



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** March 16, 2006

**In reply refer to:** M-06-1 and M-06-2

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### Background

On August 25, 2004, the National Transportation Safety Board conducted a public forum, *Personal Flotation Devices in Recreational Boating*, at its Academy in Ashburn, Virginia. At the forum, more than 80 participants from government and the recreational boating industry, including the U.S. Coast Guard, gathered to discuss policy issues related to the use of personal flotation devices (PFD) in recreational boating. The discussion highlighted a number of important issues discussed in this letter, including adult PFD use, boating safety education, and evaluating the effectiveness of recreational boating safety programs.

Recreational boating is increasing in popularity. Participation has increased from 78.3 million in 1999 to 91.1 million in 2003, according to a survey of recreational activities cited by the Coast Guard and the boating industry.<sup>1</sup> At the same time, the total number of accidents decreased by 30 percent, and the number of accidents per million participants declined more than 40 percent. However, the number of fatalities remained relatively constant from 1999 through 2004, varying less than 5 percent from an average of 714 per year (table 1). Coast Guard accident and fatality data<sup>2</sup> for 1999–2004 indicated that, on average, 71 percent of these deaths were due to drowning (table 2). In addition, statistics showed that the drownings per 100,000 registered boats remained constant during that period.

A prevalent factor among drowning victims is the lack of a PFD. Data presented during the public forum by the Coast Guard for 2003 showed that 416 of the 481 drowning victims were not wearing PFDs. The size of the boat also mattered; 7 of 10 people who drowned were in boats 21 feet or less in length. In addition, nearly 70 percent of all drownings (and more than 60 percent of all fatalities) occurred as the result of three very similar types of boating accidents that unexpectedly place boaters in the water—capsizing, falls overboard, and swamping (table 3).

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<sup>1</sup> U.S. Department of Agriculture, Forest Service *National Survey of Recreation and the Environment (NSRE), Recreation Statistics Update*, Update Report No. 2 (Washington, DC: 2004). Survey data for recreational boating participation are currently available only for years up to and including 2003. Consequently, there are no accident statistics based on survey estimates of recreational boating participation calculated for 2004.

<sup>2</sup> U.S. Department of Homeland Security, U.S. Coast Guard presentation to the public forum, *Personal Flotation Devices in Recreational Boating* (August 25, 2004), and *Boating Statistics–2004*, COMDTPUB P16754.18 (Washington, DC: 2005).

Small boats account for the largest proportion of the recreational boating fleet, and are also the kinds of boats most susceptible to capsizing and swamping. Using data for 1999–2003, the Coast Guard estimated that approximately 84 percent of the people who drowned would have been saved had they been wearing PFDs.

Table 1: Accidents, Accident Rates, and Participation in Recreational Boating, 1999-2004

Year	Number of Accidents	Total Fatalities	Number Drowning	Number of Participants (millions)	Accidents per 1.0 mil Participants	Fatalities per 1.0 mil Participants
1999	7,931	734	517	78.3	101.3	9.4
2000	7,740	701	519	77.6	99.7	9.0
2001	6,419	681	498	75.3	85.2	9.0
2002*	5,705	750	524	81.7	69.8	9.2
2003	5,438	703	481	91.1	59.7	7.7
2004**	4,904	676	484	n/a	n/a	n/a

\* In 2002, the Coast Guard changed its criteria for reporting accidents by raising the damage limit for reporting from \$500 to \$2000. This could result in fewer accidents reported than in previous years.

\*\* 2004 data released by the Coast Guard in September 2005.

Table 2: Fatalities and Rates in Recreational Boating, 1999-2003

Year	Number of Drownings	Percent Total Fatalities	Number of Registered Boats (mil)	Drownings per 100k Boats
1999	517	70.4%	12.7	4.1
2000	519	74.0%	12.8	4.1
2001	498	73.1%	12.9	3.9
2002	524	69.9%	12.9	4.1
2003	481	68.4%	12.8	3.8
2004	484	71.6%	12.8	3.8

Table 3: Most Frequent Accident Types in Recreational Boating in 2003

Type of Accident	Number of Accidents	Number of Injuries	Number of Fatalities	Number of Drownings
Collision with Vessel	1,469	1,063	70	9
Collision with Fixed Object	558	491	50	19
Capsizing	514	330	206	136
Falls Overboard	508	353	201	155
Skier Mishap	451	466	6	1
Swamping	274	61	41	36

