California Boating Accident Report For 1993

State of California
The Resources Agency
Department of Boating and Waterways

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EXECUTIVE SUMMARY

The Department of Boating and Waterways has compiled this report with the hope of reducing the number of boating accidents and fatalities that occur on California's waterways.

Under existing law, boat operators who are involved in accidents are required to submit written accident reports to the Department under specified conditions. These reports are used to analyze boating accident trends and to identify areas of concern so that Department activities can be directed to promote boating safety, education and law enforcement in those areas.

The "Boating Accident Report for 1993" provides information, analysis and recommendations based on boating accidents that occurred in the 1993 calendar year. Accident trends from previous years have also been used to identify critical problem areas.

Significant Findings and Recommendations

- In 1993, a total of 743 accidents involving 434 injuries, 67 fatalities and $2,052,800 in property damage were reported to the Department. The number of fatalities increased from the 1992 total of 59 and the number of injury accidents decreased from 447 in 1992. (Please see Tables 1 and 2 on pages 7 and 9 for additional information).

- One especially significant finding was the number of intoxicated persons falling overboard and drowning. A total of 8 of the 12 alcohol-related fatalities (66%) were in this category. Of these 8 fatalities, 5 involved intoxicated passengers who were the victims of or contributed to the cause of the accidents. Two alcohol-related fatalities occurred on anchored vessels. **This finding contradicts the concept of a "designated driver", which is now popular in some boating safety literature.**

Recommendation: The "designated driver" campaign for boaters should be approached with great caution. The assumption that a sober operator insures passenger safety is not always supported by the 1993 data. The "designated driver" concept, which implies that it is safe to drink as long as you are not operating a vessel, has its roots in automobile safety where the possibility of drowning is not a factor. To establish a higher level of safety, it is recommended that boat operators **and passengers** do not drink alcoholic beverages and that all boaters wear life jackets while on the water.

- The percentage of motorboat fatalities involving alcohol, where testing could be conducted, decreased from **59%** from 1984-85 to **33%** in 1993. This decrease is attributed, in part, to the passage of more stringent laws concerning boating and alcohol, increased law enforcement, and public education about the dangers of operating a vessel while intoxicated.

Recommendation: Accident data with respect to boating fatalities where alcohol was involved is encouraging. This area should be closely monitored, however, to see if this one-year "snap-shot" is representative of alcohol use on the water. Law enforcement and educational efforts in this area should be continued at a high level to further reduce boating fatalities caused by alcohol consumption.

- **Youth** operators under the age of 18 were involved in **10.5 % of all boating fatalities** and **12%** of all reported **injuries** in California in 1993. A total of 7 fatalities and 51 injuries were reported in this age category.

Recommendation: The Department is concerned about the number of youth boating accidents. Special emphasis should be placed on providing boating safety and educational materials to youth operators. The Department plans to conduct a study to determine the amount of boating use for persons under 18 years of age and other boaters. This additional study will provide information that can be used for future recommendations.

- **Personal watercraft** accidents accounted for **33.5% of all reported accidents, 41% of all reported injuries** and 7% of all fatalities. A total of 248 accidents, 178 injuries, and 5 fatalities were reported. Because personal watercraft make up 11% of all registered vessels in California, the number of personal watercraft accidents is disproportionate to their population. The number of injury accidents occurring with personal watercraft is especially noteworthy.

Recommendation: Based on the high number of accidents and injury accidents incurred by operators of personal watercraft, special emphasis should be placed on providing boating safety and educational materials to these boaters. In addition, increased levels of boating law enforcement should be considered in those areas of high personal watercraft use. The Department plans to conduct a study to determine the amount of boating use for persons who operate personal watercraft and other boaters. This additional study will provide information that can be used for future recommendations.

- A total of 24 personal watercraft accidents (10% of all personal watercraft accidents) occurred during **wake jumping** activities. These accidents often resulted in serious injury.

Recommendation: This trend should be monitored and laws that prohibit wake jumping by operators of personal watercraft should be considered.

- The number of **whitewater** river fatalities from rafting, canoeing, and kayaking increased from **6** in 1992 to **12** in 1993. Because 1992 was a drought year, we believe that the increase in fatalities was attributed to, in part, an increase in "paddle craft" use due to higher river water levels because of increased precipitation in 1993.

Recommendation: The whitewater community (rafters, kayakers, canoeists) should be informed of the 100% increase of moving-water fatalities. News releases and other boating safety materials should emphasize the need for paddlers to always wear life jackets. More important, whitewater boaters should not boat rivers that are rated beyond their skill level. River flows during above average water years should be closely monitored and public agencies of jurisdiction should aggressively warn the boating public of safety issues during these time periods.

INTRODUCTION

California's rivers, lakes, bays and coastal areas offer boating enthusiasts a wide variety of water recreational opportunities, including 1,356,780 surface acres of water, 30 popular whitewater rivers with approximately 2,600 miles of waterways, and 3,427 miles of coastline and tidal shoreline.

Because of the popularity of boating in California, the variety of waterways, and the growth of California's population, the number of vessels registered in the state has increased from 421,000 in 1970 to 829,000 in 1993. During this same time period, the number of boats per thousand persons increased from 20.7 to approximately 26.3.

The California Department of Boating and Waterways, the state's boating agency, administers statewide boating safety, education and law enforcement programs and also provides loans and grants for the construction of small craft harbors and boat launching facilities.

California's boating accident program is required by an agreement between the U.S. Coast Guard and the Department of Boating and Waterways. Accident information collected by the Department is forwarded to the U.S. Coast Guard in Washington, D.C. and is made a part of the Coast Guard's annual publication, "Boating Statistics." California accident statistics are compiled under a state law, Section 656 of the Harbors and Navigation Code, which requires a boater who is involved in an accident to file a written accident report with the Department if:

- a person dies, disappears, or is injured requiring medical attention beyond first aid;
- damage to a vessel or other property exceeds $500, or there is complete loss of a vessel.

The purpose of this program is to provide a data base for accident analysis, which is then used as a tool for identifying areas of concern so that the Department's activities can be directed to promote boating safety, education and law enforcement in those areas. Information contained in the reports is confidential and may not be used in prosecuting any violation which may have occurred, nor in any civil litigation. The details of each reported accident are analyzed to determine the cause, how the accident might have been prevented, and other specific safety-related problems.

The "California Boating Accident Report for 1993" does not include information on all boating accidents that occurred in California in 1993. The Coast Guard and the American Red Cross have estimated that only 10-15% of the accidents that occur are reported to state programs due to ignorance of the reporting law or difficulty enforcing the law. The

reporting of nonfatal and nonserious injury accidents is especially low. However, we believe that the vast majority of fatal and serious injury boating accidents in California are reported to the Department.

Based on accident trends in the past, the Department has made recommendations to the Legislature for changes in California boating law and has developed safety and education campaigns for such activities as water-skiing, personal watercraft operation, hunting and fishing from boats, and boating and alcohol consumption. Accident report analysis has also contributed to the development of a whitewater boating course, conducted by the American Red Cross, a Kindergarten through 12th grade education program developed by the Department in conjunction with the California Department of Education, and other boating safety education courses offered through schools and universities.

BOATING ACCIDENTS - GENERAL PERSPECTIVE

In 1993, a total of 743 accidents involving 434 injuries, 67 fatalities and $2,052,980 in property damage were reported to the Department. The number of fatalities increased from the 1992 total of 59 and the number of injury accidents decreased from 447 in 1992. Please see Tables 1 and 2 on pages 7 and 9 for additional information.

General Findings from 1993

1. "Improper lookout" by boat operators was the primary cause of boating accidents.

2. Approximately 50% of all boating accidents involved a collision with another vessel.

3. Most boating accidents occurred in the spring and summer months. July and August accounted for the highest number of accidents.

4. The highest number of boating fatalities occurred on inland lakes, followed by rivers and the Pacific Ocean.

5. The highest number of boating fatalities occurred on Saturday followed by Sunday and Friday. The lowest number of fatalities were on Monday.

6. The highest number of boating accidents occurred from 2:01 p.m. to 4 p.m., as contrasted with other two-hour increments.

7. The most common time that alcohol-related fatal boating accidents occurred was between 6:30 p.m. - 9:30 p.m.

8. The highest number of boating accidents occurred in the 31-40 age group, followed by the 22-30 age group.

9. The average age of victims involved in alcohol-related accidents was 43, with ages varying from 22 to 67. Victims' blood alcohol levels ranged from .05% to .32%, with an average blood alcohol level of .14%. All alcohol-related fatalities involved males.

10. Single vessel accidents accounted for 83% of all alcohol-related fatalities.

11. Out of 192 personal watercraft (PWC) accidents involving a collision with another vessel, **115 (60%)** involved a PWC colliding with a second PWC.

