



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 25, 1998

In reply refer to: M-98-92

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Personal watercraft (PWC) are a type of recreational boat that has become increasingly popular in recent years. Manufacturers estimate that about 200,000 PWC are sold each year, and more than 1 million are in current operation. PWC now account for more than one-third of the new recreational boat sales in the United States.

Although the overall number of recreational boating fatalities has been declining in recent years, the number of personal watercraft-related fatalities has been increasing. At the time of the National Transportation Safety Board's 1993 recreational boating safety study, there were only 26 personal watercraft fatalities a year, and the Safety Board did not believe that separate consideration of PWC was warranted. However, in 1994, the number of PWC fatalities began to increase noticeably because the number of PWC in operation increased. Preliminary numbers for 1997 indicate 83 PWC fatalities. PWC are the only type of recreational vessel for which the leading cause of fatalities is not drowning; in PWC fatalities, more persons die from blunt force trauma than from drowning. The increase in fatalities and the distinctive way in which fatalities occur prompted the Safety Board to examine the nature of PWC accidents.

The Safety Board initiated a study to more closely examine fatalities and injury in addition to accident characteristics associated with PWC accidents.¹ The study was not designed to estimate how often PWC accidents occur. The Safety Board examined 1,739 PWC accident reports for accidents that occurred during an 18-month period, January 1996 through June 1997. For PWC accidents that occurred between January and June 1997, the Safety Board requested that State marine accident investigators provide the Safety Board with copies of their accident reports and complete a supplemental questionnaire prepared by the Safety Board specifically for this study. The goal of the supplemental questionnaire was to obtain additional information

¹ National Transportation Safety Board. 1998. Personal Watercraft Safety Study NTSB/SS-98/01. Washington, DC.

concerning the accident characteristics and details concerning personal injury that have not previously been available from State boating accident reports. State accident reports and supplemental information were the sources of the Safety Board's accident information

For the January–June 1997 period, the Safety Board received boating accident reports and questionnaire responses from 37 participating States and Territories. Boating accident reports were not always accompanied by supplemental questionnaires. Also, because of concerns over personal privacy issues, five States² did not provide the Safety Board with copies of their boating accident reports but did provide supplemental questionnaires. Consequently, the boating accident reports and the supplemental questionnaires represent two different but substantially overlapping sets of data, which contain information on a total of 814 PWC accidents involving 1,218 operators.

The Safety Board also reviewed State reports of PWC accidents that occurred in 1996. A total of 49 States and Territories provided either copies of their boating accident report forms, automated boating accident report database files, or summary information for 1996 and/or 1997.

Because the States voluntarily provided the Safety Board with accident reports and supplemental questionnaire information, and because of the incomplete nature of much of the information, the Safety Board does not claim that the results of the study are representative of all PWC accidents. The Safety Board analyzed 814 (one-third) of the 1997 reported accidents, and examined all of the data for the 1996 reported accidents. Consequently, the Board believes that a substantial number of accidents was available to identify the most important safety issues associated with PWC accidents. Further, the Safety Board's analysis did not show any biases in the types of accidents in the half-year of 1997 accidents compared to the full year of 1996 accidents. The Safety Board's interest in truncating the data collection period to 6 months was based on a goal of providing the results of this study prior to the 1998 summer boating season.

Based on the analysis of the data reviewed, the safety issues discussed in the Safety Board's report include the following: protecting personal watercraft riders from injury, operator experience and training, and boating safety standards. The study also addresses the need for recreational boating exposure data. The discussion in this letter is limited to operator experience and training.

Operator Experience and Training

Each year, many first-time PWC operators are exposed to the boating environment. In the Safety Board's 1997 sample of PWC accidents, nearly half (48 percent) of the operators of rented PWC had operated a PWC only once or never; 18 percent of the operators of privately owned PWC had previously operated a PWC only once or never. This lack of experience is particularly important for PWC because the vessels have special operating characteristics, such as the loss of

² California, Delaware, Nevada, Washington, and the Territory of Puerto Rico.

control during off-throttle steering and cut-off ("kill") switches activated by the use of safety lanyards to stop the vessel if the operator is ejected, that underscore the need for training.