The Safety Board's 1993 study of recreational boating accidents found similar results.<sup>3</sup> Of the fatalities reported in the study, 73 percent were due to drowning. A comparison of 1993 data to 2004 statistics shows that the adult PFD wear rate has not substantially increased in more than a decade, and that the proportion of deaths in recreational boating attributable to drowning has not declined. The results of a Coast Guard 6-year observational study completed in 2003 confirmed these findings, showing an increase in PFD wear by children and, to a lesser extent, their parents.<sup>4</sup> However, there was no observed change in general adult PFD wear, even in States with child wear requirements and mandatory boating safety courses. For instance, in 2003, less than 10 percent of the 28,982 boaters ages 18 and older, and not aboard personal watercraft (PWC), were observed wearing PFDs. The highest observed PFD wear was among boaters on PWCs (95 percent), sailboards (94 percent), and in kayaks (84 percent). Although the perceived risk of kayaking, sailboarding, and PWC use may influence those boaters to wear PFDs, the need for PFDs on small boats may not be so obvious to all boaters.

### Previous Safety Recommendations

The consistent pattern of drownings found in the 1993 study led the Safety Board at that time to issue recommendations in several areas relevant to PFD use. For example, Safety Recommendation M-93-1 to the States called for them to implement minimum recreational boating safety standards to reduce the number and severity of accidents and to consider requirements such as mandatory use of personal flotation devices for children, demonstration of operator knowledge of safe boating rules and skills, and operator licensing.

<sup>3</sup> National Transportation Safety Board, *Recreational Boating Safety*, Safety Study NTSB/SS-93/01 (Washington, DC: NTSB, 1993).

<sup>4</sup> T. Mangione, M. Rangel, and K. Watson, *National PFD Wear Rate Observational Study* (Boston: JSI Research & Training Institute, Inc., 2003).

Recommendations in the study were based, in part, on accident data showing that boaters involved in fatal boating accidents had not received any boating safety instruction. In fact, the study found that as few as 7 percent and no more than 22 percent of the persons operating a boat for the first time had taken a boating safety course. The Board also issued Safety Recommendations M-93-9 to the National Association of State Boating Law Administrators (NASBLA) and M-93-14 to the Coast Guard to develop guidelines to be used by the States to implement minimum safe boating standards, and to establish requirements for operators to demonstrate safe boating rules and skills.

NASBLA adopted resolutions and model acts that provided guidelines for vessel operator licensing and mandatory boating safety education, as well as PFD wear requirements for children 12 years of age and under. As a result, the Safety Board classified Safety Recommendation M-93-9 “Closed—Acceptable Action.” Coast Guard participation in the NASBLA activities and its work with the States led the Safety Board to classify Safety Recommendation M-93-14 as “Closed—Acceptable Action.”

With regard to mandatory PFD requirements for children, most States (45) have enacted mandatory PFD wear requirements for children since the Safety Board’s 1993 study. For 32 of those States and the District of Columbia, Safety Recommendation M-93-1 was classified “Closed—Acceptable Action” or “Closed—Acceptable Alternative Action.” However, at the time of the 1993 study, the Safety Board lacked the evidence it needed to support a specific age requirement for children. The Board therefore issued Safety Recommendations M-93-8 to NASBLA, M-93-12 to the Coast Guard, and M-93-16 to the American Academy of Pediatrics (AAP), all calling for a uniform standard establishing an age at or below which all children should be required by States to wear PFDs while in recreational boats. After a review of the data, a joint agreement was reached by the Coast Guard, NASBLA, and AAP to support, as a first step, a uniform national requirement all children under 13 years of age to wear a PFD. AAP stated that, ultimately, all persons on recreational boats, children as well as adults, should be required to wear PFDs. As a result of these efforts by NASBLA, the Coast Guard, and AAP, Safety Recommendations M-93-8, M-93-12, and M-93-16 were classified “Closed—Acceptable Action.” In 1998, during the Coast Guard’s consideration of Federal requirements for PFD use, the Board responded to the Coast Guard’s request for comments in Docket Number CGD 97-059 by stating its support of the need for uniform and mandatory PFD wear requirements for all children aged 12 and under. The Coast Guard also took steps to protect children on waters subject to United States jurisdiction<sup>5</sup> by requiring any child under 13 to wear a PFD while the boat is underway (unless the child is below decks or in an enclosed cabin).<sup>6</sup> In those States without a child PFD wear requirement, the Coast Guard’s under age 13 rule applied. The rule also provided for Coast Guard enforcement of each State statute or rule, even if the State age requirement did not meet the under age 13 requirement. The final rule was enacted in July 2004.

