogy of the motor vehicle operator's permit in the several states.
- 3) Standards for boat operator training are both practical and feasible, and as a public benefit "environmental" factors can be included as required instruction (Rymer, 1974, p. 23).

The study appears to be a legal and administrative feasibility study. Rymer recommends that control groups with and without training be compared and analyzed for at least one year; also, a pilot program should be instituted for at least one year. Further,

he thinks that any licensing programs should be self-supporting. Boating safety education and enforcement funds should come from this system.

On behalf of the National Association of State Boating Law Administrators (NASBLA) a report titled Study Project Comprising Three Surveys was prepared for the Coast Guard. It was released in 1974. The data base years were for 1969-72, with estimates for 1973.

This study covered so many areas that it was divided into a three-part effort. American Surveys designers thought that the scope of the overall study was too demanding for a one-time response. As comprehensive as the study was, it did not directly address the question, Do we know if boat licensing of operators is likely to be effective in curbing accidents and fatalities? In the area of boating, there appears to be very little information to draw on to provide an answer.

The First Reporting Form of the survey covered twenty-four items designed to measure the degree of conformity of each state's boating laws and regulations with the Model State Boat Act, developed by NASBLA's Uniform Boating Law Committee in 1973. With 49 state offices responding to this form, it appears that there was a spirit of cooperation in meeting the needs. Among the 49 states there was a high degree of conformity achieved, 81 percent. The

State of Washington was low with only 20 percent compliance; Oregon's compliance was 88 percent; and Florida alone achieved 100 percent conformity.

The Second Reporting Form centered on enforcement of state boating laws and regulations. Its 24 items called for dollar amounts for enforcement and descriptions of marine regulations and activities. Considerable discrepancies existed among the many states reporting. Some states have few bodies of water, hence few boatmen. One item of particular interest was the impact of Federal assistance under the Federal Boat Safety Act of 1971. This Federal money made more effective patrol boats, radio-equipped vehicles, and allied equipment possible.

The Third Reporting Form asked for information about boating safety educational activities. Results indicated that there was considerable activity in achieving a multimedia approach to disseminate boating education recently. But in 1969 only 12 states reported that they had conducted boat safety courses. This number had grown to 20 by 1973. Oregon was not among the 20 states. However, no data are available to show the effectiveness of these courses or to answer the question: To what degree do educational programs reduce accident and fatality rates?

The use of major media to promote boating skills was very limited through 1972. The majority of states was not active in

this area. Oregon was a typical state in this respect, according to this survey.

In its summary and conclusions the National Association of State Boating Law Administrators' Study Project points out that:

- 1) Prior to the Federal Boat Safety Act of 1971, many state programs were inadequate but are now moving forward.
- 2) The impact of fuel price increases and environmental legislation may strongly influence the boat-buying trends of the 1960's and 1970's.
- 3) If the presently used indicators for measuring the importance of recreational boating safety are accurate, then the present level of Federal funding is a minimum amount (pp. 115-116).

NASBLA's 166 page report is far ranging. It may be the single best reference book through year 1972 in terms of how states are applying their resources to improve boating skills and safety for the public. But where are the data that may be used to measure program effectiveness? Do we know that an educational-licensing practice would be an effective deterrent to reducing accidents?

One of the strategies discussed to help educate the public who violated marine regulations dealt with a judge's discretion of a fine or taking a boating course in lieu of part or all of the fine. To date, this strategy is used by only four states. No data were given to show that this is effective.

To the question, "Would additional hours of law enforcement

achieve any appreciable reductions in the number of boating accidents in your state?" 36 states responded. Seventy-two percent of the states said yes, more hours of enforcement are a necessity. Twenty-eight percent said no. This group suggested that some other activities like boating education programs were more important. But at this point, How do we know what is the best of several approaches? Should we spend our funds for law enforcement or education? Speculation and opinion appear to be the foundation for program development to date. Factual measures of comparative effectiveness are lacking.

Question 15 of the Third Reporting Form asked whether or not it was necessary for an individual to complete a boating safety course before he may operate a boat. None of the states currently has this requirement for adults. Only three states have this limitation and it applies only to young people. In Alabama the operator must be at least 12 years of age or pass a prescribed water safety course to operate a boat. Michigan requires that operators between the ages of 12 and 16 must pass a boating course. And New York requires that 10 to 15 year old youths must attend the New York State course and successfully fulfill the requirements. Apparently the other states have no age or ability standards.

The most recent effort by the Coast Guard to gather data relative to licensing of recreational boat operators is titled

Recreational Boating in the Continental United States in 1973: The Nationwide Boating Survey.

In a prefacing letter to the various state directors of marine boards in June of 1973, Capt. D. F. Lauth, USCG, Chief Planning and Evaluation Staff, wrote,

While we are all convinced that education for the boating public, particularly the novice boat operator is the key to reduced fatalities and accidents, the question remains whether this can be accomplished through a voluntary participation or whether some form of mandatory requirement must be established (p. 1).

The last sentence of Capt. Lauth's letter also gives some insight into the possibility of mandatory licensing.

We are hopeful that it may be of substantial assistance to all of us in reaching a reasonable decision as to whether the subject of operator licensing should be further pursued (p. 2).

One example of reaction is to the Coast Guard's latest concern for licensing may be found in a letter from Kenneth E. Gruenwald, Boating Administrator Division of Law Enforcement, State of Illinois, dated June 21, 1973. The thrust of the letter is summarized in the last two paragraphs on page three:

The only reason that operator licensing "remains a distinct possibility" is the fact that the Coast Guard insists on continually talking about it as a distinct possibility. This is a classic example of a self-fulfilling prophecy.

In the face of overwhelming opposition to operator licensing and mandatory education requirements, it

is not only regrettable, but shocking, that the Coast Guard chose to spend a significant amount of public funds on an academic project that is not justified by the facts (accident data) and which is so unanimously opposed by those who know boating best. These moneys could be better used to foster continued efforts to enhance the voluntary educational programs that to date are proving successful.

Gruenwald's views are widely held by state boating administrators. They are asking some of the same questions that this inquiry is probing, i. e., What evidence do we have to use in determining whether or not an enforced licensing practice is effective? What data have been collected to show a reduced number of accidents and fatalities after enforced licensing? Only New Jersey has such a licensing requirement on non-tidal waters. This requirement has been in effect approximately 75 years, yet where are the data to show how effective it has been? Even though the Coast Guard reports that the fatality rate per 100,000 had increased to 21.9 during the past five years, the rate has been higher. In 1961 it was 22.1 and in 1965 it was 22.7 fatalities per 100,000 boats. As pointed out earlier, the fluctuation of this fatality rate varies from a low of 18.9 in 1972 to a high of 22.7 in 1965. The overall range does not appear great, with this recent exception. Although it is outside the time limitation of this study, the 1974 Boating Statistics CG-357 shows a 16.9 fatality rate for that year. This is the lowest rate on record to date. What is great is the increase in numbers of

watercraft and boatmen. But does increased numbers of boats and boatmen alone warrant a required licensing practice?

In an Executive Summary statement from the Coast Guard it is made clear that this nationwide boating survey was to expand and clarify existing information on recreational boating through the year 1973. As approximately 25 percent of all boats are not numbered and as the overall return of mail surveys is frequently under 20 percent, the survey's researchers decided to use a telephone survey system. During the months of April and May of 1974, over 25,000 households across the nation were contacted and screened. In those calls where the interviewer found that the household contained a boat owner or boat operator, the survey was administered. The responses from each geographical area were weighted, resulting in state, regional, and national estimates.

For the first time in a national survey, findings were gathered about boat exposure in terms of boat hours and passenger hours per boating participant. This data shed light on the nature and causes of the 1,754 boating fatalities during 1973. Outboards appeared to be the most dangerous kind of boating with 939 fatalities. Yet when one reflects on the amount of time different types of boats are exposed to the possibility of a boating accident, the results may differ.

The survey shows that passengers on manually-propelled

canoes have the highest fatality rate at 1.656 deaths per million passenger hours. Not far behind are the manually-propelled rowboats and jonboats (a square-ended, shallow draft boat about 12 feet long usually made of aluminum) with 1,385 deaths per million passenger hours. Considerably further behind is the boating activity that was thought to be the most dangerous, outboards, with .546 deaths per million passenger hours (Wulfsberg and Lang, 1974, p. 64).

The findings of this study may be interpreted to mean that if operator training and licensing comes to pass, it should not be limited to motorboat operators only. Some other items of particular interest from this study are the following:

- 1) There were 9.3 million boating households nationally in 1973.
- 2) Fourteen percent of all households in the nation had one member who operated a boat in 1973.
- 3) There were 16.4 million boat operators during 1973.
- 4) Over 75 percent of the boat operators were males averaging 35.3 years of age.
- 5) The majority, 66.2 percent, of boat operators had over 100 hours of boat operating experience.
- 6) Of the primary operators 25.7 percent have had a boating safety course with the Coast Guard Auxiliary sponsoring the majority of the courses. The boating safety course percentage rises to over 30 for the West Coast.
- 7) Of the boating households that saw or heard boating safety information, 80.3 percent received it via television (pp. 1-3).

The authors of the study made no specific recommendations about operator licensing. They concluded their findings by saying that this type of information should be collected often so trends may be established to see if the effectiveness of the present boating programs is meeting the needs of boatmen.

Information obtained through interviews, casual conversations with boatmen, and reading newspaper magazine articles indicates that the opinions for enforced licensing are widely divergent. Even among Coast Guard personnel who are charged with orderly operation of seaways and safeguarding boatmen there is an opinion difference ranging from one extreme to another.

The availability of literature in this area is limited, for the great increase in boating activities did not come until the 1960's. The available literature is recent. It is a result of concern over increasing marine-related injuries, collisions and fatalities.

Not until 1959 did the Coast Guard gather data on a national level dealing with recreational boat numbering and casualties. The annual report is titled Boating Statistics CG-357. This reference was initially published under the authority of the Federal Boating Act of 1958 and currently under the Federal Boat Safety Act of 1971.

In summary, recreational boating has very few compulsory operating and licensing regulations. Boating officials and boatmen

have widely divergent views about how to curb accident and fatality incidence.

### Snowmobiling

Affluent Americans who are drawn to winter recreational areas often become involved in a new snowsport called snowmobiling. The numbers of these machines have increased rapidly during the past five years. In Oregon the numbers have increased from about 5,000 snowmobiles in 1970 to about 9,000 in 1974. The Western Snowmobile Association and interested snowmobilers requested the 1971 Oregon Legislative Assembly to pass a bill proposing an educational-licensing practice for snowmobile operators and a licensing procedure for snowmobile machines. The bill for both requests passed and the law went into effect in January 1972.

The National Safety Council reports that there were 86 snowmobile-related deaths in the United States in 1971. In 1972 that figure jumped to 161 deaths. New York State alone reported 23 fatalities and 647 accidents. The Oregon Motor Vehicle Division reports one fatality in 1972 and no accident reports for any year. With about 9,000 snowmobiles registered in the State, it is surprising to some observers that Oregon operators are so accident free.

Oregon is one of the few states to have these licensing procedures. Writer Bill McKeown reports that eight states require

a snowmobile driver's license. In those eight states the licensing requirement came about due to several factors. He cited the following:

Careless and inconsiderate drivers who have ignored property rights, chased animals, collided with cars, trains, damaged tree nurseries, drowned (operators/passengers) crossing thin ice, gotten lost and required extensive rescue missions, and disturbed the peace. (McKeown, 1974, pp. 156-160)

Those states now regulating operators require an automobile driver's license or a safety certificate. Operators under 18 years of age need the certificate, as well as operators who do not have a driver's license. Directors of snowmobile programs feel that by requiring the educational program of young operators that eventually most operators will have had safety instruction. This preventive approach is felt to be fair and equitable to all snowmobile enthusiasts.

Because of increasing accident and fatality reports from other states, the National Safety Council is asking for standardized laws and enforcement and educational courses for the four million people now enjoying this sport.

The plea for safety and educational courses is going out from many concerned groups. Dr. S. L. Andelman, syndicated newspaper columnist for the Los Angeles Times, devoted his "Medical Talk" column for one recent issue to snowmobile accidents. Dr. Andelman, speaking for the American Academy of Pediatrics, suggests twelve

safety guidelines. The first is, ". . . take a good training course." (p. 5). Similar pleas for snowmobile education are being voiced by writers and sponsors in many magazines, newspapers, and industry-sponsored films and television public service announcements.

These efforts are just now taking place. No results of broad scale studies have been reported recently. With only 25 percent of the states requiring licensing of operators and machines it is apparent that activities associated with snowmobiles are sketchy and incomplete. Expert opinion about the importance of this licensing practice abounds, but documented effectiveness of licensing-educational legislated programs is lacking.

Jack Hoene, spokesman for the International Snowmobile Industry in 1973, thinks accident and fatality numbers could be greatly reduced if every rental shop and dealer gave adequate instruction. In a study about snowmobile accidents, Dr. Raymond H. Dominic of the Maine Medical Center says, ". . . machine mechanical failures are responsible for less than five percent of all the accidents reviewed" (p. 150). Another study done by Dr. S. E. Chism and A. B. Soule of the University of Vermont report that during 1970-71 the snowmobile accidents studied there show the greatest dangers in operators drinking alcohol and driving a

snowmobile, thin ice crossing, excessive speed, and hitting objects (p. 150).

It is apparent that if the snowmobile accident and fatality rates continue to increase, the public will insist on educational-licensing programs. The problems in this activity are similar to some of those in boating, i. e., novice operators, disregard for rights of others, not knowing limits of the machine, and drinking alcoholic beverages and driving. It seems to make sense to require educational licensing legislated programs, but in point of fact we do not know if such measures are effective.

### Motorcycling

Motorcycle registration and use have increased greatly during the past decade. In Oregon the registrations increased from 8,624 in 1960 to 72,300 in 1972, according to statistics from Oregon Motor Vehicles Division. Americans are concerned about the number of motorcycle accidents, serious injuries and deaths. In an interview with Chester Ott, Administrator of the Oregon Motor Vehicles Division, August 24, 1974, the author was informed that nationally the death rate in motorcycle accidents is about four times as high as for motor vehicle accidents in general.