TABLE 1
1993 BOATING ACCIDENTS BY COUNTY

COUNTY	NUMBER OF ACCIDENTS	INJURIES	DEATHS	PROPERTY DAMAGE
Alameda	23	4	2	$25,000
Amador	1	1	0	-0-
Butte	5	2	2	11,100
Calaveras	14	9	2	33,300
Colusa	3	0	0	5,100
Contra Costa	36	29	3	56,300
Del Norte	3	0	0	22,100
El Dorado	12	2	0	14,400
Fresno	17	10	1	45,300
Glenn	1	1	0	-0-
Humboldt	3	1	1	3,800
Imperial	16	12	0	21,700
Kern	22	16	3	43,500
Kings	3	2	1	-0-
Lake	17	9	2	21,600
Lassen	1	0	2	-0-
Los Angeles	56	25	2	288,300
Madera	10	9	2	22,900
Marin	11	3	5	56,500
Mariposa	2	2	0	-0-
Mendocino	2	0	0	16,600
Merced	6	1	0	12,100
Mono	1	0	0	900
Monterey	12	10	2	44,200
Napa	16	13	0	25,700
Nevada	5	6	0	15,400
Orange	12	3	0	155,600
Placer	18	11	1	31,600
Plumas	8	9	3	9,400
Riverside	57	42	0	79,500
Sacramento	19	7	4	82,800
San Benito	1	0	1	-0-

San Bernardino	49	42	1	93,700
San Diego	58	22	0	214,700
San Francisco	5	2	2	9,800
San Joaquin	34	21	4	107,600
San Luis Obispo	22	15	10[1]	181,800
San Mateo	6	2	1	4,300
Santa Barbara	7	2	0	42,700
Santa Clara	15	6	0	19,500
Santa Cruz	5	0	0	13,100
Shasta	31	19	1	54,500
Sierra	1	0	1	-0-
Solano	6	7	0	15,000
Sonoma	16	8	1	38,500
Stanislaus	17	10	0	17,900
Sutter	1	0	1	-0-
Trinity	12	11	1	5,600
Tulare	15	13	3	17,300
Tuolumne	11	7	0	13,600
Ventura	5	0	1	41,400
Yolo	5	3	1	6,000
Yuba	9	5	0	11,100
TOTALS	743	434	67	$2,052,800

[1] San Luis Obispo County experienced a high number of boating fatalities in 1993. This number is elevated both in comparison with other counties and with the number of fatalities in San Luis Obispo County in previous years. Two accidents (one triple fatality occurring in the ocean during a small craft advisory and a double fatality occurring on an inland lake) accounted for half of the victims. Two other accidents occurred on inland lakes. One person bled to death after being cut with a ski rope and another died in a vessel collision. The remaining three fatalities occurred in the ocean. Two of these fatalities occurred when boats were caught in the surf line, one of which was during a small craft advisory. The third fatality occurred when a small row boat capsized in Morro Bay Harbor. Because there are no common conditions unique to San Luis Obispo County with respect to these accidents, the high number appears to be anomalous. We note, however, that four of the 10 fatalities occurred when boat operators disregarded small craft advisories.

TABLE 2
BOATING ACCIDENTS IN CALIFORNIA
1980-1993

Year	Total Number Of Accidents	Total Number Of Injuries	Total Number Of Deaths	Total Amount Of Property Damage
1980	657	270	112	$2,039,800
1981	728	319	87	$3,655,630
1982	696	323	103	$2,497,000
1983	648	333	95	$3,713,100
1984	791	341	93	$2,491,700
1985	869	403	76	$4,246,400
1986	741	319	68	$2,645,500
1987	905	325	54	$3,381,600
1988	745	333	51	$2,396,100
1989	632	371	43	$3,669,800
1990	761	416	50	$3,131,200
1991	750	421	58	$2,653,800
1992	689	447	59	$4,360,100
1993	743	434	67	$2,052,800

ALCOHOL IN BOATING ACCIDENTS

Obstacles to Accuracy

The issue of accurate reporting and analysis in boating accidents where alcohol is a factor has been a problem for a variety of reasons, as described below:

Relying on Witness Accounts

Sometimes fatal accidents are reported without boating law enforcement officers being involved at the accident site. Reporting the accident may be delayed for 12 hours or more because persons involved want to wait until the next morning to report an accident or they were too distraught to notify authorities. In alcohol-related accidents, this delay can alter circumstances dramatically, due to alcohol burn-off, and the fact that operators are unlikely to report themselves as having been under the influence of alcohol at the time of the accident. Also, in some cases where victims are seriously injured, transporting them to treatment takes priority over blood alcohol testing, and alcohol information is lost.

Delayed Recovery

Delayed recovery is the largest obstacle to collecting reliable data on blood alcohol levels. It is often the case that the bodies of boating accident victims are not recovered or are recovered months later when the effects of putrefaction[1] render a blood analysis invalid. At the time of this report, several law enforcement agencies were reducing or eliminating their on-the-water boating law enforcement patrols due to funding problems, which may further reduce the ability of the Department to collect accurate accident information. Authorities indicate that where there is a delay in recovery of over two days in these types of accidents, serious doubt develops as to the accuracy of any blood alcohol tests conducted, due to the possibility of blood putrefaction elevating blood alcohol levels. Witness accounts and officers' reports, in addition to blood alcohol levels, can be used to document alcohol impairment in some cases.

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[1]Putrefaction is the decomposition of organic matter. Due to bacterial action and oxidation, a body may produce its own alcohol during this process, which then results in a false reading for alcohol use.

Results of the 1986 Alcohol Study

In January of 1986, the Department submitted a study to the California Legislature ("Boating Safety Report") of alcohol-related motorboat accidents that occurred between October 1, 1983 and October 31, 1985. A significant finding of that report was that 59% of all motorboat fatalities were alcohol related, where testing could be conducted. Since the release of the 1986 report, new laws regarding boating under the influence have been passed and enforced. For example, in 1987, it became illegal to have a blood alcohol level of .10% or above while operating a vessel. In 1991, this level was lowered to .08%. Furthermore, a "boating under the influence" conviction now appears on Department of Motor Vehicles records and can be used to suspend or revoke a vehicular driver's license. Beginning in 1987, the Department of Boating and Waterways began to provide specialized alcohol enforcement training for on-the-water peace officers. The Department stresses the importance of avoiding alcohol while under way in a variety of public education programs, posters, pamphlets and public service announcements.

Study Parameters for 1993 Alcohol Data

In this study, a blood alcohol level of .035% was used to determine whether or not a person was "under the influence." The National Transportation Safety Board has determined that when the concentration of alcohol in the bloodstream reaches this level, noticeable changes in a person's competency level occur. The "California Boating Accident Report for 1993" analyzes only **fatal alcohol-related** boating accidents. A total of **46** fatalities were used to calculate the number of accidents where alcohol was involved. This number is smaller than the total number of fatalities due to the inability to determine alcohol use/nonuse of boaters in all cases for the reasons noted earlier. A significant number of fatalities did not allow for sufficient analysis and had to be eliminated from the study. Department staff consulted at length with representatives of Sacramento County's Crime Laboratory in order to assure the most fair and accurate analysis of cases where there was delay of recovery.

Representative Accidents

The following cases are representative of fatal accidents involving alcohol that occurred in 1993.

- A 22-year-old male falls overboard and drowns while intoxicated. The boat he is riding in is being towed by a second vessel. The occupants of his boat pass out from excessive alcohol consumption and the towing party does not notice his disappearance. The victim's body was not recovered, but all witnesses stated he was heavily intoxicated at the time of the accident. The victim was not wearing a life jacket.

- A 34-year-old male, who is not wearing a life jacket, drowns after falling overboard from a small rowboat when he stands up and loses his balance. The others in the boat are unable to rescue him. His blood alcohol level registered .07%.

- A 49-year-old male, who is not wearing a life jacket, drowns due to a fall overboard. There were no witnesses to this accident. His blood alcohol level registered .17%.

- A 51-year-old male drowns after slipping and falling from an anchored vessel. Other passengers are unable to rescue him. His blood alcohol registered .32%. The victim is thrown a life jacket but cannot grasp it.

The following are the only two fatal collisions that involved alcohol in 1993:

- A 27-year-old male operator and his 26-year-old male passenger die in a collision with another intoxicated operator. There is evidence of reckless and negligent operation preceding the accident between the two vessels. The deceased operator's blood alcohol level registered .13%. The other operator's blood alcohol level registered .09%. It is unknown if the victims were wearing life jackets.

- A 52-year-old male operator and his 39-year-old male passenger are killed when their vessel strikes a rocky island at night. The speed limit on the lake is 5 miles per hour and they are traveling 35-40 miles per hour. The operator's blood alcohol level registered .05%. The victims were not wearing life jackets but, in this case, life jackets would not have saved their lives.

Findings and Recommendations

Table 3 shows the categorical breakdown of the 46 fatalities used in the study.

TABLE 3 - ALCOHOL FATALITIES

Boat Type	Fatalities			
	Total	Total Sober	Total Under Influence	Percentage Under Influence
All Boats	46	34	12	26%
Motorboats Only	33	22	11	33%

The analysis of the available data revealed that **33%** of all **motorboat fatalities were alcohol related** where testing could be conducted. **This figure represents a significant reduction from the 59% figure disclosed in the Department's 1986 report.** This may be due to the aforementioned changes in laws concerning boating and alcohol, increased law enforcement, and public awareness and education with respect to alcohol and boating.

Accident data with respect to boating fatalities where alcohol was involved is encouraging. This area should be closely monitored, however, to see if this one-year "snap-shot" is representative of alcohol use on the water. **Law enforcement and educational efforts in this area should be continued at a high level** to further reduce boating fatalities caused by alcohol consumption.

Accident Types - Designated Driver

Single-vessel accidents accounted for 83% of all alcohol-related fatalities. Only 3 alcohol-related fatalities involved the loss of innocent life. This finding is a significant departure from studies conducted in the past where innocent victims were more prevalent.

One especially significant finding was the number of persons falling overboard and drowning. A total of 8 of the 12 alcohol-related fatalities (66%) were in this category. Of these 8 fatalities, 5 involved intoxicated passengers who were the victims of or contributed to the cause of the accidents. Two fatalities occurred on anchored vessels. **This finding contradicts the concept of a "designated driver," which is now popular in some boating safety literature. The assumption that a sober operator insures passenger safety is not always supported by the 1993 data. The "designated driver" concept has its roots in automobile safety where the possibility of drowning is not a factor.**

Persons drinking alcohol on a vessel and falling overboard are endangered further by hypothermia.[1] Alcohol greatly increases the effects of hypothermia. The dangers of hypothermia include: disorientation, hyperventilation, heart attack, and the "gasp reflex," in which the shock of cold water on the face causes an involuntary breath, and often water is sucked into the lungs.

Based on 1993 accident data and other available evidence, **the Department recommends** that boat operators **and passengers** do not drink alcoholic beverages while boating and that all boaters wear life jackets while under way.

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[1] Hypothermia is a condition in which the body loses heat faster than it can produce it, causing a dangerous reduction in body temperature. Death can result if the body's temperature drops too low.