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<sup>5</sup> See Title 33 *Code of Federal Regulations* (CFR) Part 2.38 for definitions of the waters over which the United States has jurisdiction.

<sup>6</sup> Title 33 CFR Part 175, Subpart B, *Personal Flotation Devices*.

## PFD Requirements for Adults

Forum participants agreed that, with the exception of individuals using PWCs and kayaks, PFD wear among adult boaters remains low. When NASBLA put forth its 1988 resolution calling for mandatory PFD wear requirements for children, proponents believed that such a requirement would prompt more adults to wear PFDs.<sup>7</sup> Coast Guard observational data demonstrated that increased use among adults had not materialized; adult PFD use from 1999 through 2003 remained relatively constant at about 10 percent.<sup>8</sup> According to the Coast Guard's presentation at the public forum,<sup>9</sup> accident statistics indicate that the greatest risk appears to be for adults in small (that is, 21 feet or less in length), open motorboats. According to the Coast Guard's observational study, these are the boaters who are least likely to wear PFDs.

A representative from the Coast Guard's National Boating Safety Advisory Council (NBSAC) confirmed NBSAC's continuing support of its 2003 resolution calling for NASBLA to develop a model act that would require *all* boaters onboard recreational boats 21 feet or less in length to wear PFDs while underway.<sup>10</sup> When the organizers of the International Boating and Water Safety Summit in March 2005 surveyed attendees, they found that 65 percent of the 235 respondents agreed or strongly agreed with the statement that PFDs should be mandatory for those in boats under 22 feet in length.<sup>11</sup> Although BOAT/US survey data presented at the forum indicated considerable resistance to a general adult mandatory PFD wear requirement (86 percent of the respondents opposed such a requirement while underway in *all* boats), a majority (62 percent) supported an adult mandatory requirement for certain types of boats.<sup>12</sup>

Recreational boating accident data indicate that when mandatory requirements are put in place (as they have been for children and for all persons aboard PWCs), a significant increase in PFD wear—and the concomitant decrease in drowning—occurs. For example, before legislation was introduced requiring people aboard PWCs to wear PFDs, PWCs accounted for a disproportionate number of recreational boating deaths and injuries. By 2003, all States had enacted legislation requiring all operators of PWCs to wear PFDs. As a result, despite a more than 50 percent increase in the number of registered PWCs from 1997–2003, the number of injuries and deaths due to drowning and other causes declined (table 4). Further, the rates for drowning, other types of fatalities, and injuries in accidents per 100,000 registered PWCs in 2003 were less than half those of 1997. The Coast Guard's 1998–2002 observational study found that PFD wear among adults on PWCs was the highest among all boaters, ranging from 93 to

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<sup>7</sup> National Transportation Safety Board, *Recreational Boating Safety*, p. 39.

<sup>8</sup> Mangione, p. 5.

<sup>9</sup> U.S. Department of Homeland Security, U.S. Coast Guard presentation to the public forum, *Personal Flotation Devices in Recreational Boating* (August 25, 2004). See also U.S. Coast Guard, *Boating Statistics—2003*.

<sup>10</sup> Paper presented by the National Boating Safety Advisory Council to the public forum, *Personal Flotation Devices in Recreational Boating* (August 25, 2004), p. 7. The resolution was adopted by NBSAC at its 71<sup>st</sup> meeting on April 28 and 29, 2003, in Rosslyn, Virginia, which then issued the resolution to the U.S. Coast Guard. The resolution stated “Be it resolved that the National Boating Safety Advisory Council encourages NASBLA to develop a model act, requiring the wear of PFDs on all recreational vessels 21 feet and under while underway.”

<sup>11</sup> International Boating and Water Safety Summit, *Results of the Audience Survey* (March 14, 2005).

<sup>12</sup> E. Mahoney and others, *Boater Attitudes Regarding Requirements for Adults to Wear Life Jackets While Underway in Recreational Boats* (Lansing, Michigan: Michigan State University Recreational Marine Research Center, 2004).