Motor Vehicle Division records show that in 1958, the first accurate records available for motorcycles, there were 421 reported

motorcycle accidents and nine fatalities in the State. These numbers had risen to 1,281 accidents and 25 fatalities by 1964, the year prior to the required motorcycle educational-licensing practice.

Accident numbers declined to a low of 692 in 1968. Fatalities that year numbered 23. That was the year following the headlight on and mandatory helmet additions to the licensing program. From then to the present both accident and fatality incidence increased overall due to rapidly rising numbers of motorcycles in use. It is important to bear in mind that although total figures rose sharply in both accident, fatality, and registration categories, the pro rata percentages dropped most of the years compared to the base year of 1965. The year 1959 continues to be the record year for fatalities with a pro rata percentage of 19.2 per 10,000 registered motorcycles in the State. The year 1970 shows the lowest with a 4.5 pro rata percentage.

Legislative Assemblies have responded to these concerns over rising accident and fatality numbers with laws calling for equipment standards and an educational-licensing program. Motorcycle manufacturers have organized the Motorcycle Safety Foundation (MSF). This was organized in 1972 to make efforts to lessen the occurrence of accidents between automobile drivers and motorcyclists. MSF aids motorcycle enthusiasts by providing two-day clinics around the United States in major cities. A beginner's

riding course kit has been made available from the MSF for a nominal fee. MSF personnel think that with educational programs, clinics, and inexpensive home-study courses accident numbers will be reduced. Convincing data to prove that these kinds of educational activities really produce results is difficult to find. However, State of Oregon data are convincing and will be reported later.

Nationally, the MSF estimates that there were seven million motorcyclists in the United States in 1974. They predict that that number will increase to 12 million by 1980. More people with more automobiles on the highways and more motorcyclists competing with them for space will probably bring about conditions calling for more controls.

William Hampton, author of The Complete Beginner's Guide to Motorcycle Skill and Safety, thinks that a working knowledge of a motorcycle is important to safe operation. The operator should not only know about the principal parts of the machine, how to repair or replace those parts, and the necessary maintenance but also know about laws of the road, equipment requirements, and safe wearing apparel. In 1966 many states adopted the Z90.1 specifications dealing with standards for mandatory helmet wearing. Oregon adopted these standards in 1967 after experiencing high accident-fatality rates. Data gathered in Oregon by the Division of Motor Vehicles show that a combination of licensing and a headlight-helmet

law requirement reduced accident-fatality incidence significantly. The argument that helmet wearing creates a false sense of security is one of the reasons that four states still do not have a helmet law. Ten states do not yet have a special license for motorcycle operators.

Appeals for safe and sane motorcycle operation are found in the general media. For example, an editorial in Mademoiselle, June 1974, appealed to all readers to get acquainted with the do's and don't's before operating a motorcycle. The writer of the article warned that 70 percent of all serious and fatal cycle accidents occur within the first year of riding experience. Taking instruction in safe motorcycle operation was high on the list of do's.

Course work and a more demanding operator's license examination have a higher priority according to California Assemblymen Paul Carpenter. He has introduced an educational bill that would request motorcycle training programs in high schools. On the helmet question, Carpenter says, "They save some lives and they also cost some lives--it's a wash." ("California Argues Helmet Merits," 1975, p. 25). How does Carpenter know that it is a "wash?" Where are his data? Is it true that he was heavily lobbied by motorcycle clubs in Southern California?

Few studies appear to be available dealing with motorcycle statistics. But like boating, the activity is increasing, especially

because motorcycling offers an inexpensive transportation investment and operational cost. With gasoline shortages and increased automobile operational expenses, motorcycling will probably increase as a mode of transportation.

### Hunting

Like boating, snowmobiling, and motorcycling, hunting is an outdoor recreational activity. It is somewhat different in that a gun is not a mode of transportation, but it is a necessity for a sportsman's participation in hunting. For this reason the experiences of states and the data collected by the Oregon Wildlife Commission is examined in the data base.

Seventeen states require mandatory firearm training prior to the issuance of a hunting license. The course content varies from state to state as well as does the instructor training programs. Bryan I. Burgin, Supervisor of New York State's hunter training program, thinks that all states should work together in developing a uniform training course for hunters as well as instructors. Burgin points out that New York has a reciprocal agreement with all states bordering New York, but some states will not accept other state's safety certificates.

States with hunter safety programs are reporting declining fatality ratios, but non-fatal accident numbers have increased in

some states, i. e., New York with 124 non-fatals in 1970 with 1,118,275 licenses issued compared with 1964's 117 non-fatals and 993,640 licenses issued. This increase of one percent in non-fatal accidents is surprising in view of a required safety certificate program. However, since 1967 the fatality numbers have declined from 11 to nine in 1968, to eight in 1969, and to six in 1970. Compared to Oregon's fatality record of three in 1970 with 372,000 licenses issued, New York's statistics appears impressive.

John Thiebes, Hunter Education Coordinator for Oregon's Wildlife Commission, agrees with Burgin that greater stress should be placed on the training of the program's volunteer instructors. During 1975 the Wildlife Commission will hold instructor training seminars in 35 locations in the State in an attempt to upgrade the quality of its instructional program.

In addition to standardizing hunter safety programs with reciprocity extended from state to state to all certificate holders and upgrading instructors, some state supervisors are considering passage of a requirement that a specific color should be worn by a hunter while in the field. Field experiments show that fluorescent orange is the color most visible. All hunters are urged to wear an outer garment of this color. Some observers feel that one year in the future legislators will amend hunting laws to make wearing this color mandatory. As with snowmobiling and motorcycling, a

concerned citizenry and an informed legislature promulgated laws and regulations in those outdoor activities that have a high incidence of accidents and fatalities. As expressed earlier, data are not abundant in these recreational activities. It is difficult to conclude that legislated-licensing programs have reduced the incidence of accidents and fatalities to a great degree.

### Summary

A review of boating literature revealed that differences over the question of motorboat licensing have existed since the first mandatory licenses were required in 1906 in New Jersey. During the 1960's a few states adopted operator license requirements for youths. But beyond such data as number of classes offered, number of students enrolled, and amounts of money spent, there is very limited information available to base definitive recommendations on short of expert opinion and assumptions.

Since the Federal Boating Act of 1958 was enacted, the Federal Government has moved to make more rules and regulations on the state level possible. With the 1971 Act came Federal monies for promulgation and enforcement of more stringent laws.

The Coast Guard's position on licensing seems to change from time to time. Their posture is probably influenced with statistics from the annual Coast Guard reports. At present, the Coast Guard

appears to want states to place more controls over who operates a motorboat, and they want the states to do the educating and enforcing.

Recent studies indicate that the principal problem may not be with the powerboat operators but with boatmen using manually-propelled craft. More studies are sure to come along this line of questioning soon.

Industry spokesmen and writers are nearly unanimously against mandatory licensing. They feel that the licensing will turn into another "easy money" revenue source for the states and that boating safety may not benefit boatmen.

The review also revealed the following:

- 1) About 40 percent of the pleasure boatmen are willing to give mandatory licensing a try, but the majority is against intervention.
- 2) It has been suggested that a pilot program be tried in at least one state for at least one year to see if any noteworthy changes occur.
- 3) In the cases of snowmobiling, motorcycling, and hunting, legislative assemblies have enacted laws calling for educational-licensing programs, but they have overlooked licensing programs for recreational boating.

#### IV. FINDINGS

##### Evaluation Criteria

This study examined selected aspects of the effectiveness of educational-licensing programs legislated by the State of Oregon's Assemblymen in the recreational areas of snowmobiling, motor-cycling, and hunting. Data were collected for both pre and post program inception dates. The statistical and other material that has been gathered and developed in this study should provide useful guidelines and starting points for future efforts. The criteria to be applied to the data collected for this study include the following:

- 1) a study of the data-base information relating to fatal and non-fatal accidents of the snowmobiling, motor-cycling, and hunting educational-licensing programs;
- 2) recommendations from administrators of snowmobile, motorcycle, and hunting educational-licensing programs;
- 3) an examination of all pertinent data acquired during calendar year 1973 by the Oregon Marine Board;
- 4) an examination of a sampling of all marine citations issued to recreational boat operators during 1973;
- 5) a study of all boating accident reports filed with the Oregon Marine Board to determine the accident-involvement

- relationship between motorboat operators with and without classroom boating safety instruction;
- 6) a report of the findings on the purpose that fatality rates decrease by 50 percent or more after enactment of an educational-licensing program in two of the three recreational educational-licensing programs studied herein;
  - 7) and a report of the findings on a related inquiry of this study that examines whether or not motorboat operators without a boating safety course have substantially more reportable accidents than those operators with at least one course.

The findings of these criteria applications are used to generate recommendations for a recreational motorboat educational-licensing program in Oregon, if such a program is warranted by this data.

### Three Agencies' Data Bases

Snowmobiling. The Snowmobile Educational-Licensing Program began in January of 1972. The reason for passage of these laws covered by Oregon Revised Statutes Chapter 481 is different than in the case of the motorcycling and hunting laws. There were no recorded reports of either snowmobile accidents or fatalities prior to passage of the laws by the 1971 Legislative Assembly. Representatives from snowmobile clubs and associations appeared before the

Oregon Legislature and requested a form of snowmobile licensing and operator licensing programs and rules and regulations to aid in enforcing reasonable rules. Some observers suggest that environmentalists and ecologists were a possible threat to snowmobiling activities, hence the legislative request to protect their recreational interests.

Beginning January 1, 1972, it became necessary for snowmobile operators to have either a valid Oregon driver's license or a snowmobile safety certificate. One may acquire the latter by taking classwork and passing a written examination about snowmobiles and their operation under the law. There is no minimum age for operators in certifying for the certificate. This age decision is left to the judgement of the instructor.

Accident and fatality data on snowmobiling activities in the State of Oregon are extremely limited. The State has no recorded accident-fatality data prior to January 1, 1972. One fatality has been reported to State officials, and that occurred March 10, 1972. There are no reported snowmobile accidents through calendar year 1974.

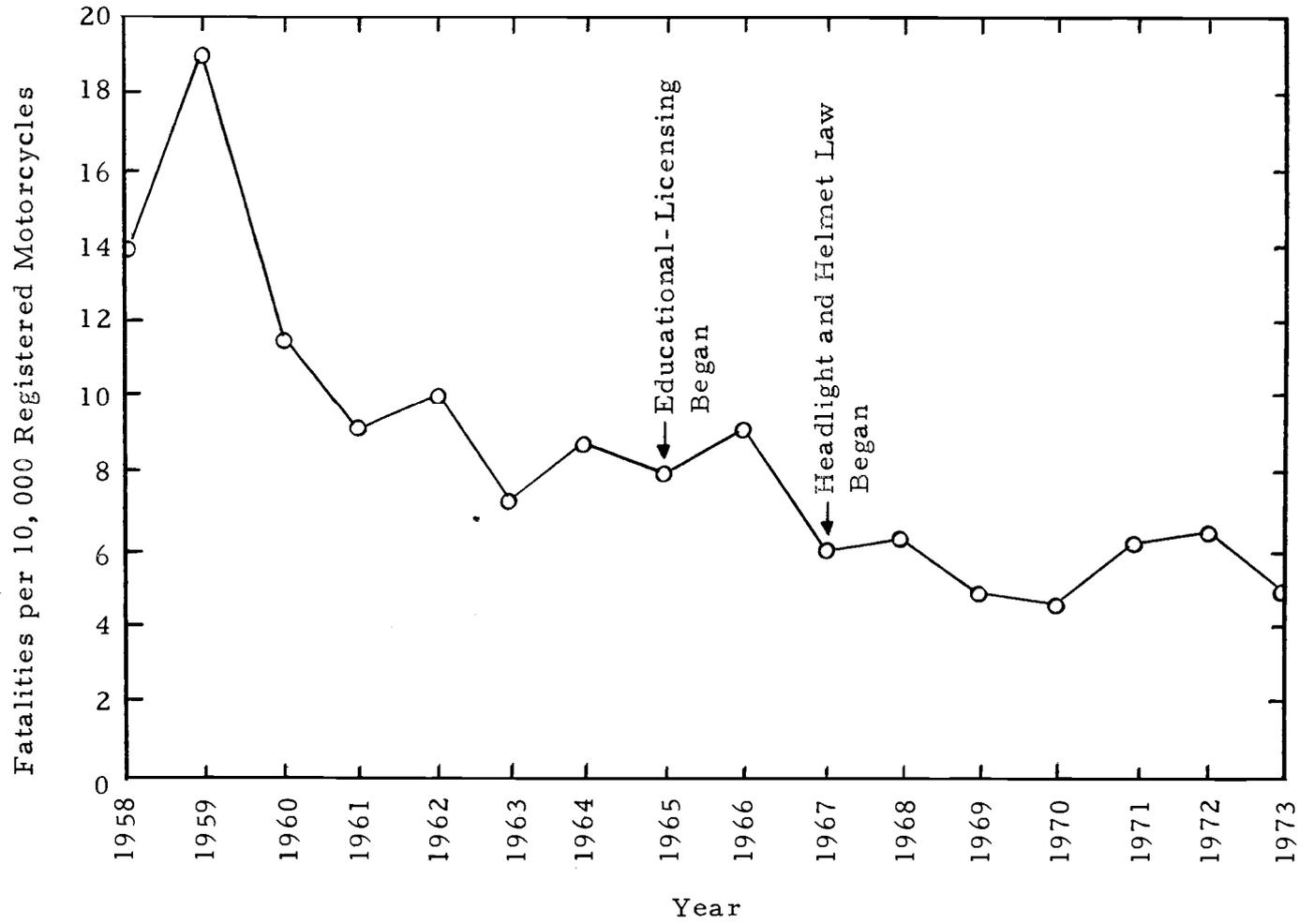
Motorcycling. The Motorcycle Educational-Licensing Program was established in 1965. Oregon Revised Statutes Chapter 483 provides the legal framework. Oregon Law requires every motorcycle operator to possess a valid automobile driver's license with a

motorcycle endorsement (stamp) on the driver's license prior to operating a motorcycle on the State's roadways. To receive the endorsement, the applicant must pass a written examination on highway regulations, a vehicle equipment knowledge test, and an on-street road test.