Cause of Death

Drowning was the cause of death in all 8 of the fatalities involving "falls overboar
In all of these accidents, the victims were not wearing life jackets. In several cases, th
were life jackets on board the vessel. In some instances, victims were thrown life jackets
but were unable to grasp them. Blunt trauma was the cause of death in the remaining 4
cases. The use of life jackets was not a factor in these accidents.

Victim Profile

The average age of victims involved in alcohol-related accidents was 43, with age
varying from 22 to 67. Victims' blood alcohol levels ranged from .05% to .32%, prov
an average blood alcohol level of .14%. Unlike other categories, there were no minors
involved in any of these accidents. Another unique feature of these fatalities was that al
the victims and perpetrators were males.

Other Specifics

Alcohol-related boating fatalities in 1993 occurred in the following areas:

TABLE 4
LOCATION OF ALCOHOL FATALITIES

Waterbody Type	Number of Alcohol-Related Fatalities	Percentage of Alcohol-Relate Fatalities Occurring in Waterbody
Lakes	6	50%
Delta	3	25%
Bays	3	25%

None of these fatalities occurred in the ocean. The most common time of da
alcohol-related fatal boating accidents occurred was between 6:30-9:30 p.m.; 9 of th
fatalities occurred during this time period. Lengths of vessels involved in alcohol-re
fatal boating accidents ranged from 8-20 feet with an average length of 15 feet. Wi
exception of one rowboat, all the vessels were small to medium-sized traditional mo

Drug Involved Fatalities

There were 6 fatal boating accidents involving drugs reported in 1993. The drugs reported were: three cases of methamphetamines, two cases of cocaine in combination with alcohol, and one case of marijuana. Unlike alcohol testing, drug testing has no established threshold levels considered to be "under the influence." These drugs are illegal regardless of the amount of the drug present. However, whether or not the drug affected a person's competency level is not clear in many cases, especially since, unlike alcohol, some drugs stay in the blood stream for extended periods. These factors make the analysis of drug-related accidents difficult.

The two cases involving cocaine and alcohol in combination were included in the alcohol study because the alcohol levels were well above the legal limit. All of the other cases were eliminated from the study due to the reasons stated in the preceding paragraph. Single-vessel accidents accounted for 4 of the 6 fatalities. In 5 of the 6 cases, the person with drugs in the bloodstream was also the person killed.

PERSONAL WATERCRAFT ACCIDENTS

Background

A personal watercraft (PWC) is a small vessel that uses an internal combustion engine powering a jet pump or a propeller. It is designed to carry from one to three persons, and to be operated by a person sitting, standing, or kneeling on the vessel rather than the conventional manner of sitting or standing inside the vessel.

The use of personal watercraft is subject to all state, local and federal regulations governing the operation of powerboats of similar size.

California law states that it is an infraction for a person under 12 years of age to operate a motorboat designed to carry only one person. In addition, any person who permits a person under the age of 12 to do so is guilty of an infraction. A person under 12 may operate a motorboat designed to carry at least two persons if accompanied by a person 18 years or older.

As of December 31, 1993, there were approximately 91,000 personal watercraft in California.

Representative Accidents

The following cases are representative of PWC accidents that occurred in 1993.

- A 16-year-old male dies when his PWC hits another PWC at a blind corner on an offshoot of a river. His speed was described as excessive for the conditions. His blood alcohol level was reported as .02%.

- A 39-year-old male PWC operator drowns after hitting his head on his PWC and falling into the water. Although there were no witnesses to the accident, officers suspect that he was wake jumping when the accident occurred. The victim was not wearing a life jacket.

- A 31-year-old male falls while riding a personal watercraft. While he is remounting, a 12-year-old male operator on a second PWC runs over him. The victim dies of massive head injuries.

- A PWC is towing a person on a kneeboard very close to shore. The kneeboarder hits and injures a small child in the water. The PWC has no observer on board, contrary to state law.

- A husband and wife are each riding brand new PWC. The husband is following his wife at an unsafe following distance and when she stops, he runs over her. The wife receives a ruptured spleen, a broken leg and head injuries.

- A PWC operator hits a water-skier in the head while trying to jump the tow boat's wake. The water-skier is admitted to a hospital with a head concussion.

- Two PWCs are doing 360° turns and strike each other injuring both riders. One of the operators is found unconscious in the water with a laceration under his eye, concussion, and neck and spinal injuries.

- A PWC operator strikes the back of a boat, becomes airborne, hits the driver of the boat on top of his head, bounces onto the bow of the boat and finally lands back in the water. The PWC operator is transported via helicopter to the hospital with unknown injuries.

Findings and Recommendations

During the 1993 boating season, 248 PWC accidents, 178 injuries, and 5 fatalities were reported to the Department.

Department of Motor Vehicle's registration information for 1993 indicates that personal watercraft represent 11% of all registered vessels in California. Department of Boating and Waterways statistics reveal that personal watercraft account for **33.5% of all reported accidents, 41% of all injuries,** 7% of all fatalities, and 15% of total property damage. This is a noteworthy mixture of statistics for this craft.[1]

The number of injuries experienced is higher than expected considering the number of registered personal watercraft. The fact that the operator is in an exposed position, sitting on the craft rather than in the craft, contributes to these injuries. The number of fatalities caused by PWC operators is lower than expected based on their registration numbers. The voluntary use of personal flotation devices (PFDs) by PWC operators probably accounts for this low number. Many of the serious injury accidents reported during this period might have resulted in fatalities had the riders not worn PFDs.

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[1]It might be argued that personal watercraft are used more than other vessels, which would then account for the higher than expected number of PWC accidents. However, use information (information which indicates the number of hours the craft are used) is not available for these or other boats at this time.

A large number of collisions occurred between PWC operators who were riding together. Out of 192 PWC accidents involving a collision with another vessel, **115 (60%)** involved a PWC colliding with a second PWC, 72 (37%) involved a PWC colliding with a vessel other than a PWC, and 5 were unknown. High speed or extreme maneuvering usually precedes and contributes to an accident involving a personal watercraft. Additionally, lack of operator experience was common in PWC accidents; a substantial number involved first-time operators.

Personal watercraft operators in the process of either wake jumping or "wetting down" other vessels were involved in several serious injury accidents. **A total of 24 personal watercraft accidents (10% of all personal watercraft accidents) occurred during wake jumping activities.** We believe laws that prohibit wake jumping should be considered to help alleviate this problem.

Personal watercraft sometimes present a danger to their riders because of the craft's lack of visibility once it has fallen over. Several accidents and one fatality occurred this year because riders who were attempting to remount their PWC's were not visible to other watercraft and collisions ensued.

Based on the high number of accidents and injury accidents involving PWC, special emphasis should be placed on providing boating safety and educational materials to these boaters. In addition, increased levels of boating law enforcement should be considered in those areas of high personal watercraft use.

The Department plans to conduct a study to determine the amount of boating use for persons who operate personal watercraft and other boaters. This additional study will provide information that can be used for future recommendations.

YOUTH ACCIDENTS

Background

California requires a person to be at least 12 years of age to operate a motorboat more than 10 horsepower, except if there is a person 18 years of age or older on board the vessel. This law went into effect in 1987.

A new law, effective January 1, 1994, requires children under seven years of age to wear life jackets on vessels that are "under way", i.e., not anchored, moored or aground.

Representative Accidents

The following cases are representative of accidents involving youths occurring in 1993. For purposes of this review, youths are considered to be under 18 years of age.

- A 10-year-old female drowns after slipping out of a raft on a moderately difficult river. This river is rated as a Class II and has been the site of a number of fatal boating accidents over the years, including another fatality this year where a boater drowned when his canoe was snagged on a mid-stream tree. The victim was not wearing a life jacket.

- An 11-year-old female drowns after falling out of a raft on a small creek. Although she was wearing a life jacket, she did not know how to swim. She was found entangled in a log jam.

- A 43-year-old male passenger on a personal watercraft (PWC) is killed when another PWC operated by a 15-year-old female strikes the vessel he is riding on. The 15-year-old female operator is following at an unsafe distance and is blinded by spray, causing the collision.

- A 10-year-old male on a PWC hits a 12-year-old female on a second PWC while he is maneuvering due to improper lookout. The 12-year-old female loses teeth and breaks a bone in her jaw.

- A 14-year-old female on a PWC overtakes, cuts in front of, and then stops in front of a 15-year-old female on a PWC, causing a collision. The 14-year-old female and her passenger were taken to the hospital with head and neck injuries.

- Two 16-year-old friends rent PWC for the first time. One turns in front of the other without looking and causes a collision. The operator of one of the watercrafts receives a serious stomach injury.

- A 12-year-old male on a PWC and his 14-year-old sister are wake jumping when they collide with each other. It was their first time on PWC's. The 12-year-old male receives 20 stitches to his knee and the 14-year-old female receives head injuries, liver and kidney damage, and broken ribs.

- A 13-year-old female on a PWC sprays a 13-year-old female on an idling PWC, tries to repeat this, but ends up colliding with the second vessel and breaks the second operator's leg.

Findings and Recommendations

In 1993, **youth** operators under the age of 18 were involved in **10.5% of all boating fatalities** and **12% of all reported injuries** in California. A total of 7 fatalities and 51 injuries were reported. These statistics suggest that **special emphasis should be placed on providing boating safety and educational materials to youth operators.**

The Department received reports of 46 operators under 16 years of age who were involved in accidents in 1993. Of these 46 operators, 40 (87%) were operating personal watercraft. Nineteen accidents involved operators of personal watercraft under 14 years of age. Based on this data, the incidence of youths involved in boating accidents while operating personal watercraft should be monitored.

The Department plans to conduct a study to determine the amount of boating use for persons under 18 years of age and other boaters. This additional study will provide information that can be used for future recommendations.

Table 5 on the next page shows the number of accidents involving minor operators categorized at different ages.