97 percent. The Personal Watercraft Industry Association (PWIA) presentation at the forum showed how the PWC industry responded to the need to increase PFD wear and PWC safety through equipment design, marketing, and education.

Table 4: Personal Watercraft (PWC) Fatalities, Injuries, and Registrations, 1997-2003

Year	Total Fatalities	Number of Drownings	Number Injured	Registered PWCs (in 1000s)	Fatalities per 100k PWCs	Number of Drownings per 100k PWCs	Number Injured per 100k PWCs
1997	84	22	1822	481.6	17.4	4.6	378.3
1998	78	13	1743	414.2	18.8	3.1	420.8
1999	66	15	1614	400.8	16.5	3.7	402.7
2000	68	24	1518	543.2	12.5	4.4	279.5
2001	50	11	1424	753.1	6.6	1.5	189.1
2002	71	21	1362	743.6	9.5	2.8	183.2
2003	57	15	1228	744.5	7.7	2.0	164.9

The Canadian Safe Boating Council (CSBC) commissioned a study to examine the feasibility of legislating mandatory PFD wear for all people in small recreational boats in Canada.<sup>13</sup> The study concluded that a mandatory PFD requirement was appropriate, and CSBC is now working on a strategy to legislate mandatory PFD wear requirements in Canada. The Safety Board believes that developing a legislative strategy in support of mandatory PFD wear is appropriate, and that the PWC experience shows how the States and the recreational boating industry can increase PFD use, integrate PFD technology into recreational boating, and properly educate and certify operators. Fundamental to the evaluation of any boating safety program are good data about boaters, boats, and boating activities. Without such data, the effectiveness of boating safety programs, or any action taken to reduce the risks in recreational boating, can be difficult to determine.

A case in point is the Coast Guard frequency data for 2003,<sup>14</sup> which indicated that most drownings were associated with motorboats 21 feet or less in length. An analysis of this finding would show that most recreational boats fall into this category. Reliance on frequency data can also hinder evaluation of the effectiveness of specific risk mitigation actions. For example, if the number of drownings decreases after institution of a mandatory PFD requirement for small boats, frequency data alone would not show if the decrease had been caused by the newly instituted PFD requirement or by a decrease in recreational boating activity in small boats. Without

<sup>13</sup> Paper presented by the Canadian Safe Boating Council to the public forum, *Personal Flotation Devices in Recreational Boating* (August 25, 2004).

<sup>14</sup> U.S. Department of Homeland Security, U.S. Coast Guard, *Boating Statistics-2003*, COMDTPUB P16754.17 (Washington, DC: 2004), page 4.

calculating accident and injury rates based on boater, fleet, or activity characteristics, verification of the effectiveness of an intervention strategy, such as requiring boaters to wear PFDs, is difficult.

## Evaluating Recreational Boating Safety Programs

The Coast Guard uses boating accident reports and frequency data to assess the risks associated with recreational boating activity and to guide its Recreational Boating Safety Program. A risk-based approach that uses only frequency data, however, cannot adequately characterize the risks of a hazard or effectively evaluate risk mitigation strategies. As a result, the Safety Board is concerned that the Coast Guard's risk-based approach to recreational boating is not consistent with standard practice in system safety.<sup>15</sup> Such a program needs four basic elements: hazard identification, risk assessment, a plan for mitigating risks, and methods for evaluating the effectiveness of mitigation actions. Risk assessment is dependent upon a clear understanding of participants' exposure to hazards in recreational boating, which is obtained through the collection of data about the number of participants, the size and composition of the recreational boating fleet, and the frequency and duration of boating activities. These data can then be used in risk assessments to quantify exposure to risk. Without such data, the Coast Guard and the States cannot ensure that their recreational boating safety programs and intervention strategies are effective.

This point can be illustrated further by considering two very similar boating activities: canoeing and kayaking. American Canoe Association (ACA) fatality statistics for 2002 showed that more canoeists (39) were fatally injured in accidents than kayakers (28).<sup>16</sup> However, the U.S. Department of Agriculture Forest Service's *National Survey of Recreation and the Environment* (NSRE)<sup>17</sup> showed a different picture. When NSRE estimates of the number of participants in each type of activity were used to calculate exposure measures, kayakers appeared to be much more at risk than canoeists. NSRE 2002 estimates showed that kayakers suffered 3.5 fatalities per million participants while the fatality rate among canoeists was almost half that, or 1.9 fatalities per million participants.