Table 3 shows a dramatic and continuing decrease in the motorcycle fatality rates per 10,000 registered motorcycles in Oregon. In 1959, 14 deaths were tabulated by the Motor Vehicle Division. A rate of 19.2 fatalities per 10,000 registered motorcycles was recorded that year. The fatality rate dropped to 7.9 in 1965 when the educational-licensing practice began. Ironically, it rose to 9.1 the next year. In 1967 the headlight on and helmet law took effect. A decrease was noted immediately; the rate dropped to 6.1 per 10,000 registered motorcycles. Since the 1965 and 1967 laws were enacted, fatality rates have been decreasing. So far, 1970 has been the safest year for motorcyclists with a rate of 4.5 fatalities per 10,000 registered motorcycles. Statistics for the most recent year studied shows a rate of 4.8 for 1973.

The non-fatal accident rate per 10,000 registered motorcycles in Oregon also shows a gradual decrease. 1973's non-fatal accident rate of 166 accidents per 10,000 registered motorcycles is the lowest on record.

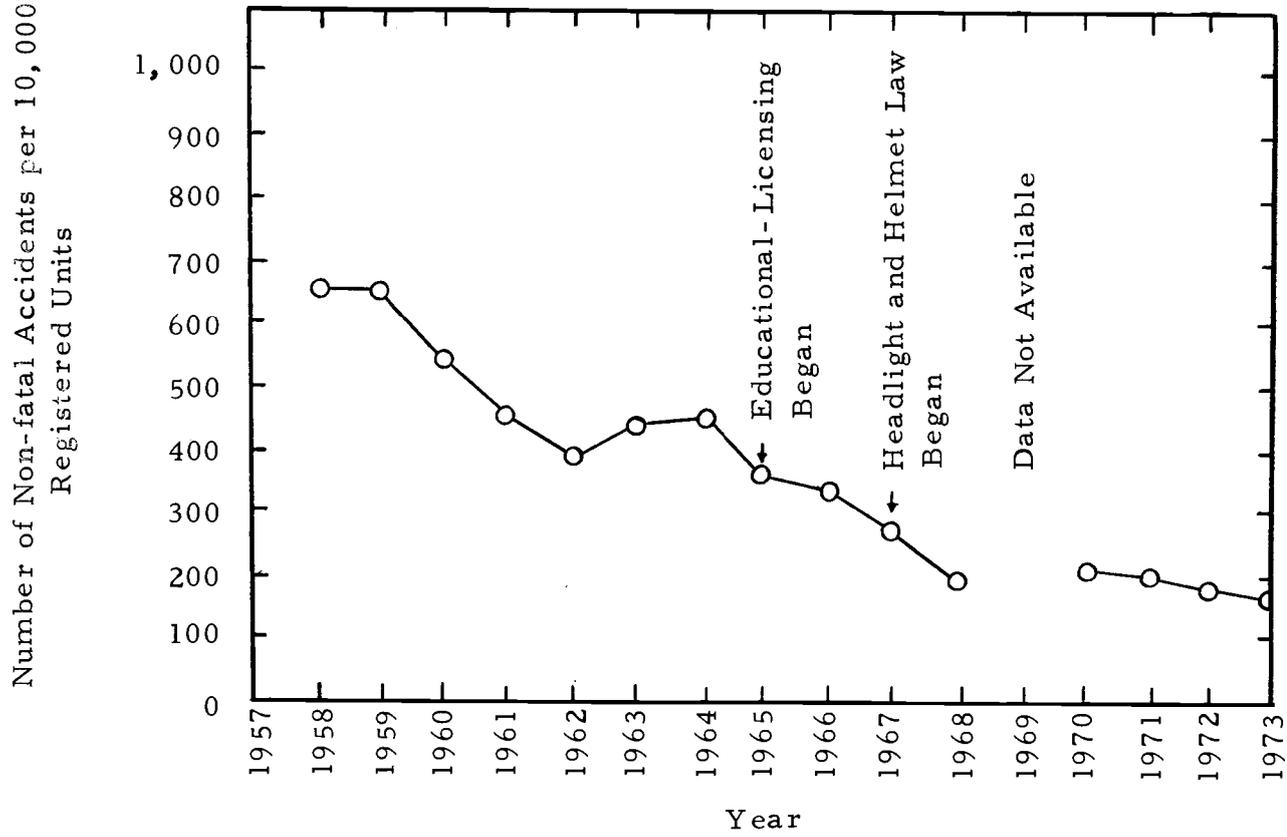
Table 3. Motorcycle fatality rate per 10,000 registered motorcycles in Oregon 1958-1973.



Oregon Motor Vehicle Division spokesmen feel that more motorcycle operators are educated and licensed and that motorcycles are probably safer now than in previous years. Table 4 shows a generally declining non-fatal accident rate with a high of 658 in 1958 and a low of 166 in 1973. The motorcycle industry has cooperated in taking steps to standardize the location of the controls, i. e., brake on right-hand side and clutch on left-hand side, and to build safer machines. These improvements have probably contributed to lowering both fatal and non-fatal accident incidence.

Hunting. The Oregon Hunter Safety Program was established in 1959. Oregon Revised Statutes Chapter 497 provides the legal mechanics for establishment and operation. The Federal Government supports this State program by collecting tax monies from gun, powder, and equipment sales to be used in safety programs at state levels. Both the fatality and accident percentage rate increases were of growing concern to the public. The earliest fatality data shown in Table 5 indicates more deaths per 100,000 licenses in the 1950's than in later years. As a result of growing concerns about hunting accidents, classes were offered throughout the State of Oregon. Volunteer instructors were trained and certified by Wildlife Commission personnel. Students attending the classes were given a written examination covering hunting laws and gun safety. Students who pass are issued Hunter-Safety Certificates.

Table 4. Non-fatal accident rate per 10,000 registered motorcycles in Oregon 1958-1973.



In 1962 the Hunter Safety Certificate became mandatory for all hunters under the age of 18 years. Table 5 shows the decline in fatalities per 100,000 licenses issued to hunters since the certificate became mandatory. Years 1969 through 1973 show the greatest declines of any preceding year. Wildlife Commission spokesmen feel that this continual decline in the fatality rate is due to an increasingly greater number of hunters who have gun safety knowledge acquired in the hunter safety course.

Table 6 showing hunter non-fatal accidents per 100,000 licenses issued to hunters does not indicate as dramatic a decline as the fatality rates. Again, Wildlife Commission spokesmen say that an increasing number of hunters are now reporting non-fatal accidents whereas prior to 1958 few hunters were aware of the importance of filing accident report forms.

#### Agency Administrator Recommendations

Snowmobiling and Motorcycling. Chester Ott, Administrator of Oregon's Motor Vehicle Division, says that a recreational motorboat operator's licensing program might be a good idea. With the data presently available it is difficult to determine if this procedure would result in fewer accidents and fewer fatalities. Ott says that boats are not a "culture" need as cars are, so an educational base of information is even more important for boat owners.

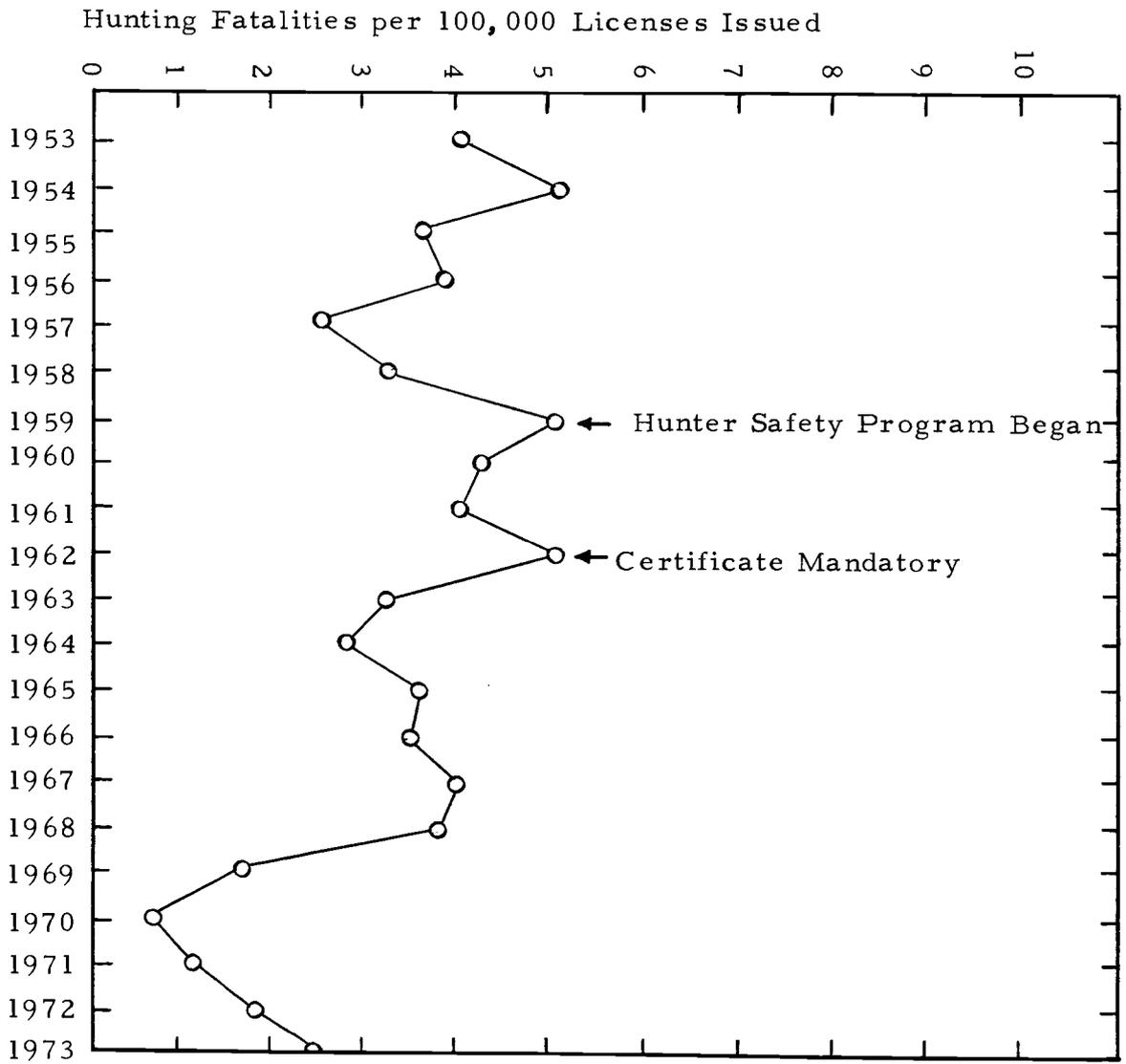
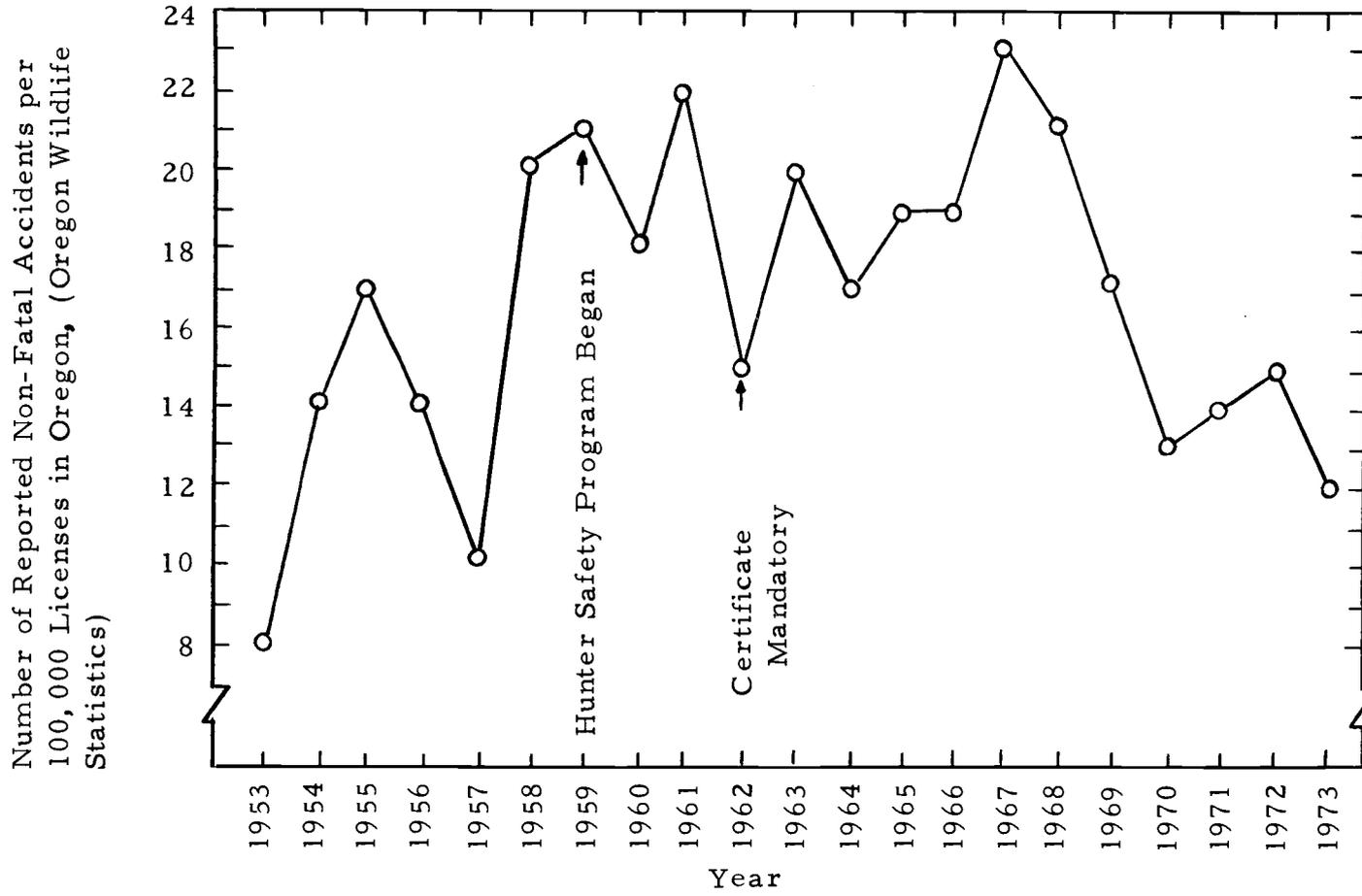


Table 5. Hunting fatalities per 100,000 licenses reported in Oregon 1953-1973.