Operating a PWC requires a high degree of vigilance. Several PWC models can exceed 60 mph, but even at a speed of 40 mph, a PWC travels about 20 yards per second. As speeds increase, the time available to react decreases. PWC are highly maneuverable vessels that can change course quickly while under power, which presents a particular problem when several PWC are traveling together.³ The timeframe for perceptually tracking another PWC can also be quite limited under these conditions. Operators of two PWC traveling at 40 mph on a head-on course will have a response time of 1.3 seconds to travel 50 yards. Even when the vessels are converging on a 45-degree angle, the response time is less than 2 seconds.⁴ The response time must accommodate perceiving the other vessel, deciding which vessel is burdened to comply with rules of the road, determining the risk of collision, and executing a response to alter course. Under these conditions, inexperienced operators who are not aware of navigation rules⁵ that dictate which vessels have the right of way and, therefore, what direction of turn can be expected for vessels on conflicting routes, are faced with split-second decisions.

The Safety Board's analysis of the 1997 State boating accident reports showed that 87 percent of the PWC operators had received no boating instruction.⁶ The NTSB supplemental questionnaire submitted by the States indicated a similar proportion: 84 percent had completed no type of boating instruction.⁷ The need for boating instruction was addressed in the Safety Board's 1993 safety study of recreational boating; 81 percent of the operators involved in fatal accidents in that study had received no boating safety instruction.⁸ A review of 1996 Coast Guard boating statistics also illustrates that recreational boaters have a low exposure to safety education. Of the 709 recreational boating fatalities, educational experience was known for 340: 50 (15 percent) had received operator education, and 290 (85 percent) were known not to have received operator education. Data for 1991 through 1996 reflect similar proportions regarding the fatally injured operators who had received boating safety education.

³ State boating law administrators agree that PWC operations often involve riding close to other PWC

⁴ 40 mph = 19.5 yd/sec. On a direct course, each vessel traverses 25 yards; on a converging course, each vessel travels 35.35 yards before intersecting.

⁵ PWC are subject to inland navigation rules as stated in USCG COMDTINST M16672 2B, dated August 17, 1990.

⁶ Training information was reported for 471 of the 1,218 PWC operators: 413 had none, and 58 had completed State courses, Coast Guard Auxiliary training, Power Squadron training, Red Cross training, or other (military) training. The duration of the reported training or quality of the course content may have varied.

⁷ Responses to a boater education question that was included on the supplemental questionnaire were reported for 712 of the 1,218 operators: of those responding, 600 (84 percent) had no training.

⁸ National Transportation Safety Board 1993. Recreational boating safety. Safety Study NTSB/SS-93/01. Washington, DC. 104 p. The Safety Board's experience indicates that boating accidents involving a fatality are more likely to be reported than those involving less serious injury. Fatal accidents are also better documented. The Board used fatal accidents to illustrate the proportion of operators who had received boating education because it had greater confidence in the boating education data from that subset than from all accidents.

Although no State or Territory requires a special boating license to operate a PWC, 16 jurisdictions have special boating education requirements to operate a PWC.⁹ Effective June 23, 1993, PWC operators in Connecticut were required to take a safe handling course to obtain a certificate for PWC operation; there are no exceptions. Mandatory education requirements include 10 hours of basic boating safety and an additional 2.5 hours of instruction concentrating on PWC safety. Even though there has been a substantial increase in the number of PWC operations, there have been no fatalities attributable to PWC operations in Connecticut in the past 10 years. The boating law administrator for Connecticut indicates that accidents and injuries have decreased over the last 5 years. Training is typically offered by the States' marine safety officers. Michigan's marine education program¹⁰ certified 50,554 students in classroom courses in 1996.¹¹ That State also conducts a PWC education/enforcement program that began in 1995; it involves 30 marine officers assigned to PWC patrol who review regulations, discuss safety, and give equipment demonstrations. Even with a growth in PWC operations, that State has seen a decrease in both PWC accidents and fatalities; PWC accidents in Michigan accounted for 45 percent of all boating accidents in 1995 and dropped to 41 percent in 1996.

On October 23, 1997, the Coast Guard issued a notice in the Federal Register requesting comments on a proposed Federal requirement for education in recreational boating. On March 20, 1998, the Coast Guard extended the comment period until May 29, 1998.¹² The Safety Board submitted comments supporting the need for operator education and training for recreational boaters and PWC operators, and reiterating the conclusions and recommendations of its 1993 study on recreational boating safety. The Board's comments noted that the lack of education reported for the PWC operators in the current study provides further support for the need for education of recreational boat and PWC operators.