Accident and injury data for canoeists and kayakers also illustrate the need for different risk mitigation actions. The Coast Guard observational study conducted from 1998–2002 found that, in general, more than 84 percent of kayakers wore PFDs, in contrast to only 27 percent of canoeists. These data implied that a requirement to wear PFDs would affect kayakers less than canoeists. In addition, the high rate of PFD wear among kayakers indicated that factors other than PFD use affect the outcome in such accidents. However, Coast Guard data showed that 48 percent of the kayakers who were fatally injured from 1996–2002 were not wearing PFDs,<sup>18</sup> indicating that the kayakers observed during the Coast Guard study may not have been

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<sup>15</sup> For example, U.S. Department of Defense MIL-STD-882D, *Standard Practice for System Safety* (2000).

<sup>16</sup> A. Snow-Jones and others, *Critical Judgment II: Understanding and Preventing Canoe and Kayak Fatalities, 1996–2002* (Springfield, VA: American Canoe Association, 2004), page 16.

<sup>17</sup> U.S. Department of Agriculture, Forest Service *National Survey of Recreation and the Environment* (NSRE) (Washington, DC: 2004).

<sup>18</sup> Snow-Jones, *Critical Judgment II*, page 19.

representative of the kayakers involved in fatal accidents. Such discrepancies suggest that surveys and observational studies must be carefully designed to ensure that the data collected are representative of the participants most at risk.

### **Measuring Participation, Activity, and Exposure**

Although some measures of participation, activity, and exposure are available for recreational boating, using those measures to make risk-based decisions can be difficult for a number of reasons. First, documenting the number of recreational boats in the fleet and how they are used is difficult. The Coast Guard calculates accident and fatality rates based on the number of registered boats. Unfortunately, boat registration requirements differ considerably among States. Some, like Ohio and South Carolina, require registration of all watercraft; others, like Vermont and Maryland, limit registration to motorboats only. The Safety Board therefore concludes that accident or injury rates based on boat registration data may not adequately represent the size, composition, and use of the recreational boating fleet for risk assessment purposes and that a more uniform system for collecting data about the fleet is required.

Second, surveys and studies vary widely in their characterization of recreational boating participation and activity. NSRE, the most frequently cited survey for recreational boating participation, is a general survey of participation in recreational activities, including recreational boating, and represents a cross-section of the United States population over 16 years of age. Based on a survey of 57,868 people, NSRE estimated that in 2002, 77.1 million people (36.2 percent of the U.S. population age 16 or older) participated in recreational boating at least once in the previous 12 months.<sup>19</sup> NSRE found that motorboating (51.8 million), floating/rafting (20.7 million), canoeing (20.5 million), and PWC use (20.3 million) topped the list of recreational boating activities.

The Coast Guard also surveyed recreational boating for the 12 months beginning in September 2001.<sup>20</sup> Unlike NSRE, which used a cross-section of the general U.S. population, the Coast Guard survey targeted boating operators. The 25,547 boat operators surveyed in 2001 by questionnaire (approximately 500 from each State) were divided equally between operators of registered and non-registered boats. Estimates of participation were calculated using data weighted to reflect the population of each State. The Coast Guard estimated that 209 million people made 59.2 million boating trips, mostly in motorboats (59 percent), followed by canoes (30 percent) and personal watercraft (24 percent).

Difficulties arise when estimates of participation and activity from the two surveys are compared. NSRE estimated the total number of boating participants for 2002 to be only 77.1 million while the Coast Guard estimated that number at 209 million. Adjusting the Coast Guard estimate for frequency of activity (boat operators who took a boat out one or more times a year were counted as a participant with each trip) produces a measure of participation more like the NSRE estimate.

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<sup>19</sup> See <[www.srs.fs.usda.gov/trends/Nsre/Rnd1t13weightrpt.pdf](http://www.srs.fs.usda.gov/trends/Nsre/Rnd1t13weightrpt.pdf)> for the *National Survey of Recreation and the Environment*, Table 1.

<sup>20</sup> Strategic Research Group, *2002 National Recreational Boating Survey Report* (Columbus, OH: 2003).



Finally, and perhaps most significantly, is that the NSRE and Coast Guard surveys do not obtain consistent estimates for specific boating activities. This problem is illustrated in table 5, which shows a significantly different proportion of boating participants by boat type for each survey. Such discrepancies undermine the validity of participation and activity measures, and, if used to calculate accident, injury, and fatality rates, can produce significantly different risk exposure rates.