Table 6. Hunter non-fatal accidents reported per 100,000 licenses.



Director Ott thinks that an actual in-water demonstration of an applicant's operating ability is important. That task alone would require an extensive corps of examiners. Whatever direction such a proposal for motorboat operator licensing may take, the responsible agency must strive to serve the public as simply and as well as possible.

Ott is confident that enforcement of laws is vitally important to reducing accidents and fatalities. Until such time as a motorboat operator's educational-licensing program becomes a reality, strict enforcement of existing laws is very important. He thinks that just as patrol cars visible on highways slow down violators so would marine patrolmen visible to the boating public reduce the number of marine violations and accidents.

Motorcycling. As Director Ott is in charge of the Oregon Motor Vehicle Division, he is chief spokesman for both the snowmobile and motorcycle educational-licensing programs. Director Ott's opinions and recommendations have been reported on page 67.

Hunting. Cliff Hamilton and John Thiebes, Oregon's Wildlife Commission hunter safety specialists, think that a form of recreational motorboat licensing will be beneficial in promoting boating safety and helpful in reducing fatalities and accidents. Operators of boats propelled by machinery with 25 or more horsepower should have a short course in boating and pass both written and operating

competency tests. Recruiting of volunteer teachers from Coast Guard Auxiliary Units, Power Squadrons, Red Cross and other organizations that focus on boating safety could provide the volunteer instructional staff. The Wildlife specialists feel that boat marina personnel might be used to give operational competency tests. Hamilton and Thiebes say that a set number of hours in boating instruction and passing an examination appears to be reasonable. To provide enough examiners to pass judgement on every operator's ability to maneuver a boat may be difficult. But the Wildlife Commission is definitely in favor of an educational-licensing program for recreational motorboat operators in Oregon. Recommendations from all three spokesmen who presently direct educational-licensing programs in the State are based on opinion and assumption.

#### 1973 Oregon Marine Board Data

The number of boats in Oregon during 1973 is open to speculation. Several thousands of boats (canoes, kayaks, rubber rafts, dinghies, rowboats without machinery and unpowered sailboats less than 12 feet in length) do not fall under the State's boat registration laws. The Marine Board's records show 103,182 registered recreational boats. Accurate recordkeeping began in 1960. From that year until 1963 the boat count remained generally stable. Then in 1964 the number of registered boats increased greatly and has

continued to increase annually, as shown in Table 7.

The boat accident report rates per 10,000 registered boats in the State have declined since records began in 1960. In that year 113 accident reports were noted for a 16.9 percent rate. In 1973 the number of reports fell to 125 for a 12.1 percent rate, according to Table 8. Two principal variables should be considered when examining these pro rata rates. The Federal Boat Safety Act of 1971 provided funds for the states to do a number of things among them were to provide more enforcement and to improve reporting of marine activities. These two factors influence the number of boating accident reports filed. The other consideration goes back to 1960. Starting in 1960, motorboats with 10 horsepower rating or more had to be registered. In 1962 the rating was lowered to eight horsepower for mandatory registration. In 1964 the rating was lowered further to 3.5 horsepower. And finally in 1972 the requirement was changed to include all boats powered by machinery. Each time the horsepower rating for registration purposes was lowered the more boats there were for statistical purposes.

The boating fatality rate per 10,000 registered boats has been variable during the period from 1960 to 1970. A notable decline began in 1971. By 1973 the fatality rate of two deaths per 10,000 registered boats is the lowest noted since Marine Board records were first kept in 1960, according to Table 9.

Table 7. Registered boats in Oregon 1960-1973.

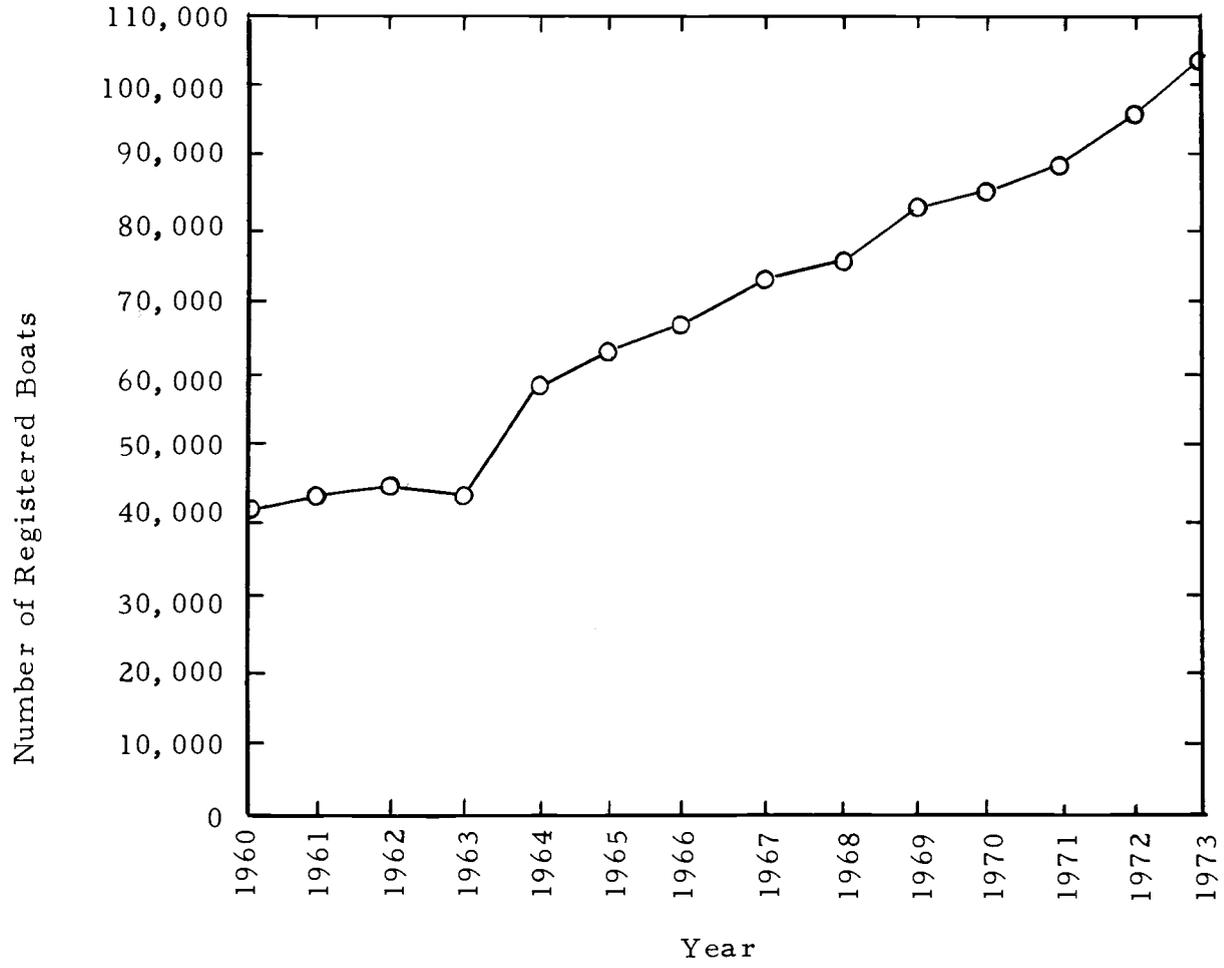


Table 8. Boat accident reports filed per 10,000 registered boats in Oregon 1960-1973.

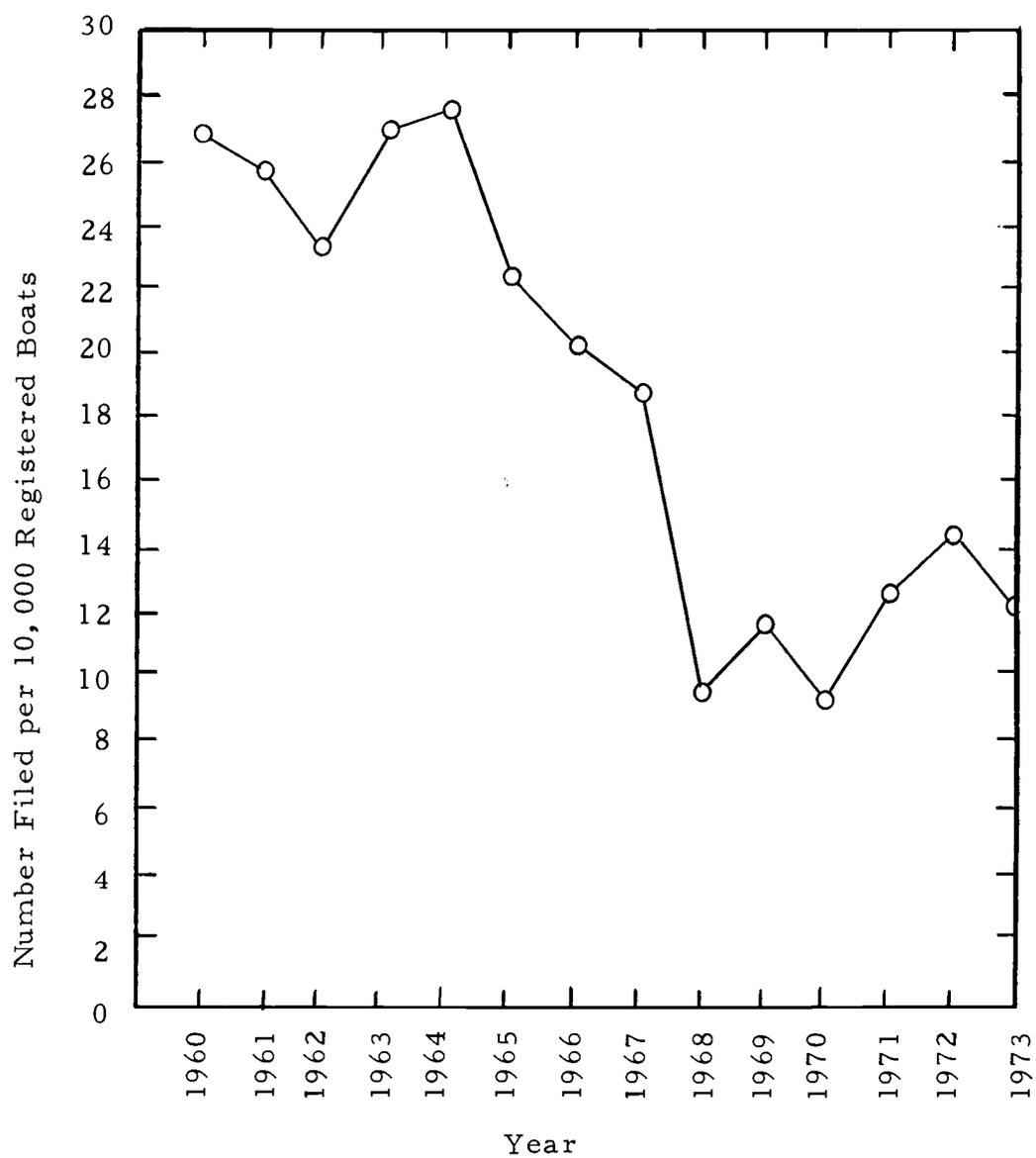
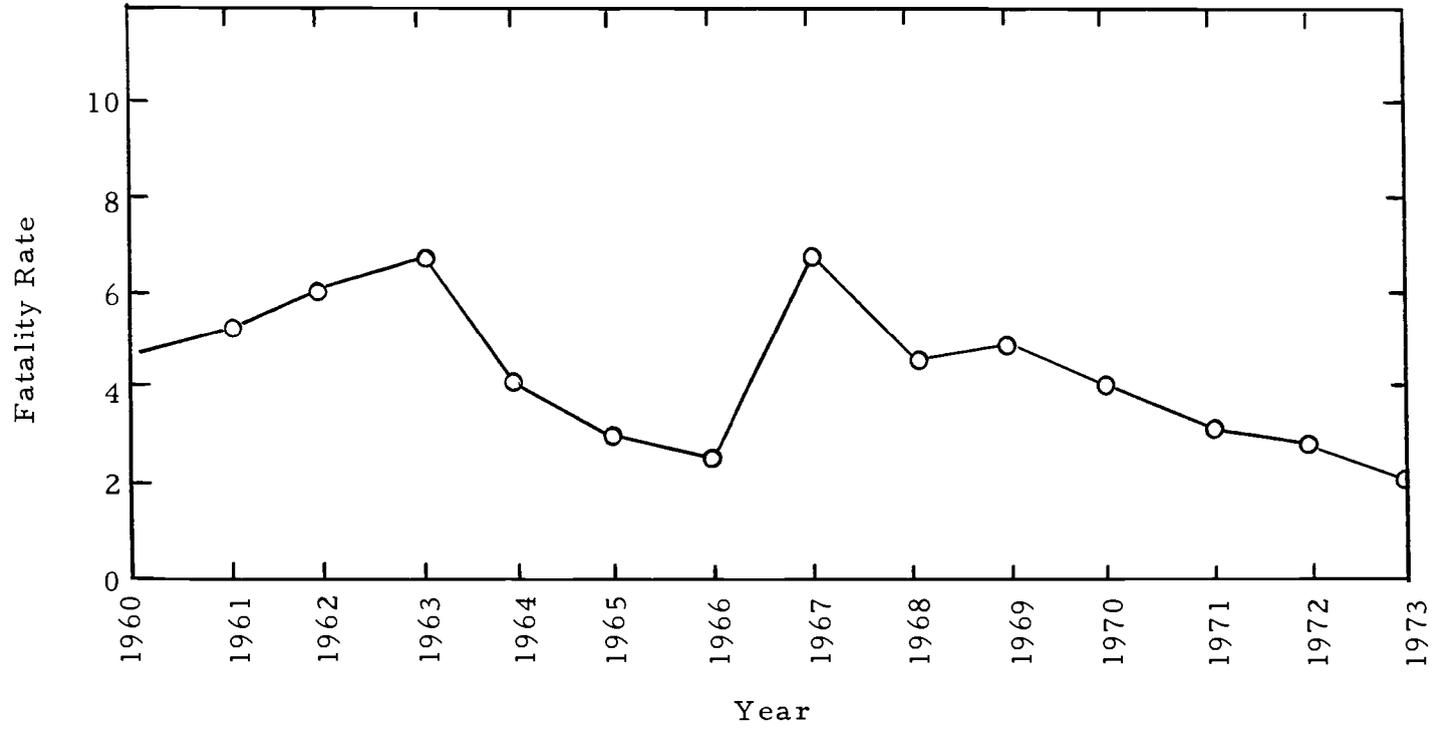


Table 9. Boating fatality rate per 10,000 registered boats in Oregon  
1960-1973.