TABLE 5
ACCIDENTS INVOLVING MINOR OPERATORS

Age	Number of Operators Involved in Accidents	# of injuries where minor operators played a role	# of deaths where minor operators played a role
17	14	6	1
16	17	12	2
15	16	13	1
14	11	5	0
13	7	6	0
12	5	4	1
11	3	3	1
10	2	1	1
8	1	1	0
3	1	0	0
Totals	77	51	7

WHITEWATER ACCIDENTS

Background

California had experienced a six-year drought leading into the 1993 boating season. During this period, the Department received a relatively low number of river boating fatality reports. When 1993 precipitation increased significantly and caused larger than normal water runoff on California rivers, the Department anticipated the potential for increased accidents and alerted the whitewater boating public of the dangers through news releases and other public information avenues. In spite of these efforts, a much larger than normal number of fatalities occurred. It is important to note that the higher than normal water levels are not directly responsible for all of these boating accidents. Many are the result of poor judgment or entrapment factors not directly attributable to flow rates. The Department believes that the number of boaters participating in whitewater activities increased significantly during the 1993 season, thus increasing the chances for accidents.

Representative Accidents

The following is a brief description of some of the moving water fatalities occurring on California's waterways in 1993:

- A 37-year-old male kayaking on a small stream, capsizes and broaches on a midstream tree. He is pinned in the kayak and drowns. The victim was wearing a life jacket at the time of the accident.

- A 33-year-old male falls from a raft while boating on a difficult river. After floating over a drop in the river he disappears. Despite the fact that he was wearing a life jacket and helmet, he was later found to have been swept to the bottom and wedged under a rock.

- A 30-year-old male wearing a life jacket drowns on a difficult river when he falls out of a raft and lodges his foot in a crack in the rocks.

- A 36-year-old expert kayaker wearing a life jacket drowns in extreme conditions on a Class V (5) plus river. His kayak pins by the bow at the base of a drop. Water pours over the craft's stern, drowning the victim.

- A 21-year-old male scout leader wearing a life jacket drowns on a Class II (2) river after his canoe wraps around an obstacle. His foot becomes entrapped in the wrapped canoe, causing him to be held under water.

- An athletic 16-year-old male drowns when his raft capsizes on a small creek. He was not wearing a life jacket.

- A 28-year-old male drowns in a rafting accident on a difficult whitewater river when the raft wraps around a tree causing the victim to fall off. He was not wearing a life jacket.

- A 27-year-old female wearing a life jacket drowns after falling from a raft. She and 4 others were thrown into the water when their raft overturned; everyone resurfaced right away except her. Her body was found 1/2 mile downstream.

Findings and Recommendations

The Department received an unusually large number of "moving water" fatalities during 1993. **A total of 12 fatalities occurred on whitewater rivers during the reporting period.** Additionally, a commercial river rafting company reported a serious whitewater accident on a California river that resulted in a customer, at last report, remaining in a coma. The whitewater community is describing the 1993 season as "horrendous."[1] Reports indicate that 24 people died while rafting, kayaking or canoeing on whitewater rivers in the United States during the 1993 season. California accounted for one half of this total.

An analysis of accidents reveals there is more to moving-water safety than simply wearing a life jacket. Even expert boaters wearing life jackets fell victim to river dangers in the 1993. In some cases, individuals were clearly operating in conditions that outmatched their abilities and preparation. Moving water is certainly not a risk-free environment and no amount of experience or equipment can remove all the risks associated with the sport. Unfortunately, a number of these fatal accidents reveal that some people are still not wearing life jackets and are boating on rivers beyond their skill level. The result -- people are dying unnecessarily on California's rivers.

It is recommended that the whitewater community (rafters, kayakers, canoeists) be informed of the 100% increase of moving-water fatalities from 1992 to 1993. News releases and other boating safety materials should emphasize the need for paddlers to always wear life jackets. More important, white river boaters should not boat rivers that are rated beyond their skill level. River flows during heavy water years should be closely monitored and public agencies of jurisdiction should aggressively warn the boating public of safety issues during these time periods.

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[1] "NORS/Currents", Winter 1993-1994

Commercial Accidents

It is noteworthy that no commercial whitewater fatalities occurred during this unusually high water period. A number of injury accidents and one near fatality were reported by commercial rafting companies during the 1993 season. These included broken bones and a variety of cuts resulting from falls within the raft and overboard. Reporting of accidents of this type is sporadic because commercial boating accidents are not required by law to be submitted to the Department.

TOWING LINE ACCIDENTS

Background

Towing lines, typically made from plastic-type products, are used to pull water-skiers and persons on kneeboards, towing sleds, inner tubes, and other towing devices, from motorboats, including personal watercraft.

California law states that:

> "No person shall operate a vessel on any waters for towing a person or persons on water skis, an aquaplane, or a similar device unless there is in the vessel a person at least 12 years of age, in addition to the operator, in a position to observe the progress of the persons being towed."

Representative Cases

The following examples from 1993 accidents are typical of the problems involving towing lines:

- A skier is sitting on the swim step with the ski-line, as the vessel is taking off to another skiing area. The skier falls off the platform and is at the same time entangled in the ski-line. The ski-line cuts into the skier's leg when his weight hits the end of the line. The skier later bleeds to death in the ambulance while in route to a hospital.

- Two water-skiers are skiing from the same boat on lines of different lengths. Injuries result when one skier runs into the longer of the two lines.

- A boat is pulling a person on an inner tube when the tube collides with rocks on the shoreline. The victim is airlifted via helicopter to the hospital.

- A boat begins to pull a skier, and as the line goes out, the observer is injured because her leg is tangled in the ski-line.

- A jet-drive type vessel engaged in skiing activities injects the ski-line in the jet-drive intake. The skier's leg is broken by the jerking action of the line (which is wrapped around her leg) being pulled into the intake.

- A boat is pulling two people on inner tubes. As the boat rounds a turn, the tubers collide, sending one victim to the hospital with back injuries.

- A second vessel runs over a ski-line, wrapping it in the propeller. The line causes a major rope burn to the skier's ankle. The handle then snaps out of the water, injuring a

passenger on the tow boat.

Findings and Recommendations

Injuries resulting from ski-lines should not be underestimated. This is a long-standing problem that results in numerous accidents each year and accounts for one fatality in 1993. In previous years, there have been two fatal accidents involving the operators of personal watercraft striking ski-lines from other vessels. In addition, several severe injuries resulted from the careless towing of inner tubes in 1993.

Based on the 1993 accident data, the **Department recommends that boaters take the following precautions** when operating with or around ski-lines and inner tubes:

- Water-skiers should never allow ski-lines to wrap around themselves. This rule also applies to persons engaged in letting rope out to skiers.

- Ski-lines should always be the same length when two skiers are being pulled by a vessel.

- When waterskiing or towing activities end, the ski-line should be placed completely inside the vessel to avoid injuries or the rope catching in the propeller.

- Boaters should carefully check to see if other boats are towing water-skiers or "tubers" before proceeding near the other vessels.

- Boat operators engaged in towing inner tubes should remember that unlike water-skiers, occupants of tubes have no way of maneuvering. It is essential that extra care be taken to ensure that inner tubes have adequate clearance near the shoreline or any hazard.

In addition, it is recommended that information concerning water-ski tow lines should be developed in boating safety literature and other materials that are provided to the public.

SPECIAL CASES

The Department received accident reports that indicate special dangers we wish to illustrate for consideration. Although the cases are not statistically large in number, they are representative of conditions that could result in additional accidents of this type and are listed here in hopes of preventing similar occurrences. These special cases include:

- A boat is towing an unoccupied inner tube that is attached to the ski-line, by means of a metal "D" ring, also referred to as a carabineer, a coupling device originally used by mountain climbers to work with lines used in their sport. The ski-line in this case is under significant stress due to the drag induced by the tube being pulled through the water by the ski boat. The "D" ring pulls free from the tube when the line breaks and **snaps back to the boat, striking the operator**. The ring hits with enough impact to penetrate the skull, breaking loose portions of the victim's skull. Other accidents involving the snap-back of the ski-rope handle have occurred where less serious injuries have resulted.

- A skier is sitting on the vessel's swim step with the ski-line, as the vessel is taking off to another skiing area. The skier falls off the platform and is at the same time entangled in the ski-line. The ski-line cuts into the skier's leg when his weight hits the end of the line. The skier later bleeds to death in the ambulance while enroute to a hospital.

- An accomplished water-skier with many years of driving experience takes friends out in her vessel for a day of skiing. While driving her tournament ski-boat, she demonstrates a **"power turn,"** a very sharp and powerful turn. The driver falls overboard and is run over and killed by impact with the vessel's propeller. [1]

- A mother sets her 3-year-old daughter on her personal watercraft, which is idling, and prepares to climb on behind her when the child grips the throttle and travels across the lake, about 1,000 feet, before hitting a piling and falling into the water. The daughter was uninjured.