Table 5. Proportion of Boaters for Each Type of Boat

<b>Type of Boat</b>	<b>NSRE</b>	<b>Coast Guard Survey</b>
<b>Sailboat (includes auxiliary)</b>	9.2%	5.2%
<b>Kayak</b>	17.0%	6.3%
<b>Canoe</b>	6.5%	14.6%
<b>Rowboat</b>	7.6%	6.8%
<b>Motorboat (includes open, cabin, pontoon, houseboat)</b>	42.9%	48.1%
<b>Personal watercraft (PWC)</b>	16.8%	10.2%

In addition, the methods used to select the type of boats, boaters, or boating activity for inclusion in a survey or study can significantly affect the outcome. For example, the Coast Guard observational study<sup>21</sup> showed a high rate of PFD use among kayakers, but Coast Guard accident statistics indicated that a large proportion of people fatally injured in kayaks were not wearing PFDs. Such results cast doubt on the boater selection methods used in observational studies and on the merits of applying the data to all types of boaters, boating locations, and boating activities.

In contrast to these findings, other Federal agencies have successfully collected participant and activity data that can be used with confidence in an analysis. The U.S. Fish and Wildlife Service has produced the *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* every 5 years since 1955. The survey is conducted by the U.S. Census Bureau and is based on census data. The survey provides State-level estimates of participation and collects activity data on the number of participants, the type of activity they engage in, where and how often they participate, the type of wildlife they encounter, and the amounts of money they spend on these activities. The latest survey, conducted in 2000–2001, involved 52,508 households located in 754 geographic areas and was administered in two parts: an initial screening of 80,000 candidate households and a series of follow-up interviews.<sup>22</sup> The survey uses a design and methodology that allows, to the extent possible, compatibility with previous surveys and estimates at both the State and national levels.

<sup>21</sup> Mangione, *National PFD Wear Rate Observational Study*, page 16.

<sup>22</sup> U.S. Department of Interior, U.S. Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau, *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, Appendix D, D-2 (Washington, DC: 2002).

A comparison of participation in similar recreational activities based on NSRE and the Fish and Wildlife survey is shown in table 6. In most cases, NSRE estimates of participation are two to three times greater than the Fish and Wildlife survey for comparable activities. Consequently, the Fish and Wildlife survey will produce more conservative accident, injury, or fatality rates and a potentially higher estimate of the risks involved in recreational boating. Such discrepancies among surveys not only raise questions about the validity of methods currently being used to assess recreational boating participation, but also illustrate the potential to underestimate actual risk, which complicates any attempt to evaluate intervention strategies.

Table 6. Estimates of Number of People (in Millions) Participating in Comparable Recreational Activities

<b>Type of Recreational Activity</b>	<b>NSRE</b>	<b>Fish &amp; Wildlife</b>
<b>Fishing</b>	72.2	34.1
Freshwater	62.0	28.4
Saltwater	22.2	9.1
<b>Hunting</b>	23.7	13.0
Big Game	17.9	10.9
Small Game	15.1	5.4
Waterfowl/Migratory Bird	4.9	3.0
<b>Wildlife Viewing/Bird Watching</b>	161.7	85.5

### **A Risk-Based Approach to Recreational Boating Safety**

The Safety Board believes that a risk-based approach is an appropriate strategy for reducing risks and enhancing safety in recreational boating, and that the Coast Guard's Recreational Boating Safety Program will help define performance measures that can be used to evaluate the effectiveness of program activities. Nevertheless, the Board is concerned that current Coast Guard data are not adequate to effectively identify, characterize, and eliminate or control hazards as part of an overall risk assessment and mitigation program. Without effective data collection methods, the Coast Guard's boating safety program cannot adequately determine the risks in boating nor determine how best to effectively reduce the number of accidents, fatalities, injuries, property damage, and healthcare costs associated with boating accidents. Furthermore, without an adequate risk assessment and mitigation program, the Board is concerned that the Coast Guard cannot adequately evaluate the potential benefits of mandatory and voluntary PFD wear programs for recreational boats. The Safety Board also believes that the Coast Guard's boating safety program would be most effective if States could use Coast Guard data to evaluate their own recreational boating safety activities.