### Marine Citation Analysis

Another procedure used to gain a perspective on the issue of whether or not licensing would be effective was to examine a randomized sample (ten percent) of all marine citations issued in Oregon during 1973. The purpose of this part of the study was twofold: to determine the age profile of operators being cited and to determine the kind of infractions for which boat operators were cited.

According to Oregon Marine Board records, a total of 2,270 citations were written in the State during calendar year 1973. County Sheriff Departments wrote 1,225 citations and Oregon State Police officers wrote 1,045. An abstract of each citation is sent to the Marine Board after court action has been taken. A random sampling of the 2,270 citations was used in this data collection. (See page 15 for an explanation of the sampling process.)

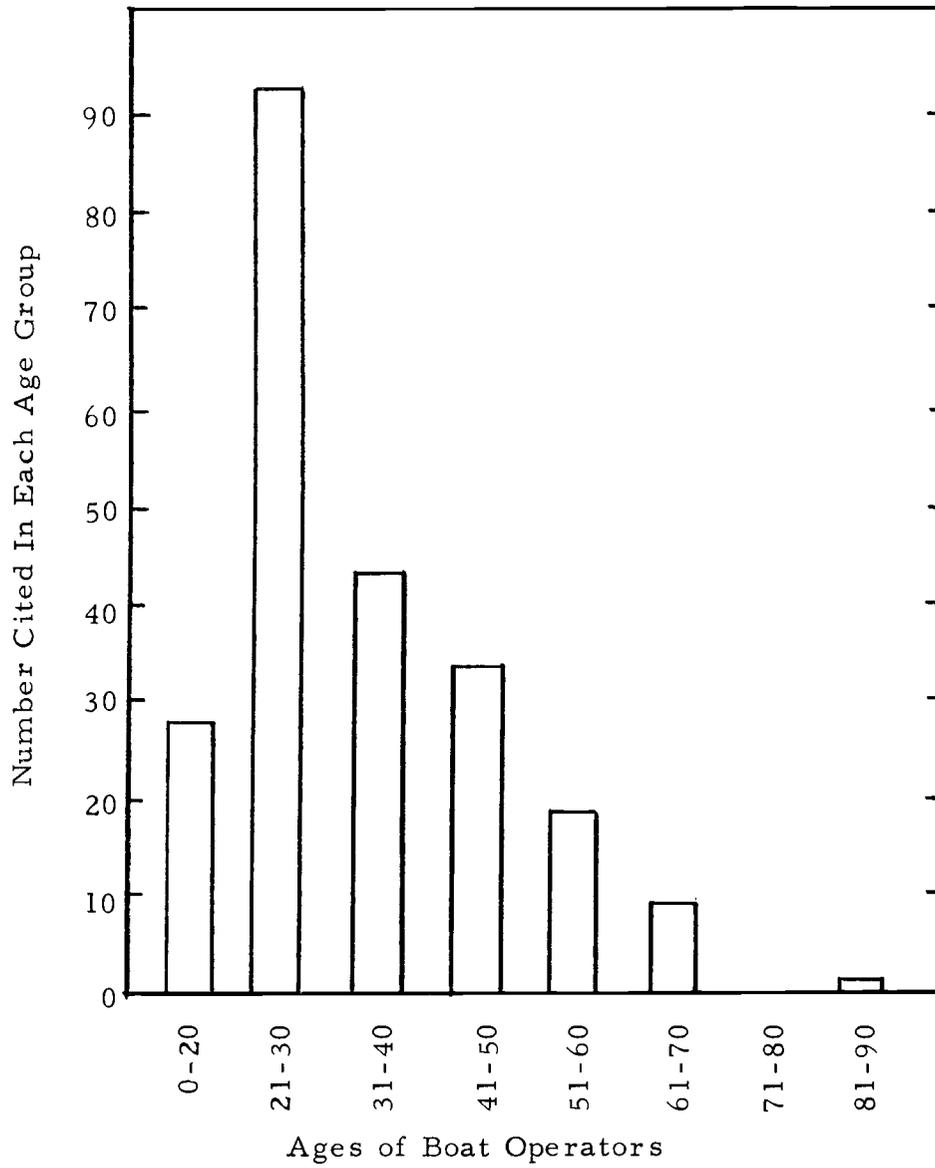
Table 10 indicates that the ten percent sample showed that the youngest person cited was 16 years old and the eldest was 84. The age most often given was 24. The median age was 28, according to the sample.

More than half of those operators cited were in violation of the Personal Flotation Device<sup>1</sup> requirement. Oregon law requires

---

<sup>1</sup> Hereafter the initials PFD will be used as an abbreviation of the term "Personal Flotation Device."

Table 10. Distribution of ages of a ten percent sample of boat operators cited during 1973 for marine violations in Oregon.



that the operator of a boat must have one approved PFD for each person on board the vessel and one for each person being towed.

Boat number violations ranked second with 22 percent of the operators being cited. This category may include infractions such as no current decal displayed on the forward half of the bow, boat numbers not appearing on the bow area properly, and failure to have a current certificate of numbers on board while the boat is in use.

The next most frequent violation was for inadequate lighting during the period from sunset to sunrise. Lack of a competent observer or an approved curved mirror was the reason in five percent of citations. Other violations such as speeding, lack of approved fire extinguisher, unlawful bow riding, reckless operation, fleeing from an officer, lack of approved flame arrestor, and overloading accounted for another 12 percent of the infractions.

What appears to be dangerous boat operating behavior, i. e., no lights after sunset, no ski mirror or observer, speeding, lack of extinguisher, bow riding, reckless operation, fleeing, unapproved flame arrestor, overloading, is not reflected in fatality data. Of the 21 fatalities in boating activities during 1973 in Oregon, 16 were caused by capsizing, 4 were caused by falls overboard, and 1 was caused by collision. Drowning was listed as the cause of death in all 21 fatalities. Marine Board officials report that had all 21 boatmen been wearing Coast Guard approved personal flotation devices

probably fewer than 21 would have drowned. Reliable data on whether or not boatmen had access to personal flotation devices is not available.

Coast Guard spokesmen, Marine Board personnel, and law officers report that the biggest problem in promoting boating safety is convincing boatmen to have at hand and to wear when an emergency arises suitable life saving devices. Of the 1,754 boating fatalities in the United States during 1973, 1,186 were caused by boatmen being the victims of capsizing and falling overboard. These two causes represent 68 percent of the fatalities during 1973. In Oregon these two causes represented 95 percent of the fatalities.

The seriousness of not wearing personal flotation devices is shown in a press release dated May 13, 1974, by James Hadley, Oregon Marine Board Director. Six boating fatalities occurred from January 1 through May 9, 1974. Of the six, four were caused by drowning in rubber boat accidents. Not one of the victims was wearing a personal flotation device. Director Hadley commented in the release, "We believe that none of the inflatable raft fatalities would have happened had these boatmen worn a Coast Guard approved personal flotation device."

Boating fatality data clearly support the reason for high drowning incidence is a lack of approved life saving equipment. That 55 percent of the citations issued, according to this study's

sample, are for violation of the personal flotation device requirement indicates the wide spread complacency boatmen show regarding PFD's.

Twenty-two percent of the sample's citations were for boat number violations. This violation probably has less to do with accidents and fatalities than any of the others. The numbering requirement is owner protection oriented. For example, if a boat owner loses his craft, he stands a chance of having authorities locate it for him through a State numbering system. Also, boats properly numbered so they may be identified from a distance stand a better chance of receiving aid from other vessels in time of distress.

The data strongly suggest that if boatmen were to abide by the personal flotation device requirements there would be fewer fatalities. The nine areas other than PFD's and numbering account only for a smattering of citations, according to Table 11. Boat Accident Report (BAR) data indicate that few fatalities are a direct result of these kinds of infractions of the law.

Prior to 1972 there was not a great deal of enforcement of marine laws. With Federal monies available because of the Federal Boat Safety Act of 1971, more peace officers spent more time patrolling Oregon's waterways during the years 1971, 1972, and 1973. According to a Marine Board report titled "Report on Boating

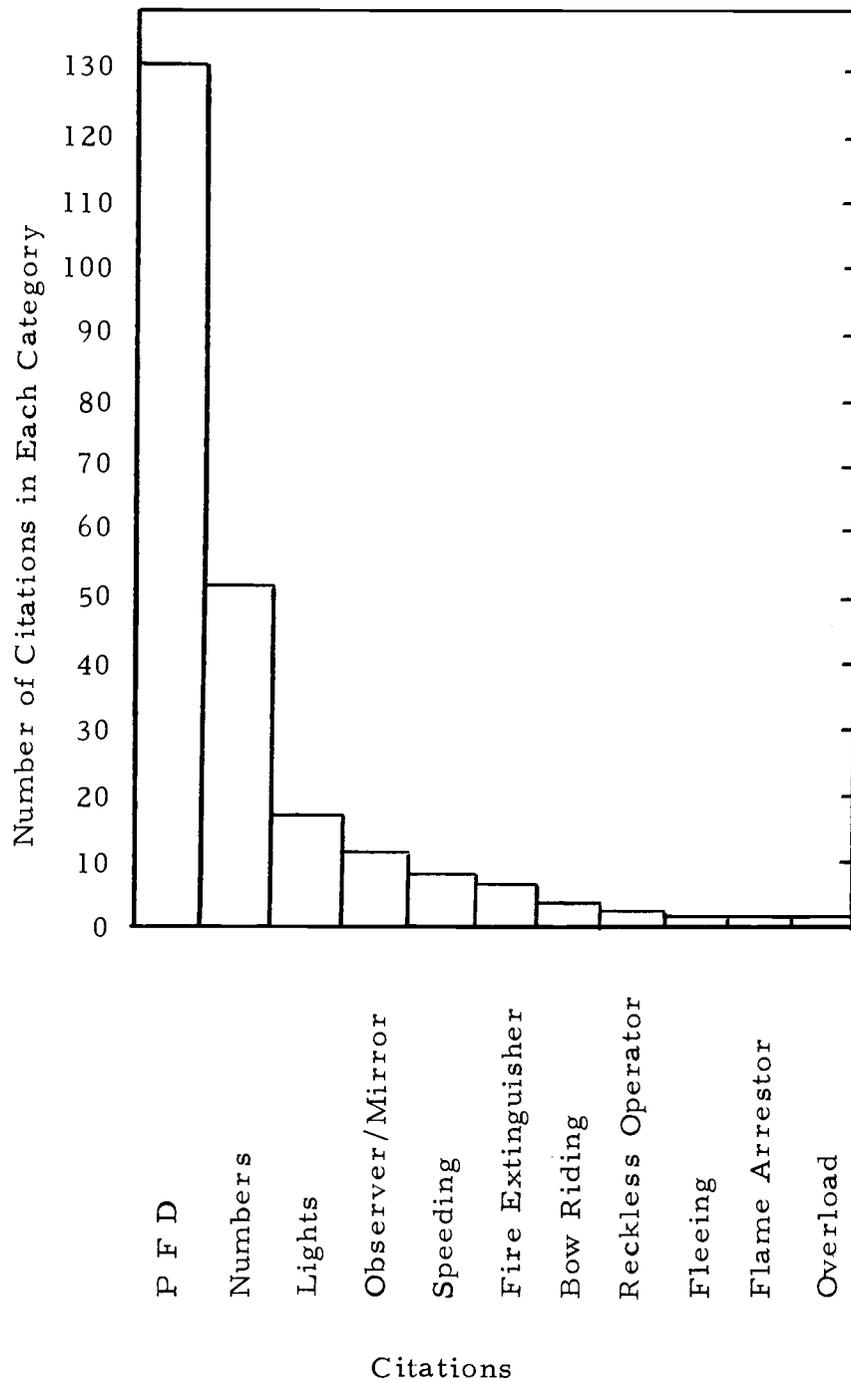
Safety and Law Enforcement Program, " February 1, 1973, a total of 2,954 citations were issued during 1972, 2,270 were issued during 1973, and 2,180 were issued in 1974. Records indicate that the number of citations are decreasing each year that enforcement has been increased. Another factor is that many boatmen probably weren't aware of some of the rule changes until cautioned or cited by an officer.

#### Examination of Boating Accident Reports

Another perspective of boating activities in Oregon was gained by examining all 122 of the available boating accident reports filed during 1973. These reports show that 21 people lost their lives in recreational boating accidents. Sixteen people were killed due to capsizing; four deaths were caused by falls overboard, and one life was lost in a collision.

The operator of a boat is legally responsible for filing a boating accident report within 48 hours for death or injury and within five days for property loss exceeding \$100. This is a legal responsibility of the operator, the person at the helm. The operator may or may not be the owner of the vessel. This part of the study shows the age of the operator and the amount of formal classroom instruction in boating.