- A 14-month-old boy leaves his bed during the night and falls overboard from a moored houseboat on lake. The child's father found the body after returning to the house boat at a late hour. The child could not be revived. **The new life jacket law for children would not apply in this case.**

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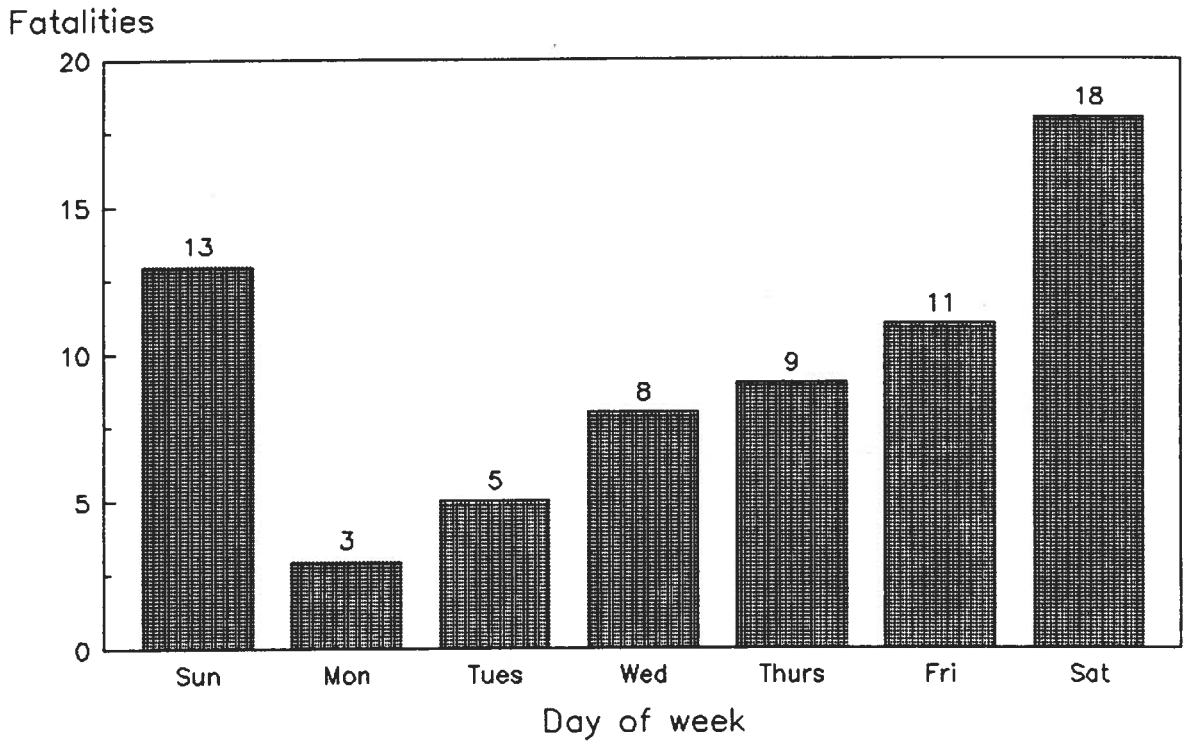
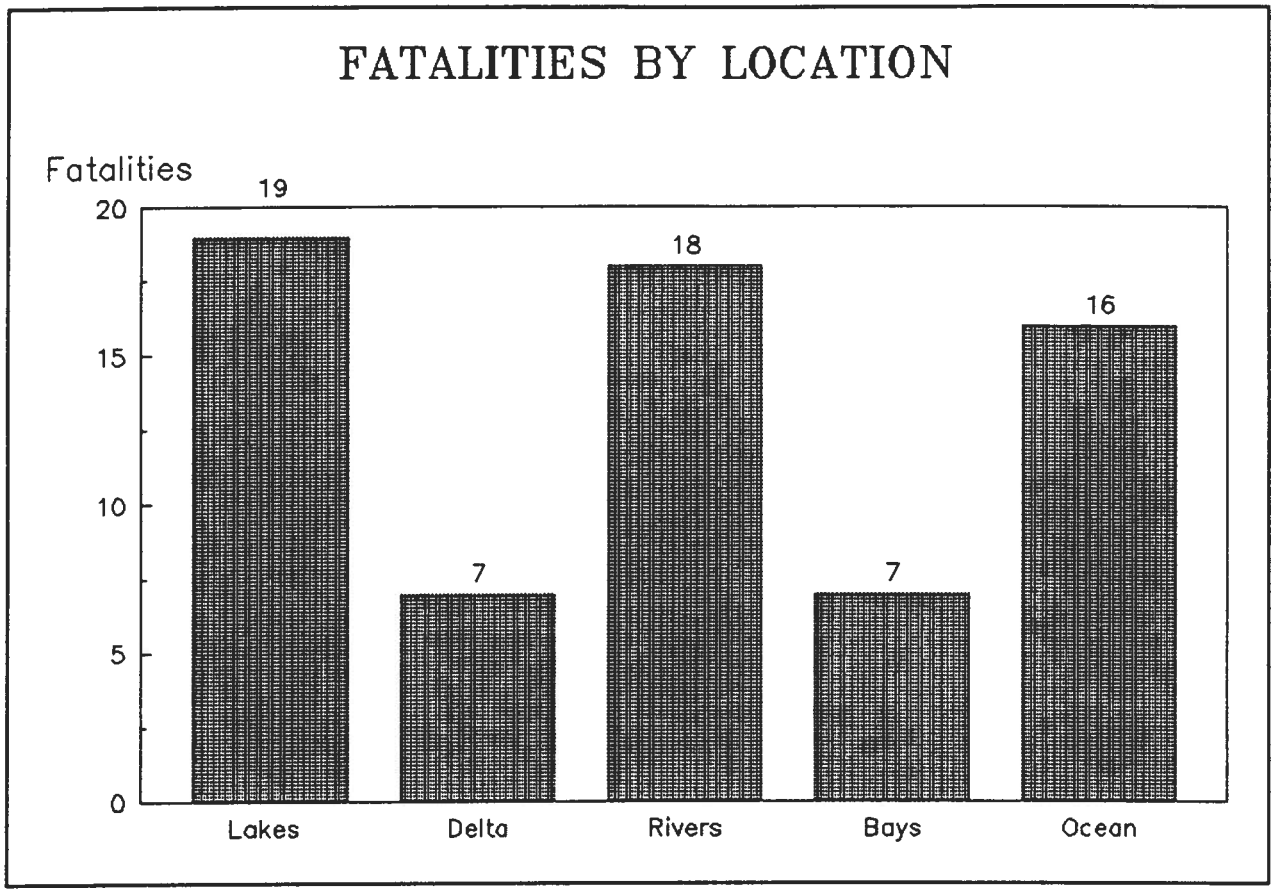
[1] The power turn accident relates in part to the characteristics of the tournament style ski-boat that was involved in this case. Tournament ski-craft employ double or triple fins on the bottom of the hull which help insure straight line performance for slalom water-skiing. With this design, the vessel is not pulled off center when the skier cuts sharply to the side to round a buoy. A secondary unintended effect of these triple fins is the ability of the craft to perform very hard tight turns. In the accident listed above and another which occurred in 1992, serious injury and death occurred due to falls overboard during high performance turns.