The National Association of State Boating Law Administrators (NASBLA), BOAT/U.S., the U.S. Coast Guard Auxiliary, the U.S. Power Squadrons, the National Safe Boating Council, and the National Water Safety Congress support recreational boating education. NASBLA's Education Committee has a review process designed to standardize training information by approving boating safety curriculums. NASBLA has also developed a model PWC boating course. This course outline may be used by the individual States to pattern the courses they develop, and it serves as a guide to educational organizations that work within the local communities to provide training. In addition to NASBLA's education efforts, the Personal Watercraft Industry Association (PWIA) has also been developing model PWC education

⁹ The following States and Territories require PWC education: Colorado, Connecticut, Delaware, Georgia, Idaho, Kansas, Massachusetts, Minnesota, Nevada, Rhode Island, Tennessee, Texas, Utah, Wisconsin, U.S. Virgin Islands, and American Samoa. Nevada requires PWC education only of PWC operators who rent the vessel. (National Association of State Boating Law Administrators, 1997. Reference guide to State boating laws. 3d ed. Lexington, KY (p. 21). 182 p., plus appendixes.)

¹⁰ Michigan's course is only 1 hour long; most States require 6 to 8 hours of classroom instruction.

¹¹ *Small Craft Advisory*, Dec. 1997/Jan. 1998. Lexington, KY: National Association of State Boating Law Administrators; 13(2): 20.

¹² Federal Register, Vol. 63, No. 54, dated March 20, 1998, page 13585.

requirements. PWIA advocates mandatory education for PWC operators and has mandatory education as an element of its model legislation.

PWC manufacturers provide safety information in printed and video formats with every PWC sold, and dealers are asked to review these safety techniques with customers. The PWIA has also developed classroom material used in several State safety education courses. One manufacturer recently introduced a PWC training program that requires dealers to deliver a boating safety presentation (video and law review) to all purchasers of new PWC.¹³ The product cannot be warranty-registered until the customer receives the information. The Safety Board commends industry efforts to provide PWC owners with point-of-purchase education and training. However, this point-of-purchase information may not reach relatives and friends of the PWC owner who may use the vessel. In its 1993 study on recreational boating, the Safety Board recommended that each State

Implement minimum recreational boating safety standards to reduce the number and severity of accidents; 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 (M-93-1)¹⁴

Although some progress has been made in responding to the Safety Board's recommendation, as shown by the 4 States that now require boater certification and the 20 that mandate boating education, the Safety Board continues to believe that if more recreational boaters were trained, the number of persons killed and injured in recreational boating accidents, including those involving PWC, would be reduced. Therefore, the Safety Board is reiterating Safety Recommendation M-93-1 in the report of its PWC study. Because two-thirds of PWC owners also owned a powerboat prior to purchasing a PWC,¹⁵ it is reasonable to believe that powerboat operators taking a recreational boating education course may someday be PWC owners or operators. To reach the maximum number of persons who may operate a privately owned PWC, recreational boating education courses should provide some level of PWC training. This is not to say that all boaters should take a PWC course, but rather that all recreational boating courses should address PWC safety issues. Therefore, the Safety Board believes that the Coast Guard Auxiliary, the States, BOAT/US, the U.S. Power Squadrons, and NASBLA should include information on the safe operation of PWC in all recreational boating courses.

¹³ Polaris Industries, Inc.

¹⁴ Safety Recommendation M-93-1 has been classified "Closed—Acceptable Action" for 7 States, "Open—Acceptable Response" for 28 States, "Open—Response Received" for 4 States, "Open—Awaiting Response" for 9 States, and "Closed—Unacceptable Action" for 4 States.

¹⁵ Bowe Marketing Research 1996 PWIA owner usage, attitude, and demographic research. Survey of PWC owners commissioned by the PWIA and presented at the PWIA Board of Directors meeting July 23, 1996.

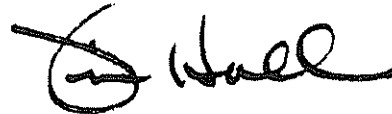
Therefore, the National Transportation Safety Board recommends that the U.S. Coast Guard Auxiliary:

Include information on the safe operation of personal watercraft in all recreational boating courses (M-98-92)

Also as a result of this study, the Safety Board issued safety recommendations to the manufacturers of personal watercraft (Kawasaki, Yamaha, Polaris, Bombardier, and Arctic Cat, Inc./Tiger Shark), the U.S. Coast Guard, the National Association of State Boating Law Administrators, the U.S. Power Squadrons, BOAT/U.S., the Personal Watercraft Industry Association, and the Governors of the States and Territories.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation M-98-92 in your reply.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation

A handwritten signature in black ink, appearing to read "J. Hall", written in a cursive style.

By: Jim Hall
Chairman