Table 11. Categories and frequencies of citations issued according to a ten percent sample of boat operators receiving citations during 1973 in Oregon.



This study shows that almost 50 percent of the operators filing a boating accident report in Oregon in 1973 were in the 31 to 50 age group. Both the youngest operators in the 0-20 category, and oldest, in the 61-70 category, had the fewest reported accidents of all other age groups represented, according to Table 12. The Bureau of Governmental Research and Service of the University of Oregon, Eugene, Oregon, released age characteristics of boat owners in a report titled "Pleasure Boating in Oregon" in 1972. The report states,

The median age of boat owners in the state (Oregon) is 49.9 years. This is considerably higher than the median age of Oregon's total population (29.0 years). However, it must be noted that this difference may be simply the result of the fact that there are virtually no boat owners under the age of 18 but one-third of the state's population is under 18. A more useful comparison for the median age of all recreational boat owners in the state may be the statistic that the median age of Oregon's total population, exclusive of the population under 18, is 44.1 years. (p. 12)

This discussion appears to agree with the findings in Table 12.

The data on formal instruction in boating safety classes indicate no great difference exists between having no formal instruction, 42 percent, and having at least one class, 37 percent. The category titled "unknown classes," 21 percent, is represented by fatalities and operators simply omitting the item. Table 13 indicates

Table 12. Age groups of boat operators and the frequency of each group in filing a boat accident report from in Oregon during 1973.

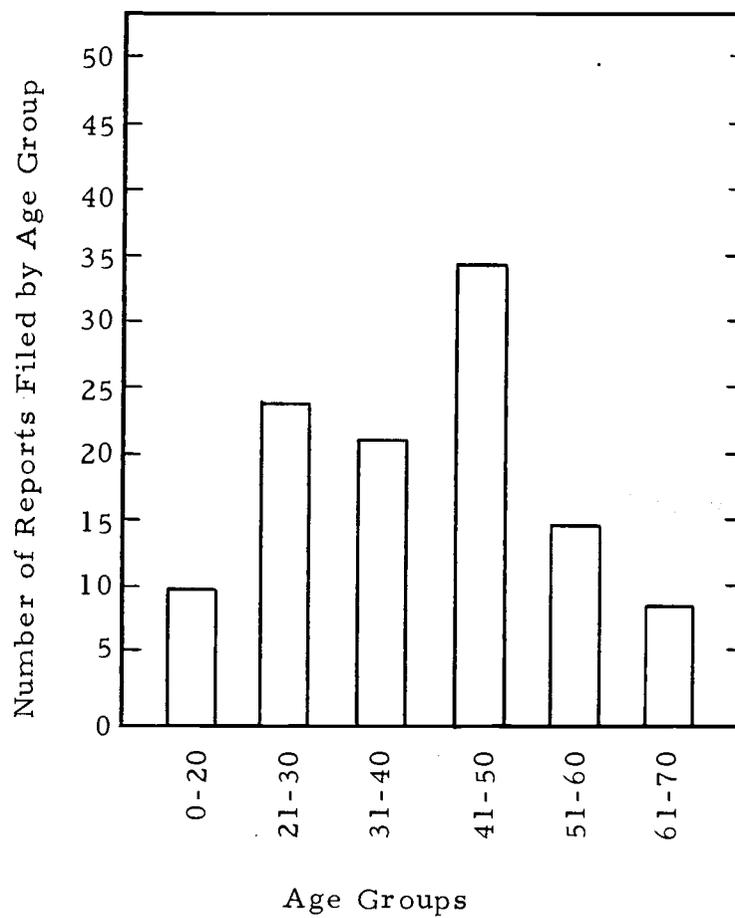
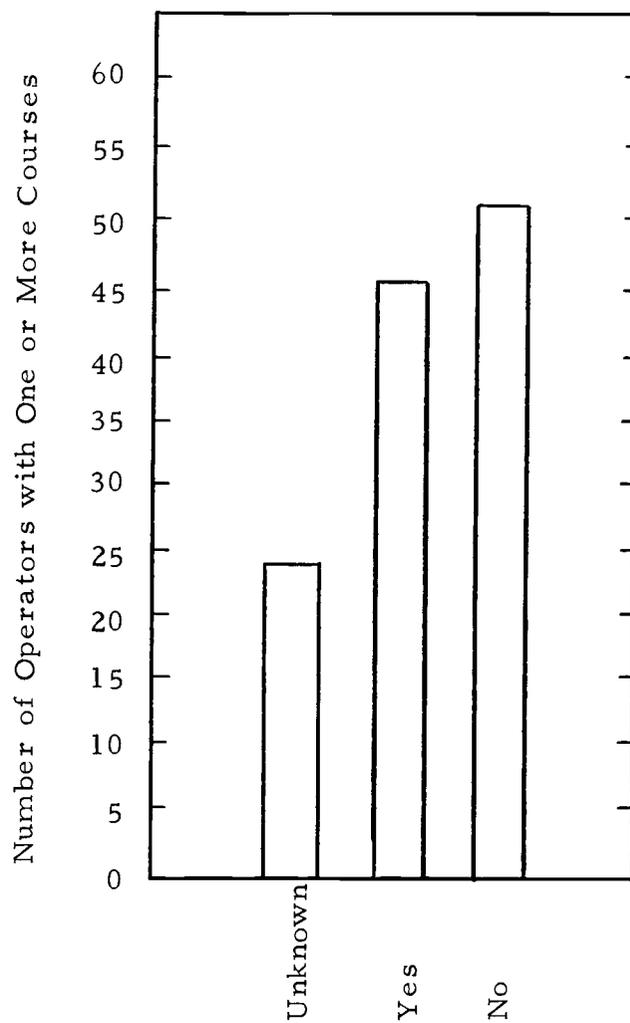


Table 13. Boating education of operators filing a boating accident report during 1973 (formal class work required to count).



the numbers of boat operators filing a boating accident report form who had taken a boating course.

### Results

This study examines fatality rates prior to and following the implementation of an educational-licensing practice in snowmobiling, motorcycling, and hunting. To affirm that an educational-licensing procedure was effective required that fatal and non-fatal rates drop by 50 percent after adoption of the program. This decrease is significant, and it may be interpreted that considerable operator behavior change has taken place as compared to operator behavior of years prior to the program.

In the snowmobile program there are no accurate State reports about either fatal or non-fatal accidents prior to the program's inception. Since the snowmobile educational-licensing program began in 1972, there is one fatal accident reported. No non-fatal accidents have been reported. Hence, no clear conclusions can be drawn about the effectiveness of either educational or licensing legislated programs in the area of snowmobiling.

In the motorcycle educational-licensing program the fatality rate from 1958 to 1965 averaged 11 fatalities per 10,000 registered motorcycles in Oregon. After the program began, the rate from 1965 through 1973 averaged six fatalities per 10,000 registered

motorcycles. This shows a decrease of approximately 50 percent. The non-fatal accident rate for the period prior to the program 1958 to 1965 averaged 513 reported accidents. From 1965 through 1973, the years after the program was begun, the average is 225 reported non-fatal accidents per 10,000 registered motorcycles, an approximate 55 percent reduction.

In the hunter safety program the fatality rate per 100,000 licenses for the period 1953 to 1959 averaged 3.9 fatalities per year. After the program was initiated, the rate for 1959 through 1973 averaged 3 fatalities per year. An approximate 25 percent reduction in fatalities was made. With non-fatal accidents reported, the rates prior to the program, 1953 to 1959, averaged 16 per 100,000 hunting licenses issued. After the program began, 1959 through 1973, the rate average increased to 17.4 per 100,000 hunting licenses issued. This 1 percent increase probably reflects an appeal to the public to report all hunting accidents. Wildlife Commission spokesmen report that prior to 1960 no great effort was made to encourage hunters to report non-fatal accidents.

The findings of this study indicate that State legislated educational-licensing programs have not reduced either fatal accidents or non-fatal accidents to the criterion level adopted for the study. One of the three educational-licensing programs reduced the fatality rate by 50 percent--the motorcycle program

met the 50 percent criterion with an approximate 50 percent reduction. The hunter safety program showed an approximate 25 percent reduction. The snowmobile program has very limited data to analyze.

The non-fatal accident data shows a reduction in the motorcycle program of 55 percent. Hunting shows a 1 percent increase. And snowmobiling data is limited and inconclusive.

An inquiry related to this study is concerned with a comparison between boat operators filing an accident report having one or more formal boating classes and those having no formal boating instruction. The results of this inquiry indicate that 52 operators (43 percent) filing a boating accident report had no formal boating instruction, 46 operators (38 percent) reported having taken at least one formal class, and 24 operators (19 percent) reported no response on that part of the form. The latter percentage may have been due to oversight or lack of information by the person filing the report. With 43 percent of all boating accident reports showing no formal class activity in boating, the results of this inquiry are inconclusive.

## V. RECOMMENDATIONS

### Summary of Design of Study

This study is designed to develop and evaluate criteria for implementation of a recreational motorboat educational-licensing practice in Oregon. The design includes provisions for an examination of the educational-licensing programs of snowmobiling, motorcycling, and hunting. Data were collected from all years prior to the enactment of the programs, with the exception of the snowmobile program where no data existed, and from all years through 1973 following enactment.

From this data, including unit license registration numbers, tables were prepared showing accident trends and fatalities in pro rate percentages. A data base of general information concerning these three programs was gathered through use of an agency administrator interview sheet.

The design also called for an examination of Oregon's boating record which is based on an experience of no licensing and no mandatory education of recreational boat operators. Marine citations were examined for the age of operator and nature of law violation.

Data were used from snowmobiling, motorcycling, hunting, and boating to construct tables to use for comparative purposes.

In addition to the tables, descriptions of the State's legislated educational-licensing programs were made. One of the significant inquiries of this descriptive study was to determine the pro rata percentage of change prior to and following the establishment of three educational-licensing programs. Another inquiry of interest was to determine the percentage of recreational boat operators filing a boating accident report form with and without a minimum of one formal class of boating instruction.

From these data, (statistics, recommendations, tables, and related inquiries) conclusions were made and recommendations made regarding the merits of an educational-licensing program for recreational boat operators in Oregon.

### Summary of Findings

An examination of very limited snowmobile program data shows that one fatality has been reported after the inception of the licensing program. No accident reports for non-fatal accidents have been filed.

An examination of reported non-fatal motorcycle accidents from 1958 to 1965, these seven years are prior to the Motorcycle Educational-Licensing Program, shows a pro rata average of 513

accidents per year. During the nine years of the program, 1965 through 1973, (excepting 1969 for which no data are available from Motor Vehicle Division in this area) the reported motorcycle non-fatal accident rate average is 225 per year. This pro rata average reflects an approximate 55 percent decrease. The motorcycle fatality rate prior to the establishment of the program is 11 fatalities. For the years following the program, the rate is six fatalities. This pro rata decline represents a reduction of 50 percent in the fatality rate reported.

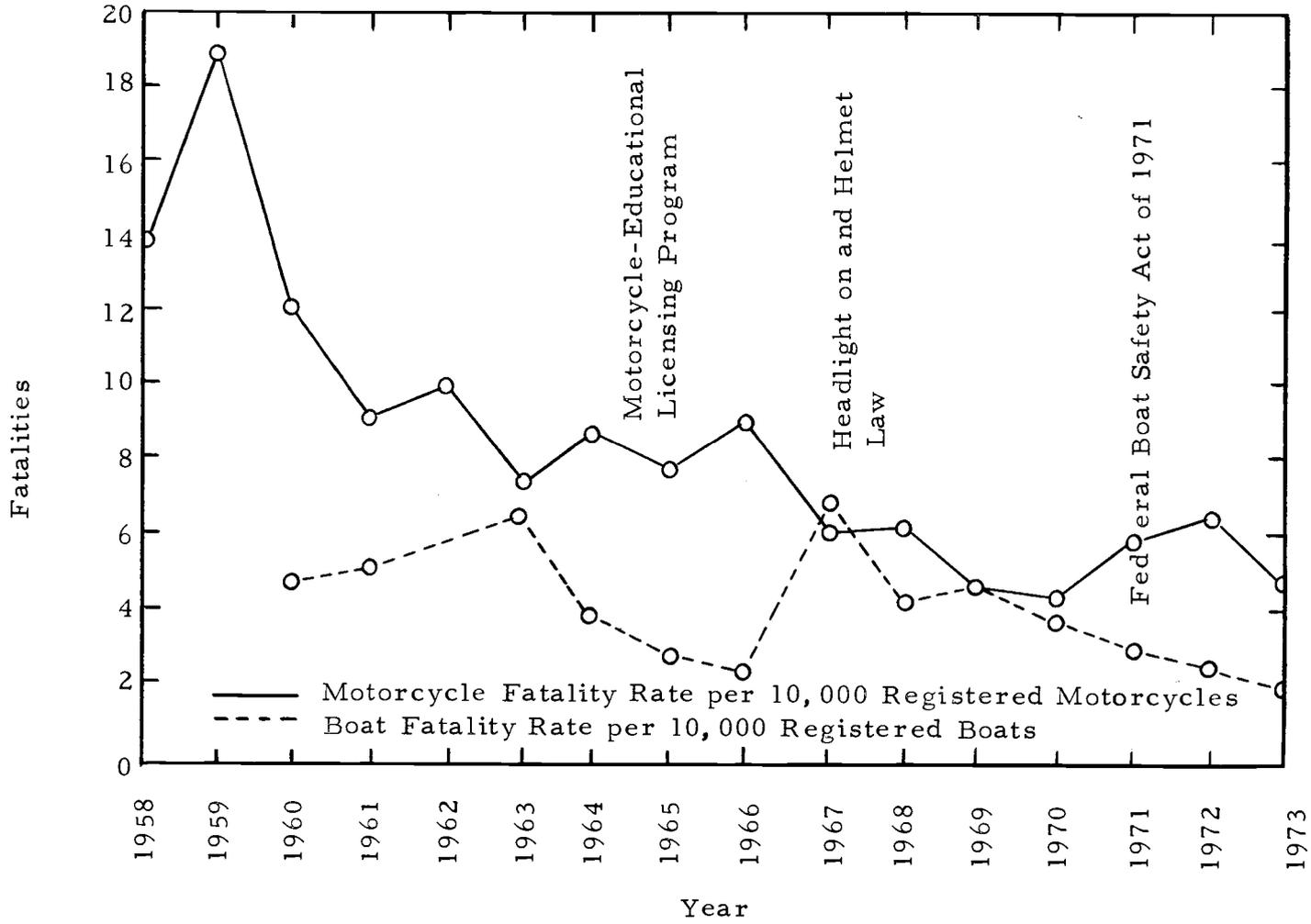
An examination of all data relevant to hunting shows that from 1953, the first year accurate accident reports were kept, to 1959, the year the Hunter Educational-Licensing Program went into effect, the non-fatal hunting accident pro rate percentage average is 16. For the years 1959 through 1973, the years the program was in effect, the non-fatal hunting accident pro rate percentage average is 17.4. This comparison shows an increase of 1.4 non-fatal hunting accidents reported after the program was established. The hunting accidents fatality pro rate average for the period 1953 to 1959 is 3.9. For the years 1959 through 1973, the hunting fatality pro rata average is 3.0. These percentages indicate that the hunting fatality rate decreased by .9 percentage. This lower fatality rate has resulted from the establishment of an educational-licensing practice intended to make hunting a safer activity or from better first aid,

since there are more accidents but fewer deaths. An interpretation of this .9 reduction in hunting fatalities over an earlier period without the program is that the program has been successful. This reduction is approximately a 25 percent improvement.