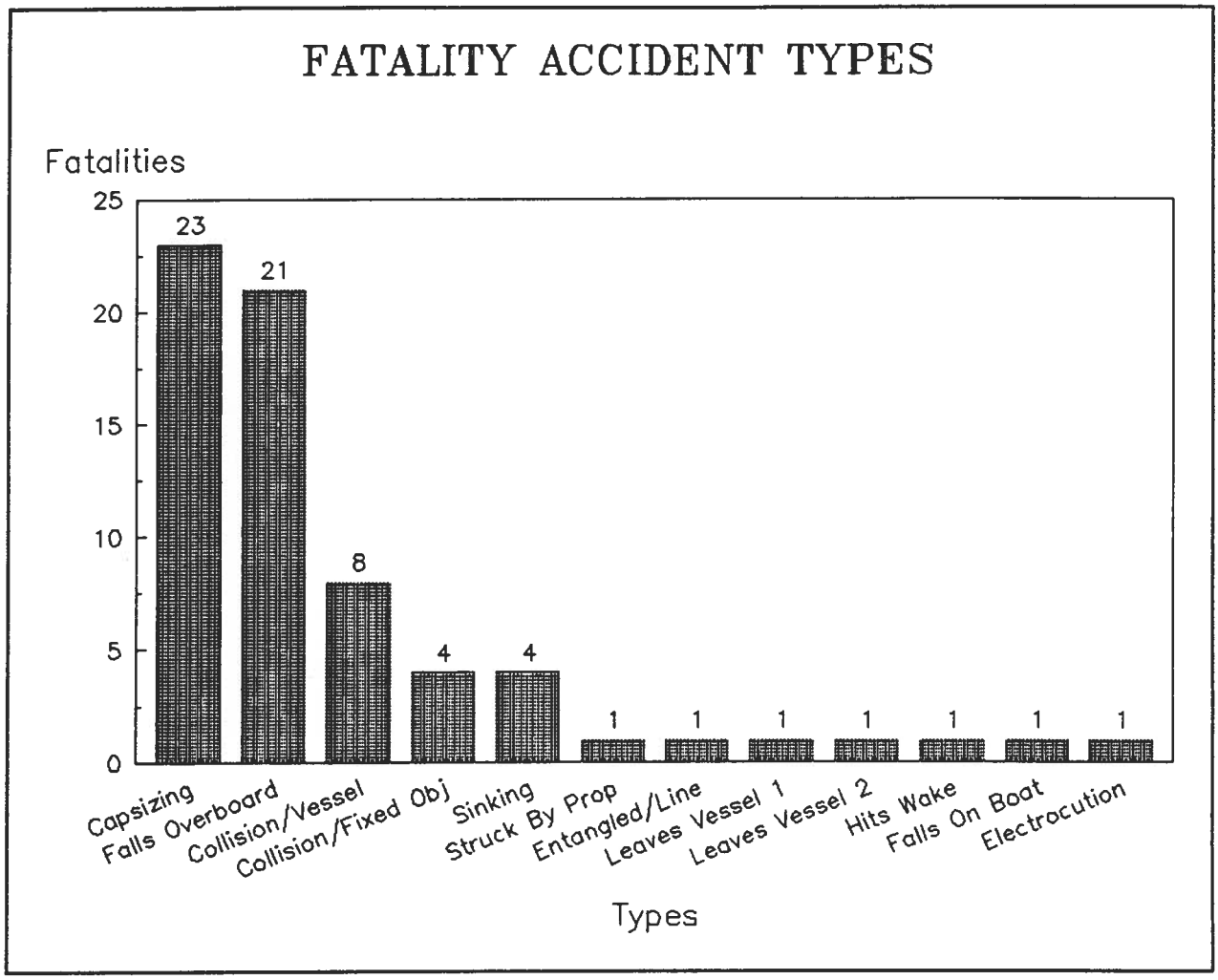
2

FATALITIES BY DAY OF THE WEEK

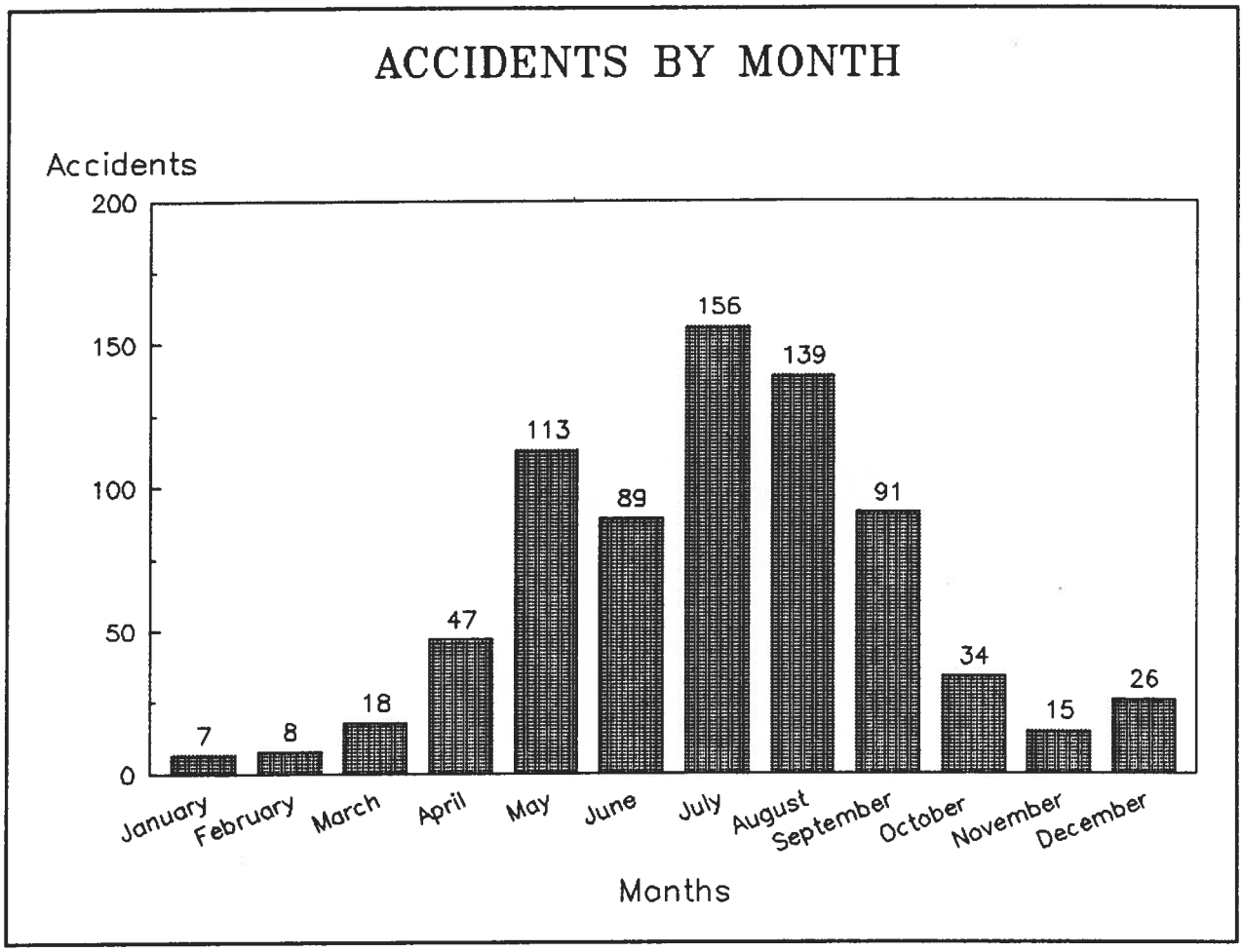




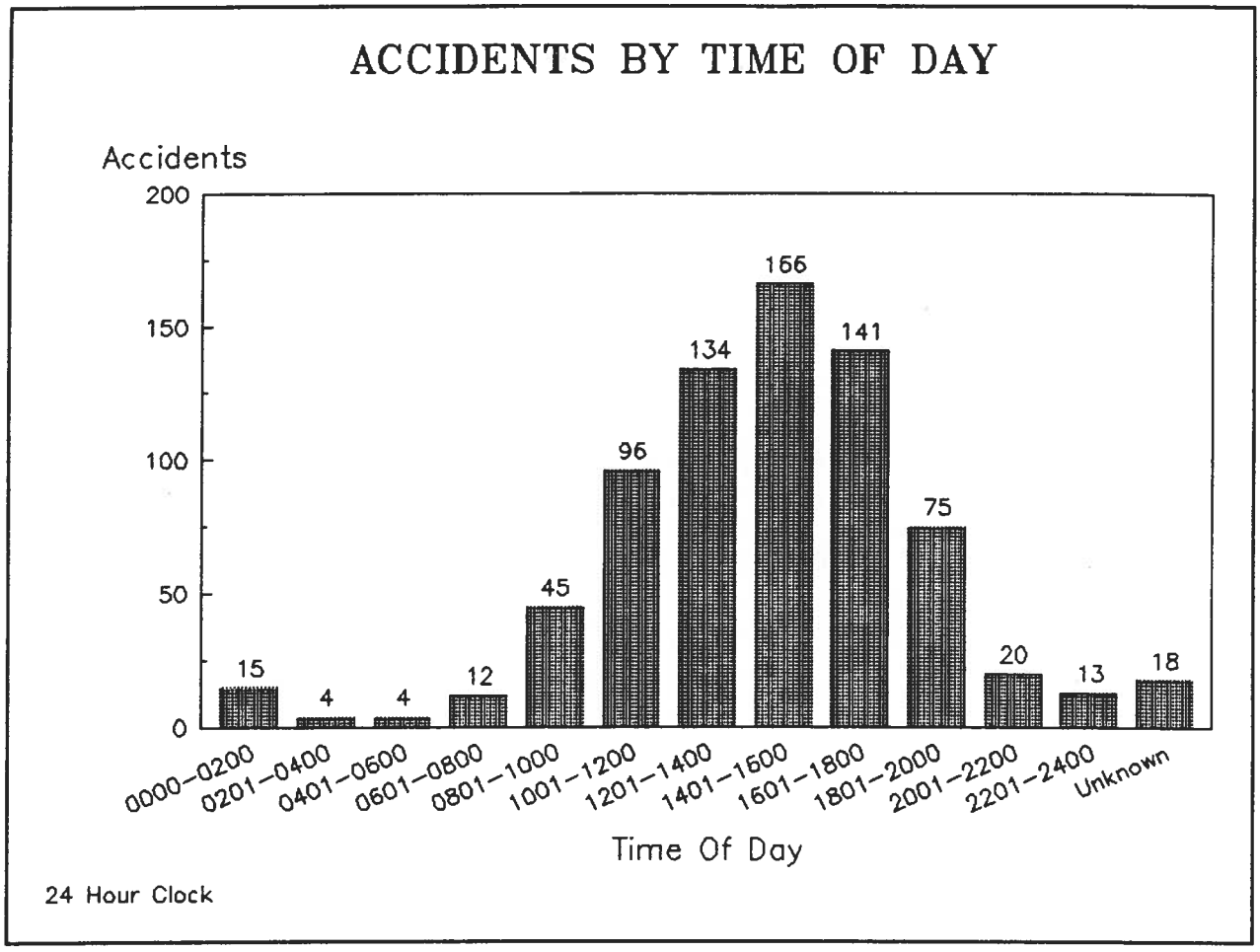
This chart indicates the general location of fatal recreational boating accidents in 1993. The highest number of boating fatalities occurred on inland lakes, followed by rivers and the Pacific Ocean.



This chart breaks down 1993 fatality cases by accident type. Entangled/line: The victim is severely cut by a ski-line and bleeds to death. Falls on boat: A personal watercraft operator dies after hitting his head on the craft's handlebars. Leaves vessel 1: In this accident the victim drowned while attempting to swim to shore for gas. Leaves vessel 2: In this accident the victim drowned while attempting to rescue a second victim.