Accordingly, the Safety Board concludes that an effective risk assessment program will help the Coast Guard identify intervention strategies that will reduce the number of accidents,

injuries, and fatalities in recreational boating. Effective assessment of risk mitigation strategies in recreational boating must be based on demonstrable reductions in measures that characterize the risks as a function of boater, boating, and boat characteristics. As previously mentioned, a more uniform system for collecting accurate data on the size, composition, and use of the recreational boating fleet is required.

The Safety Board also concludes that a risk assessment program will require development of new survey and research methods, at both the national and State levels, to collect, analyze, and disseminate data and information on recreational boating participation and activity. Established approaches that produce reliable and valid data (similar to the survey techniques used by the Fish and Wildlife Service) can be used as models for developing survey and research methods for collecting data to characterize boaters and boating activities. Such survey and research methods can also provide the basis for longitudinal studies of educational and licensing programs, identification of best practices at the State level, and ongoing observational studies of recreational boating activity and boater behavior. Therefore, the Safety Board recommends that the U.S. Coast Guard develop measures of recreational boating activities, boaters, and boats that can be used to identify and evaluate the risks in recreational boating. Once those measures have been developed, collect the appropriate data at the Federal and State levels, and use it to evaluate the effectiveness of recreational boating safety programs. Provide the data and the results of the evaluations to States for use in their own boating safety programs.

Many participants at the forum believed that PFD use could be increased through better boating safety education. As stated above, the Safety Board has issued several safety recommendations addressing the need for improved boating safety education, including M-93-1 to the States, M-93-9 to NASBLA, and M-93-14 to the Coast Guard. Since 1993, 32 States and the District of Columbia have enacted mandatory boating education statutes and regulations (in addition to PWC-specific requirements) that address some segment of the adult recreational boating population. Despite these efforts, 77 percent of the recreational boaters involved in fatal accidents in 2003 had not received any boating safety instruction,<sup>23</sup> and 18 States still have no education requirement.<sup>24</sup> As a result, the Board believes that the kinds of boating education and operator licensing requirements advocated in the 1993 recommendations are essential and if implemented by the States, would improve boating safety, decrease recreational boating accidents and injuries, and increase PFD use.

The Safety Board is concerned, however, that records of boater educational experience are inadequate. Such a record is necessary to assess the effectiveness of current education programs. In addition, the best practices and lessons learned from States that have introduced mandatory boating safety education need to be made available to other States and the Coast Guard for consideration. The lessons learned by the few States that have adopted operator licensing requirements (such as Connecticut, Maryland, and Alabama) also need to be made available for consideration. The Safety Board believes that the absence of such data limits the Coast Guard in its ability to plan, coordinate, and evaluate recreational boating education and licensing programs at both the Federal and State levels. Therefore, the Board recommends that

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<sup>23</sup> U.S. Coast Guard, *Boating Statistics—2003*, p. 19.

<sup>24</sup> Alaska, Arizona, California, Idaho, Indiana, Iowa, Maine, Massachusetts, Minnesota, Montana, New Mexico, North Carolina, Oklahoma, South Carolina, Utah, Virginia, Wisconsin, and Wyoming.

the Coast Guard ensure that the measures of recreational boater characteristics include documentation of boater educational experience that can be used at both the Federal and State levels to plan, coordinate, and evaluate recreational boating education and licensing programs.

### **Recommendations**

Therefore, the National Transportation Safety Board recommends that the U.S. Coast Guard:

Develop measures of recreational boating activities, boaters, and boats that can be used to identify and evaluate the risks in recreational boating. Once those measures have been developed, collect the appropriate data at the Federal and State levels, and use it to evaluate the effectiveness of recreational boating safety programs. Provide the data and the results of the evaluations to States for use in their own boating safety programs. (M-06-1)

Ensure that the measures of recreational boater characteristics include documentation of boater educational experience that can be used at both the Federal and State levels to plan, coordinate, and evaluate recreational boating education and licensing programs. (M-06-2)

The Safety Board is also issuing one safety recommendation to the National Association of State Boating Law Administrators and one recommendation to the Marine Retailers Association of America and the National Marine Manufacturers Association. In your response to the recommendations in this letter, please refer to Safety Recommendations M-06-1 and M-06-2. If you need additional information, you may call (202) 314-6170.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS, HERSMAN, and HIGGINS concurred in this recommendation.

*[Original Signed ]*

By: Mark V. Rosenker  
Acting Chairman