In recreational boating the non-fatal accident pro rata number for the period prior to the Federal Boat Safety Act of 1971, covering years 1960 through 1970, shows an average of 20 accidents per year. For the three years since the Act, years 1971 through 1973, the pro rata number dropped to 13 accidents reported per year. These figures indicate a decrease of 39 percent in the pro rate non-fatal accident rates in boating. The fatality rates for the pre-Federal Boat Safety Act of 1971 show a pro rata 4.6 fatality average per year. For the post-Act period the pro rata average is 2.4 fatalities per year. These figures show a 48 percent decrease in recreational boating fatalities since inception of the Federal Boat Safety Act of 1971.

Table 14 shows a comparison of the Motorcycle Educational-Licensing Program's fatality rate per 10,000 registered motorcycles to Oregon's boating fatality rate per 10,000 registered boats. The fatality pro rata incidence in boating has not reached the high incidence proportions of motorcycling fatalities. Table 14 also indicates a downturn in boating fatalities since 1970, and especially

Table 14. A comparison of boat and motorcycle fatality rates per 10,000 registered units in Oregon.



since passage of the Federal Boat Safety Act of 1971, which promoted more patrolling, reporting, and safety.

### Recommendations

Based on the following findings of this study:

- 1) the snowmobile program results are inconclusive,
- 2) the motorcycle program results showed a decrease in both reported non-fatal accidents and fatalities after its inception,
- 3) the hunter safety program results showed an increase in reported non-fatal accidents and a decrease in fatal accidents after starting the practice,
- 4) the agency administrators indicated a preference for initiation of a recreational motorboat operator's educational-licensing program in the belief that such a program may reduce accident incidence,
- 5) Oregon Marine Board data show declining boating accidents and fatalities being reported, especially since passage of the Federal Boat Safety Act of 1971,
- 6) marine citation numbers have declined each year since 1972,
- 7) an examination of boating accident report forms indicates that having taken one boating course does not greatly diminish an operator's chances of being involved in a boating accident,
- 8) an examination of a 10 percent sampling of all marine citations written during 1973 indicates that over 75 percent of the citations were for violation of the personal flotation device requirement and lack of required boat numbering,

these recommendations are made:

1. Due to the inconclusive results of the findings of this study, it appears inadvisable for an initiation of an educational-licensing program for operators of recreational motor-boats in Oregon at this time. Two principal reasons for this recommendation are that the data from the three recreational licensing programs examined did not show to the arbitrary criteria level established that legislated licensing programs are conclusively effective and that since 1970 the boating fatality rate has shown a steadily continuing decline through 1973. In comparing the pre-Federal Boat Safety Act period of 1972 data, which showed an average 4.6 fatality rate per 10,000 registered boats in Oregon, to the post-Act period, which showed an average of 2.4 fatalities per 10,000 registered boats in Oregon, it is obvious that an impressive 48 percent decrease in recreational boating fatalities has been effected without compulsory legislated educational or licensing programs.

The motorcycle educational-licensing endorsement program was the only program of the three that met the 50 percent reduction level criteria level with legislated requirements. Yet boating came very close.

2. The Oregon Marine Board should continue to make self-study materials, loan films, and related teaching aids available to the public free of charge. Fatal boating accident reportings have been declining. There may be a relationship between boating safety education and declining accident rates.
3. Should a study of this nature be undertaken in the near future, it is suggested that a different approach be taken. A randomly-generated telephone interview survey may produce more helpful data than a study of existing legislated educational-licensing programs.

These conclusions and recommendations are made in view of the limitations discussed earlier. Additional limitations that may have influenced the outcome of this study are variability of instruction of classes offered by the agencies analyzed in this study, variables brought about by new Federal requirements for reporting accidents on July 1, 1973, changes necessitated by Federal regulations concerning horsepower limitations for boat registration purposes, problems of data collection where very limited information was available in snowmobiling and no information available for non-fatal accidents in motorcycling for 1969, and many variables arising from product improvement associated with snowmobiling, motorcycling, hunting, and boating.

Should the assumptions and evaluative criteria of this study be less demanding, the following recommendations may be of value. Some observers feel that one life saved is worth all costs, regardless of cost benefit considerations and bureaucratic demands which may ensue.

1. Oregon legislators should consider enacting legislation leading to a program whereby youths below the age of 16 will be required to have a valid boating safety certificate on their person when operating a motorboat without responsible supervision. This recommendation is based on recent data from the Wildlife Commission showing that increasingly fewer accidents and fatalities are occurring in the 18 to 30 age group of hunters, which represents that group of hunters who probably took a hunter safety course when a teenager.
2. The Oregon Marine Board should consider promoting Boating-Water Safety classes as an elective subject in the schools of Oregon. This class may be modeled after the Hunter Safety Program and Driver Training Program now being offered in many schools in Oregon.
3. The Oregon Marine Board should add the fulltime position of Boating Education Coordinator to its staff and fill it as soon as possible. The coordinator should cooperate with

all boating instructors in the State in planning and evaluating effective educational programs for all Oregonians who wish boating education. Now the Power Squadron, Coast Guard Auxiliary, and Red Cross offer boating instruction using different materials and teaching strategies. An involved coordinator might help to strengthen each organization's curriculum through idea sharing. He would also consult with curriculum directors of the school districts in Oregon, making available lists of free and inexpensive teaching materials and visual aids. In liaison with the Oregon Board of Education, the coordinator may help develop survival-type courses to meet the three major areas of public school responsibility established by the Board in 1974. These areas of Personal Development, Social Responsibility, and Career Development have implications for several levels of water-related activities and learning experiences.

#### Discussion and Implications

As this was a pioneer study in the area of educating and licensing recreational motorboat operators in Oregon, and perhaps the first of its kind in the United States, it was difficult to develop a design leading to high degrees of reliability and validity. There

were no similar studies reported in the literature. As a result some interesting phenomena were discovered in two of the three established educational-licensing programs studied. For example, no fatal or non-fatal accident data were available prior to the snowmobile licensing requirement. Now that the program has been in effect since 1972, some data are being collected. Another example surfaced in the study of hunter safety. The pro rata non-fatal accident reportage rate has increased 1.4 percent since a hunter-safety license program was begun. The paradox is that these two educational-licensing programs generated data that may not have been reported prior to the two programs' initiation. The results of this study seem to indicate that legislated educational-licensing programs generate data.

Due to restrictions developing from the design of this study and to inconclusive results, it is recommended that a different approach be used in the future for a study in this area of educating recreational boatmen. As the data were collected, it became apparent that not all non-fatal accidents were being reported. The estimates range from a conservative 10 to 20 percent being reported to about 50 percent being reported to boating officials. In snowmobiling it is expected that with over 9,000 registered snowmobiles in Oregon that occasional fatal and non-fatal accidents occur. Yet no accidents per se were reported through 1975. Hunting officials

expressed concern that their non-fatal data might be underreported. A second questionable source was the reliability of fatality data. Both boating and hunting spokesmen were reasonably certain that fatality reports were accurate and complete.

A principal restriction of the design was that comparable educational-licensing boating programs in other states are non-existent for comparison and analysis. Only one state has a licensing requirement and that applies to tidal waters only. No boating knowledge examinations of any manner are given in New Jersey to attain this license. Collected data comparing those boatmen with licenses to those in the same state without licenses may be interesting and revealing. This data could be helpful in meeting boatmen's needs if it were broader based than this study, which examined the success of State legislated educational-licensing programs.

Another method of data collection that may be more satisfactory concerning boat ownership, use, exposure, fatals, non-fatals, and near misses is interviewing known boat owners in Oregon. In the interest of saving data collection costs and keeping them to a minimum, evening telephone interviewing could save travel time and make the best use of an interviewer's time.

Using randomly-generated telephone calls, researchers might interview boat owning householders about the number of boats owned

by that household, characteristics of the boats owned, boating education programs completed by family members, and fatality, injury, and accident incidents. New insights could possibly be derived on the basis of exposure in a particular type of vessel.

One of the most valuable kinds of data would be that of participant hour in a particular craft with or without mechanical means of propulsion. The Coast Guard's 1973 Nationwide Boating Survey reveals that boatmen on non-motorized vessels have a higher risk of being involved in a fatal accident. Boatmen on motorized craft have a greater chance of being seriously injured. These surprising findings may be attributed to the fuel shortage and petroleum price increases which have changed recreational boating activities. Each year more inner-tube boats and vinyl inflatables are being used. As these are but two examples of non-registered boats, no data are being collected about their use or dangers, except in the case of fatalities arising from floating or whitewater activities. This facet of data collection would add significant information in generating recommendations for boating safety.

Safety through education appears to be the only way to gain general support at this time. The notion that licensing alone will promote greater safety practices is not widely held among boatmen. Licensing based on demonstrated boating competencies may be more widely supported. As has been seen in this study, educational

programs differ widely. There are variations in length of course, place of instruction, manner of instruction, kinds of instructional materials, and means of examination. Questions have been raised as to what may constitute a quality boating education program.

A ten meeting outline for weekly two-hour blocks of instructional time could consist of the following:

- Meeting One: Welcome and brief orientation; Distribution of learning materials; Boat handling under normal conditions; Skipper and crew responsibilities; Boat characteristics; Boat handling; Minimum equipment requirements.
- Meeting Two: Handling under adverse conditions; Rough seas and bars; Anchoring and ground tackle; Causes of swamping and capsizing.
- Meeting Three: Seamanship and common emergencies; Fueling and ventilation; Marlinspike; Docking techniques.
- Meeting Four: Seaway rules and Oregon law; Inland and International rules.
- Meeting Five: Boat trailering practices and Oregon law; Launching and retrieving techniques; Boat storage wet and dry.
- Meeting Six: Running lights and equipment; Purposes of equipment and maintenance; Light identification.
- Meeting Seven: Aids to navigation; Types of aids day and night; Lateral system explained.
- Meeting Eight: Inland Boating; Rights of way; Navigation aids; Locking procedures.
- Meeting Nine: Compass and chart familiarization; Selection and care of compass; Chart features and symbols; Plotter and divider use.

Meeting Ten:      Piloting; Importance of variation and deviation;  
                  True and magnetic bearings; Deviation table;  
                  Bearings and simple fixes.

Final Exam:       Optional

An abbreviated two or three meeting program could be abstracted from the above outline if only some basic safety points were to be made, along with boating laws and rules of the seaway. More time is needed for students to become familiar with skills needed in reading a compass, reading lights and buoy markers, and using chart information effectively.

## BIBLIOGRAPHY

Books and Surveys

- American Surveys. Study project comprising three surveys (USCG Grant Agreement No. 1301-91). Washington, D. C.: American Surveys, 1974.
- Best, J. Research in education. Englewood Cliffs, N. J.: Prentice-Hall, 1970.
- Bureau of governmental research and service. Pleasure boating in Oregon. Eugene, Ore.: University of Oregon, 1972.
- Hampton, W. The complete beginner's guide to motorcycle skill and safety. Chatsworth, Calif.: Books for Better Living, 1973.
- McLean, T. and Crick, N. Fund allocation study of the marine law enforcement program of the Oregon state marine board. Portland, Ore.: Department of Administration of Justice, Portland State University, 1973.
- National Association of State Boating Law Administrators. A Report on operator controls committee. San Francisco: NASBLA, 1967.
- Rymer, F. Feasibility and cost factors of a national boat operator licensing program. (USCG Grant Agreement No. 4804. Washington, D. C.: University Sciences Forum, 1974.
- U. S. Coast Guard. Boating statistics: 1973, CG-357. (Department of Transportation Publication No. CG-357). Washington, D. C.: U. S. Government Printing Office, 1973.
- U. S. Coast Guard. Survey of opinions of owners of recreational boats on question of licensing. (Department of Transportation Publication) Washington, D. C.: U. S. Government Printing Office, 1970.

Wulfsberg, R. and Lang, D. Recreational boating in the continental United States in 1973. (Department of Transportation Publication No. 745103). Springfield, Virginia, : National Technical Information Service, 1974. (NTISNo. 745103)

### Manuals

Oregon Motor Vehicles Division. "Oregon snowmobile manual".  
Salem, Ore. : Oregon Department of Transportation, 1971.

Oregon Motor Vehicles Division. "Oregon motorcycle manual".  
Salem, Ore. : Oregon Department of Transportation, 1971.

Oregon Wildlife Commission. "Hunter education instructor manual".  
Portland, Ore. : Oregon Wildlife Commission, 1974.

Outdoor Empire Publishing, Inc. "Hunter safety handbook". Seattle,  
Wash. : Empire Publishing Co. , 1974.

### Legislative Acts

Congress of the United States, 76th Congress. "Motorboat act of  
1940". Washington, D. C. : Congress of the United States,  
Government Printing Office, April 1940.