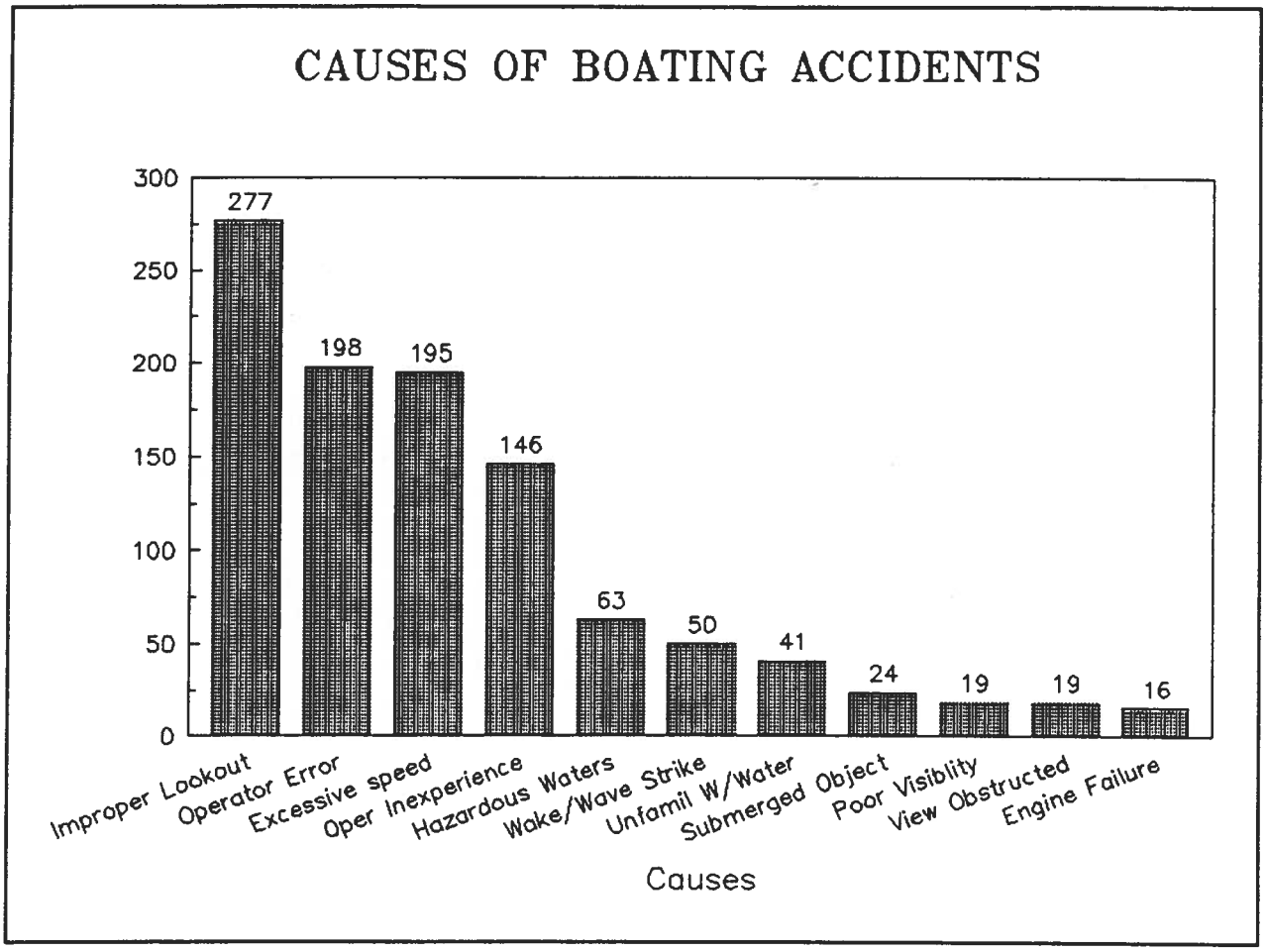
The findings in this chart indicate that most boating accidents occur in the spring and summer months. Unusually cool days and rain on weekends may account for the lower number of accidents reported for the month of June.



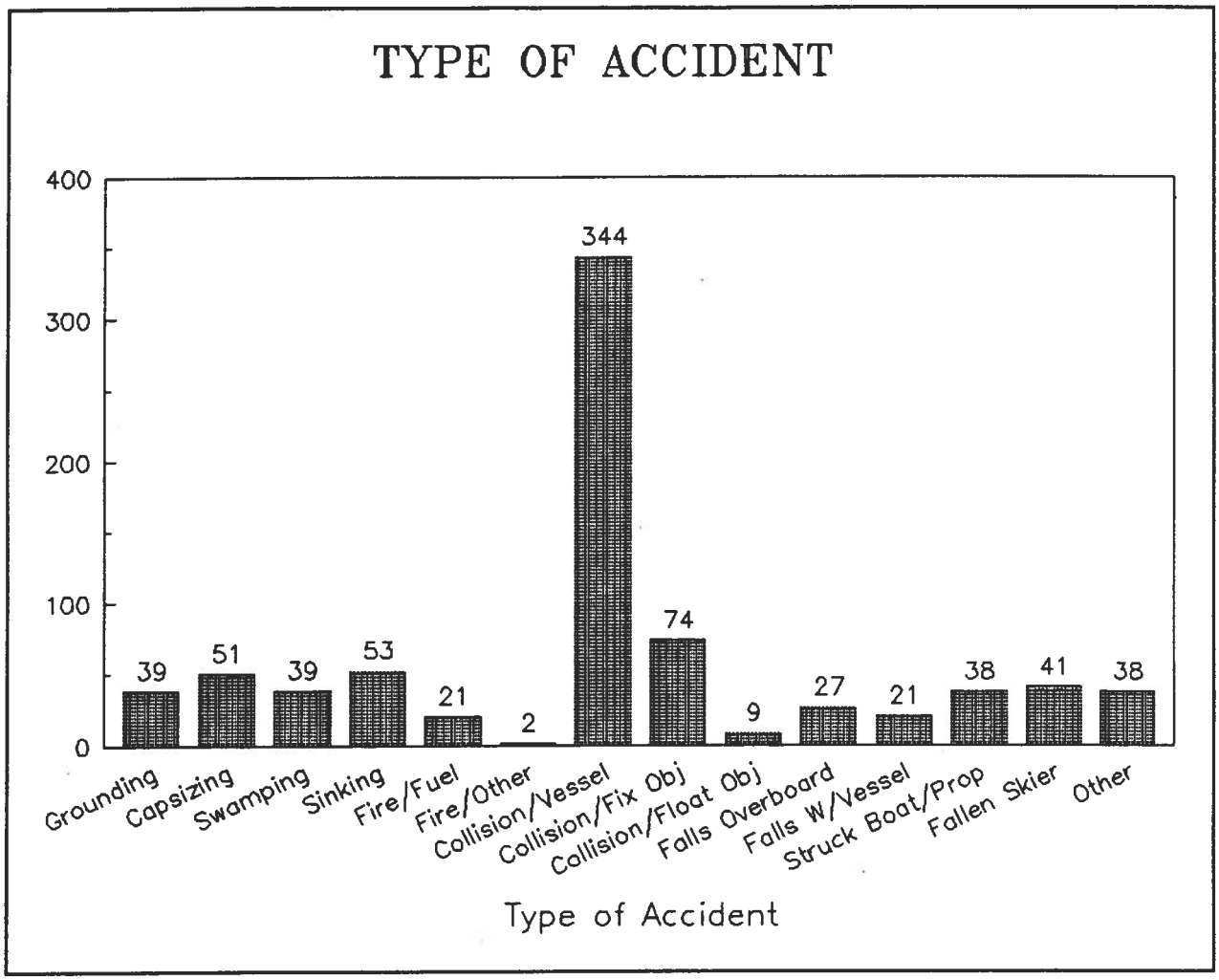
This chart reveals that mid-day to afternoon is the most dangerous time to go boating. This is the time when the waterways would be expected to be the most congested resulting in increased chances of collisions. These findings are consistent with national trends as reported by the U.S. Coast Guard.

Time on this chart is represented by a 24-hour clock. Time progresses normally through 12 noon. After noon add one for each additional hour. One p.m. becomes 1300 hours, etc.

Some accident reports submitted to the Department do not include time-of-day information as indicated by the unknown category.



This chart lists the causes of boating accidents occurring during 1993. Improper lookout leads the list of causes of these accidents. The category "wake/wave strike" represents a wake or wave striking a vessel. The "wake" portion refers to a vessel-generated condition, while "wave" refers to a naturally occurring condition. The category "submerged object" refers to a vessel striking a submerged object. Some reported accidents had more than one cause. For example, both excessive speed and operator inexperience are causal factors for some accidents.



Collision with another vessel is the leading category of accidents. The following explains the abbreviations used in the chart:

Fire/fuel: A fire on a vessel involving fuel used to power the vessel.

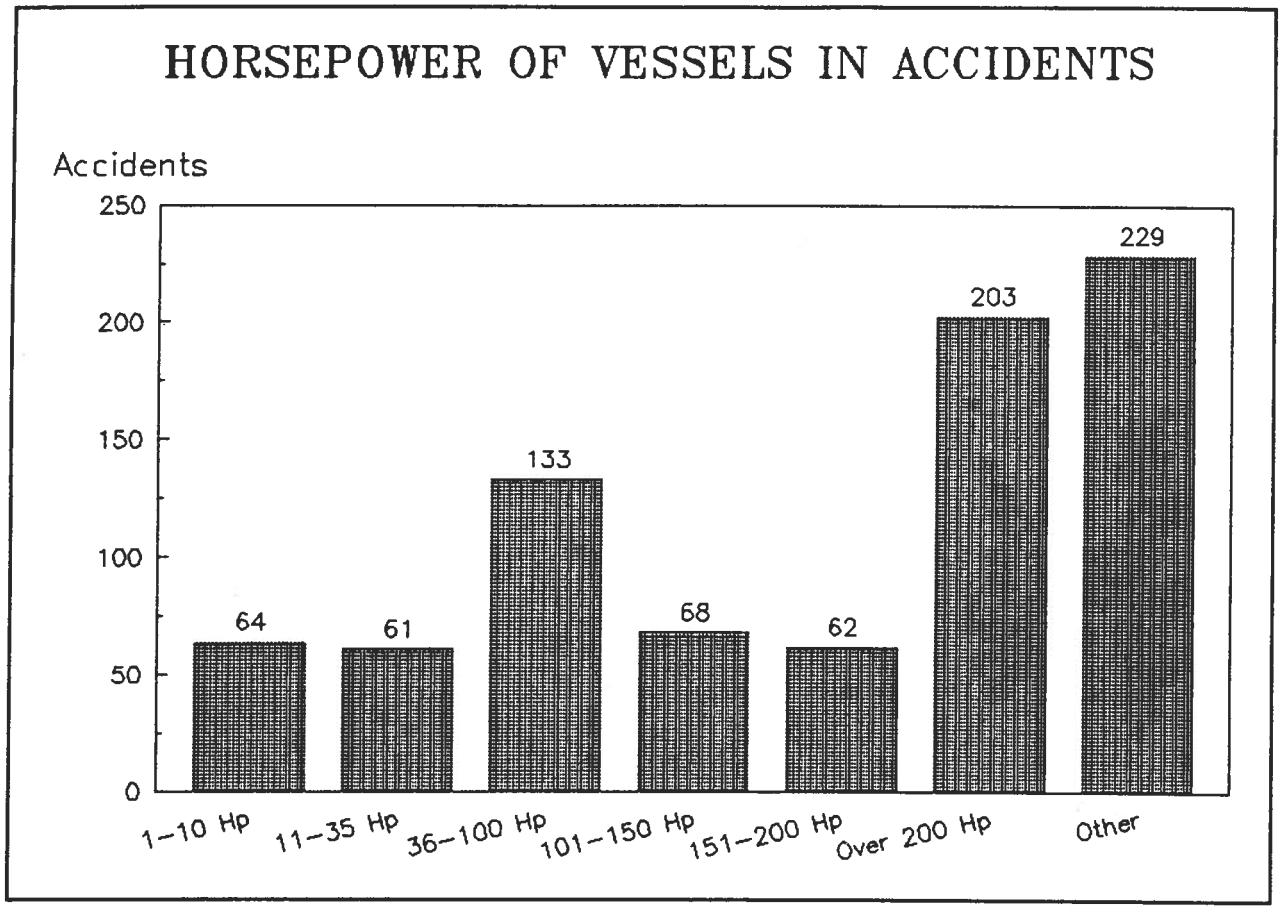
Fire/Other: Indicates a fire involving any other type of fuel source including auxiliary heating sources.