Congress of the United States, 85th Congress. "Federal boating  
act of 1958". Washington, D. C. : Congress of the United  
States, Government Printing Office, September 1958.

Congress of the United States, 92nd Congress. "An act: federal  
boat safety act of 1971". Washington, D. C. : Congress of  
the United States, Government Printing Office, 1971.

Michigan, Department of Natural Resources, Marine Safety Section,  
"Marine safety act of 1967". Lansing, Mich. : Michigan  
Department of Natural Resources, 1967.

Oregon Legislative Assembly, 1973 Regular Session. "House bill  
5021". Salem, Ore. : House of Representatives, 1973.

Oregon Legislative Assembly, 1975 Regular Session. "House bill 2591". Salem, Ore.: House of Representatives, 1975.

Periodical Literature

Andelman, S. Medical talk. The Oregon Statesman, January 29, 1975, p. 5.

California argues helmet merits. Capital Journal, February 20, 1975, p. 25.

Boaters get educated about boating laws. The Oregon Statesman, September 22, 1974, p. 22.

Coast guard chief reaffirms stand against licensing. Legislative Ledger (OBC of America), June 4, 1962, p. 1.

Crimmin, E. Waterfront. Motor Boating and Sailing, May 1975, p. 46.

Stem to stern. Ensign, February 1972, p. 9.

Hunting accident report for 1970. The Conservationist, August-September 1970, p. 19.

Licensing, Boating, May 1968, p. 45.

Motorcycle safety tip sheet. Mademoiselle, June 1974, p. 168.

Green, R. Under way with the USPS. Motor Boating and Sailing, January 1, 1973, p. 82.

Howe, C. Safe and sensible snowmobiling. Field and Stream, February 1973, pp. 62; 152-155.

Jorgensen, V. Licensing boatmen: an actual case history. Motor Boating and Sailing, April 1973, p. 75.

Lord, L. The other half. Ensign, April 1973, p. 75.

Mainwaring, W. Boat operator's license? Capital Journal, June 1, 1973, p. 4.

- McKeown, B. Driver's license for snowmobilers? Popular Mechanics, January 1974, pp. 156-160.
- Morris, M. North Jersey pilot license. The Courier-News, August 15, 1968, p. 5.
- Norton, T. The watch. Motor Boating and Sailing, June 1973, p. 41.
- Raasina, J. Sailing is the safest way to go. Northwest Magazine (The Sunday Oregonian), September 29, 1974, p. 22.
- Rittenhouse, R. Licensing is not the answer. . . education is! Boating, April 1969, pp. 76-77.
- Thompson, J. The Berkeley conference. Motor Boating and Sailing, December 1973, p. 86.
- Wagner, S. Stem to stern. Ensign, February 1972, p. 9.
- Woodward, B. Under the blue ensign. Motor Boating and Sailing, May 1973, p. 30.

## APPENDICES

APPENDIX A

Agency Administrator Interview Sheet

Agency Administrator Interview Sheet

1. When was this educational-licensing program established?
2. What brought about its establishment?
3. Are the agency's procedures defined in ORS?
4. What are the elements of the program to bring lowered fatality and non-fatality records?
5. Who instructs programs and how are they chosen?
6. What are meeting times and places for programs?
7. What kinds of publicity are used with the public?
8. What kind of evaluative criteria to determine pass/fail for students?
9. What percentage passes on first attempt? How many tries?
10. What is the overall cost of the program?
11. What is the relationship of accident, fatality, property loss, citizen infringement of pre-test period to present day?
12. What is the overall success/failure relationship with agency goals?
13. What is the impact of agency on safety and welfare of citizens?
14. What are recommendations for setting up a comparable operator educational-licensing agency for boating?
15. What are some strategies to avoid in setting up a new agency?
16. What kind of accountability criteria is recommended?

APPENDIX B

Boating Accident Report Form

	<b>BOATING ACCIDENT REPORT</b>	FILE NUMBER _____
	The operator of every vessel involved in an accident resulting in injury or death of any person, or property damage in excess of \$200 is required by law to file a written report within 48 hours to	
		<b>STATE OF OREGON</b> STATE MARINE BOARD SALEM, OREGON 97310

COMPLETE ALL BLOCKS (Indicate those not applicable by "NA")

NAME AND ADDRESS OF OPERATOR	AGE _____	OPERATOR'S EXPERIENCE	
		THIS TYPE OF BOAT	OTHER BOAT OPERATING EXP.
		<input type="checkbox"/> UNDER 20 HOURS	<input type="checkbox"/> UNDER 20 HOURS
		<input type="checkbox"/> 20 TO 100 HOURS	<input type="checkbox"/> 20 TO 100 HOURS
		<input type="checkbox"/> 100 TO 500 HOURS	<input type="checkbox"/> 100 TO 500 HOURS
		<input type="checkbox"/> OVER 500 HOURS	<input type="checkbox"/> OVER 500 HOURS
NAME AND ADDRESS OF OWNER	RENTED BOAT	NO. OF PERSONS ON BOARD	FORMAL INSTRUCTIONS IN BOATING SAFETY
	<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> NONE <input type="checkbox"/> STATE <input type="checkbox"/> USCG AUXILIARY <input type="checkbox"/> OTHER (Indicate) <input type="checkbox"/> U.S. POWER SQUADRON <input type="checkbox"/> AMERICAN RED CROSS

VESSEL NO. 1				
BOAT NUMBER	BOAT NAME	BOAT MAKE	BOAT MODEL	MFR HULL IDENTIFICATION NO.
TYPE OF BOAT	HULL MATERIAL	ENGINE	BOAT DATA (Propulsion)	BOAT DATA (Construction)
<input type="checkbox"/> OPEN MOTORBOAT <input type="checkbox"/> CABIN MOTORBOAT <input type="checkbox"/> AUXILIARY SAIL <input type="checkbox"/> SAIL (ONLY) <input type="checkbox"/> ROWBOAT <input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> WOOD <input type="checkbox"/> ALUMINUM <input type="checkbox"/> STEEL <input type="checkbox"/> FIBERGLASS (Plastic) <input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> OUTBOARD <input type="checkbox"/> INBOARD GASOLINE <input type="checkbox"/> INBOARD DIESEL <input type="checkbox"/> INBOARD-OUTDRIVE <input type="checkbox"/> OTHER (Specify)	NO. OF ENGINES _____ MAKE OF ENGINE _____ HORSEPOWER (Total) _____ YEAR BUILT (Engine) _____	LENGTH _____ WIDTH BEAM _____ DEPTH (Inner Transom To Keel) _____ YEAR BUILT (Boat) _____

ACCIDENT DATA			
DATE OF ACCIDENT	TIME _____ AM _____ PM	NAME OF BODY OF WATER	LOCATION (Give location precisely)
STATE	NEAREST CITY OR TOWN	COUNTY	

WEATHER	WATER CONDITIONS	TEMPERATURES (Estimate)	WIND	VISIBILITY	WEATHER ENCOUNTERED
<input type="checkbox"/> CLEAR <input type="checkbox"/> RAIN <input type="checkbox"/> CLOUDY <input type="checkbox"/> SNOW <input type="checkbox"/> FOG <input type="checkbox"/> HAZY	<input type="checkbox"/> CALM <input type="checkbox"/> CHOPPY <input type="checkbox"/> ROUGH <input type="checkbox"/> VERY ROUGH <input type="checkbox"/> STRONG CURRENT	AIR _____ °F WATER _____ °F	<input type="checkbox"/> NONE <input type="checkbox"/> LIGHT (0-6 MPH) <input type="checkbox"/> MODERATE (7-14 MPH) <input type="checkbox"/> STRONG (15-25 MPH) <input type="checkbox"/> STORM (Over 25 MPH)	<input type="checkbox"/> GOOD <input type="checkbox"/> FAIR <input type="checkbox"/> POOR	<input type="checkbox"/> WAS AS FORECAST <input type="checkbox"/> NOT AS FORECAST <input type="checkbox"/> NO FORECAST OBTAINED
OPERATION AT TIME OF ACCIDENT (Check all applicable)		TYPE OF ACCIDENT	WHAT, IN YOUR OPINION, CAUSED THE ACCIDENT?		
<input type="checkbox"/> CRUISING <input type="checkbox"/> APPROACHING DOCK <input type="checkbox"/> WATER SKIING <input type="checkbox"/> RACING <input type="checkbox"/> TOWING <input type="checkbox"/> BEING TOWED <input type="checkbox"/> DRIFTING	<input type="checkbox"/> AT ANCHOR <input type="checkbox"/> TIED TO DOCK <input type="checkbox"/> FUELING <input type="checkbox"/> FISHING <input type="checkbox"/> HUNTING <input type="checkbox"/> SKIN DIVING OR SWIMMING <input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> GROUNDING <input type="checkbox"/> CAPSIZING <input type="checkbox"/> FLOODING <input type="checkbox"/> SINKING <input type="checkbox"/> FIRE OR EXPLOSION (Fuel) <input type="checkbox"/> FIRE OR EXPLOSION (Other than fuel) <input type="checkbox"/> COLLISION WITH VESSEL	<input type="checkbox"/> COLLISION WITH FIXED OBJECT <input type="checkbox"/> COLLISION WITH FLOATING OBJECT <input type="checkbox"/> FALLS OVERBOARD <input type="checkbox"/> FALLS IN BOAT <input type="checkbox"/> BURNS <input type="checkbox"/> HIT BY BOAT OR PROPELLER <input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> WEATHER CONDITIONS <input type="checkbox"/> EXCESSIVE SPEED <input type="checkbox"/> NO PROPER LOOKOUT <input type="checkbox"/> OVERLOADING <input type="checkbox"/> IMPROPER LOADING <input type="checkbox"/> HAZARDOUS WATERS <input type="checkbox"/> FAULT OF OTHER PERSON	
			<input type="checkbox"/> FAULT OF HULL <input type="checkbox"/> FAULT OF MACHINERY <input type="checkbox"/> FAULT OF EQUIPMENT <input type="checkbox"/> OTHER (Specify)		

PERSONAL FLOTATION DEVICES		FIRE EXTINGUISHERS
WAS THE BOAT ADEQUATELY EQUIPPED WITH CG APPROVED LIFESAVING DEVICES	WAS THE VESSEL CARRYING NON-APPROVED LIFESAVING DEVICES	WERE THEY USED - (If yes, list Type(s) and number used.)
<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES _____ <input type="checkbox"/> NO _____
WERE THEY ACCESSIBLE	WERE THEY ACCESSIBLE	<input type="checkbox"/> NOT APPLICABLE
<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO	
WERE THEY USED	WERE THEY USED	
<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO	
PROPERTY DAMAGE (Est.)	DESCRIBE PROPERTY DAMAGE	
THIS BOAT \$ _____		
OTHER BOAT \$ _____		
OTHER PROPERTY \$ _____		
NAME AND ADDRESS OF OWNER (Damaged Property)		

COMPLETE ALL BLOCKS (Indicate those not applicable by "NA")				
<b>DECEASED</b>				
NAME	ADDRESS	DATE OF BIRTH	WAS VICTIM- <input type="checkbox"/> SWIMMER <input type="checkbox"/> NON-SWIMMER	DEATH CAUSED BY <input type="checkbox"/> DROWNING <input type="checkbox"/> DISAPPEARANCE <input type="checkbox"/> OTHER
NAME	ADDRESS	DATE OF BIRTH	WAS VICTIM- <input type="checkbox"/> SWIMMER <input type="checkbox"/> NON-SWIMMER	DEATH CAUSED BY <input type="checkbox"/> DROWNING <input type="checkbox"/> DISAPPEARANCE <input type="checkbox"/> OTHER
NAME	ADDRESS	DATE OF BIRTH	WAS VICTIM- <input type="checkbox"/> SWIMMER <input type="checkbox"/> NON-SWIMMER	DEATH CAUSED BY <input type="checkbox"/> DROWNING <input type="checkbox"/> DISAPPEARANCE <input type="checkbox"/> OTHER
<b>INJURED</b>				
NAME	ADDRESS	DATE OF BIRTH	NATURE OF INJURY	INCAPACITATED OVER 24 HOURS <input type="checkbox"/> YES <input type="checkbox"/> NO
NAME	ADDRESS	DATE OF BIRTH	NATURE OF INJURY	INCAPACITATED OVER 24 HOURS <input type="checkbox"/> YES <input type="checkbox"/> NO
NAME	ADDRESS	DATE OF BIRTH	NATURE OF INJURY	INCAPACITATED OVER 24 HOURS <input type="checkbox"/> YES <input type="checkbox"/> NO
<b>ACCIDENT DESCRIPTION</b>				
DESCRIBE WHAT HAPPENED (Include Failure of Equipment, If diagram is needed attach separately)				
<b>VESSEL NO. 2</b>				
NAME OF OPERATOR	ADDRESS	BOAT NUMBER		
TELEPHONE NUMBER		BOAT NAME		
NAME OF OWNER	ADDRESS			
<b>WITNESSES</b>				
NAME	ADDRESS	TELEPHONE NUMBER		
NAME	ADDRESS	TELEPHONE NUMBER		
NAME	ADDRESS	TELEPHONE NUMBER		
<b>PERSON COMPLETING REPORT</b>				
SIGNATURE	ADDRESS	DATE SUBMITTED		
QUALIFICATION (Check one) <input type="checkbox"/> OPERATOR <input type="checkbox"/> OWNER <input type="checkbox"/> INVESTIGATOR <input type="checkbox"/> OTHER		TELEPHONE		
<b>(do not use) - FOR REPORTING AUTHORITY REVIEW (use agency date stamp)</b>				
NAME OF REVIEWING OFFICE	DATE RECEIVED	CAUSES BASED ON (Check one) <input type="checkbox"/> THIS REPORT <input type="checkbox"/> INVESTIGATION AND THIS REPORT <input type="checkbox"/> INVESTIGATION <input type="checkbox"/> COULD NOT BE DETERMINED		
PRIMARY CAUSE OF ACCIDENT			REVIEWED BY	
SECONDARY CAUSE OF ACCIDENT				