Collision/Fix Obj: Indicates a vessel collision with a fixed object such as a dock.

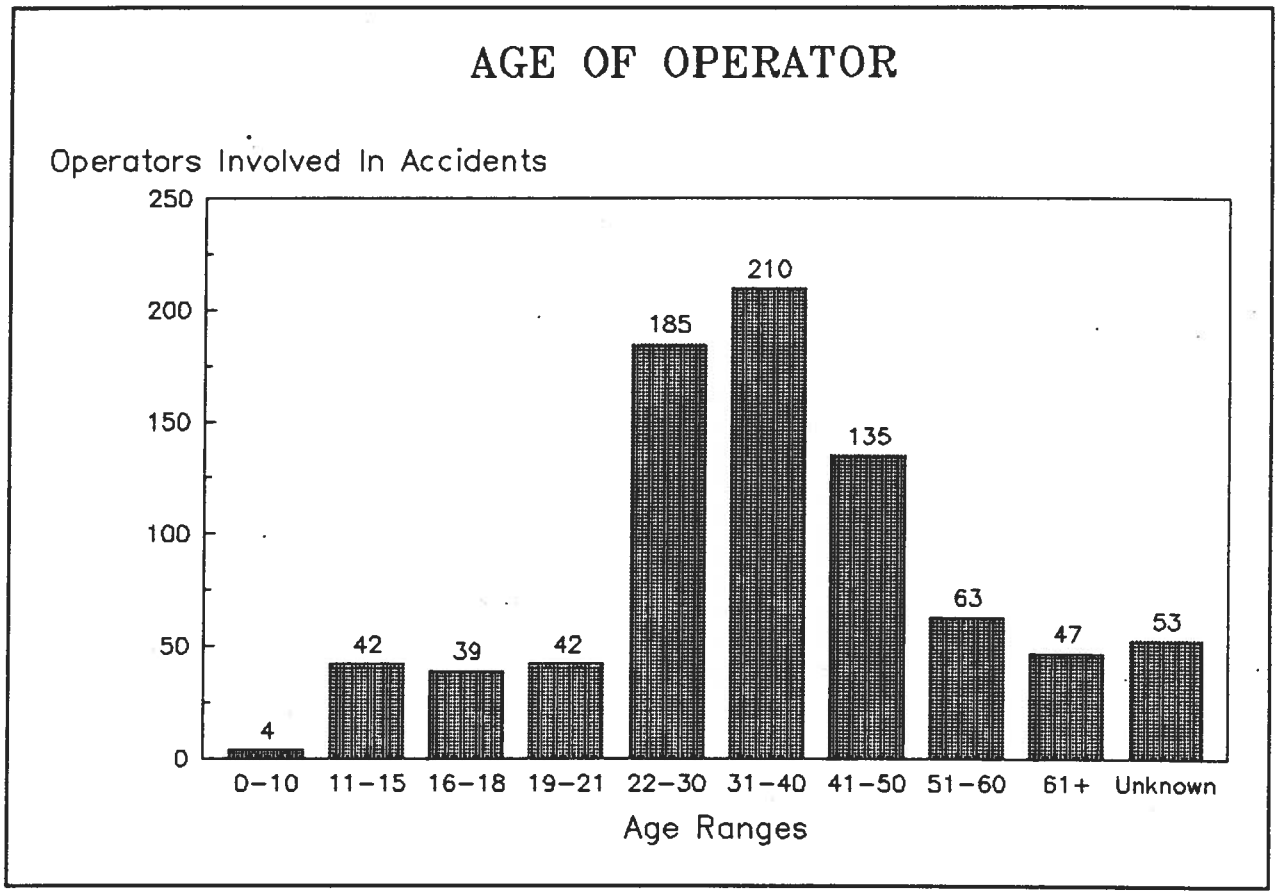
Falls W/Vessel: Indicates a fall within the vessel that resulted in injury.

Struck/boat/prop: Indicates a person being struck by a boat or propeller.

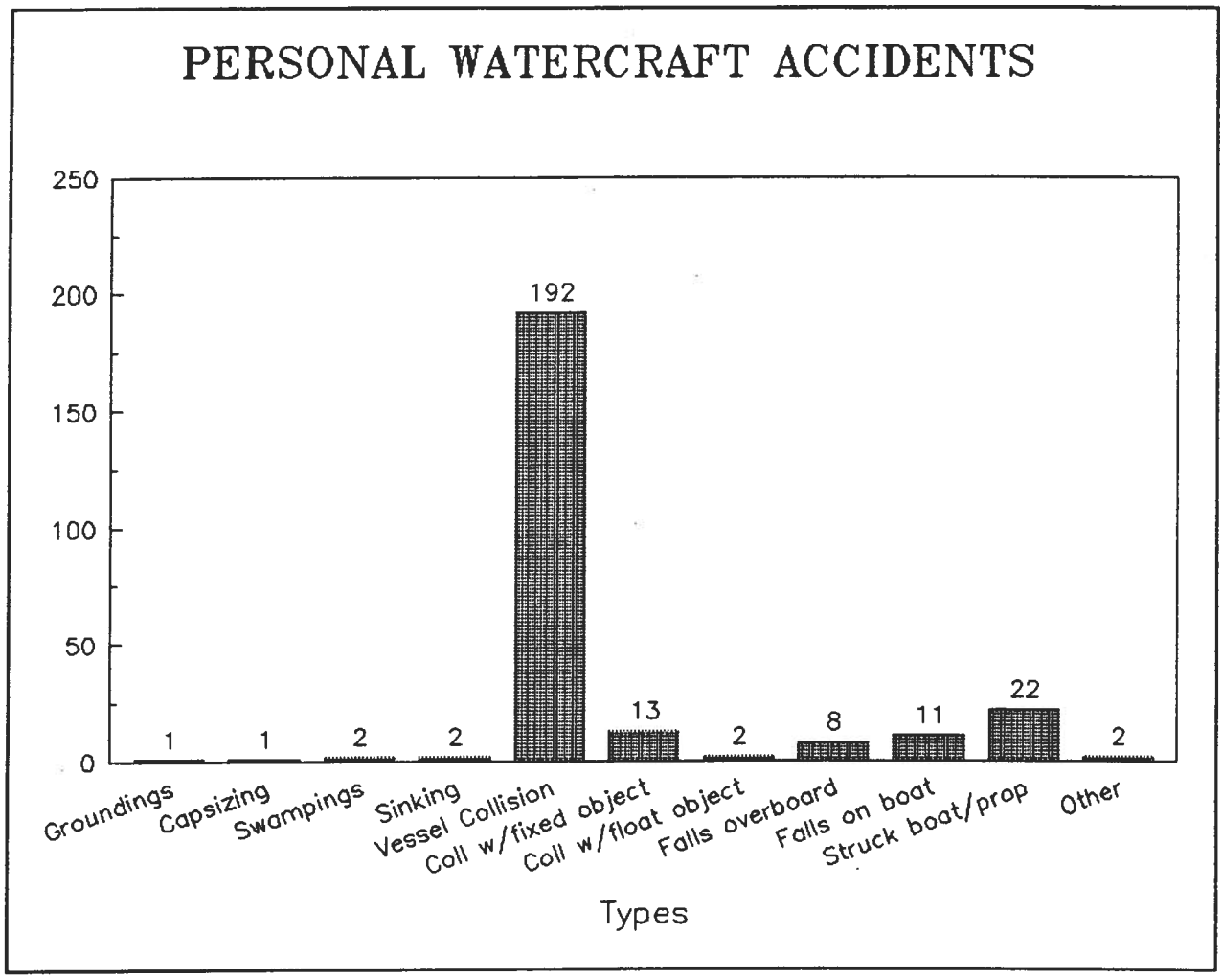
Some accidents are assigned more than one type of accident.



This chart indicates a clustering of accidents in the 36-100 horsepower range and in the over 200 horsepower range. The "Other" category includes sailboats, paddlecraft and motorboat reports where horsepower information is not indicated.



This chart shows the age groupings of operators involved in boating accidents. The majority of accidents occurred in the 22-50 age group. A total of 40 of the 46 operators in the 0-15 age group were operating personal watercraft. A total of 33 injuries and 4 fatalities resulted from accidents involving operators in the 0-15 age group. Some accident reports submitted to the Department do not include operator age information as indicated by the unknown category.



The most significant area of concern for personal watercraft (PWC) operation is "vessel collisions." Most PWC collisions involved another PWC. Activities prior to the collision include "wetting down" and wake jumping. The PWC operator is often faulted for improper lookout. The second area of concern is "struck boat/propeller." In this category, PWC often strike swimmers, water-skiers or other PWC. Some of these collision accidents have resulted in broken limbs without property damage. The exposed position of the PWC operator helps explain these kinds of occurrences.

The small size of the PWC is also a factor in some cases. Operators of traditional vessels often do not see the PWC during the time when the PWC operator has fallen and the PWC presents a less visible profile.

The "falls on boat" category represents wake jumping incidents where the operator is injured by hitting his/her own craft. A variety of accidents in this category included one fatality during the 1993 season.

Some accident cases are assigned more than one "cause."