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Affiliation: Canadian Safe Boating Council

Submitted By: Barbara Byers, Chair
Canadian Safe Boating Council
322 Consumers Road
Toronto, ON M2J1P8
Canada

WILL IT FLOAT?

A BACKGROUND RESEARCH PAPER PREPARED FOR THE CANADIAN SAFE BOATING COUNCIL (CSBC)

In 2002, the Canadian Safe Boating Council struck a Lifejacket/Personal Flotation Device (PFD) Taskforce to examine the advisability of advocating for legislation concerning mandatory PFD use for recreational boaters in small craft. In October 2002, the taskforce contracted with SMARTRISK, a national injury prevention organization, to develop a background research paper summarizing the best available evidence pertaining to mandatory lifejacket/PFD use. This background research paper would then be used to inform a position paper on the topic of mandatory PFD wear legislation by the taskforce. Several lines of evidence were considered in order to examine the case for mandatory wear of lifejackets/PFDs for boaters in vessels under 6m while the vessel is underway.

The current background research paper examines the following issues:

- First, it must be determined whether there is a problem that needs to be addressed.
- Second, that mandatory PFD use is likely to address this problem.
- Third, that it is possible to successfully work toward such a regulatory solution.
- And finally, that there is evidence that such legislation could be successfully implemented.

Accordingly, the initial proposal was for four blocks of research.

Research Blocks

Block One

First, there was a need to collect and analyze the general data pertaining to the magnitude of the problem. Incidence rates of drowning related to boating and PFD use were collected and compiled from a number of sources. A brief examination of the social and human costs of boating fatalities was made. Finally, the economic burden associated with these events was modeled using methods previously applied at SMARTRISK to all classes of injury in the country.

Block Two

There was a need for a series of systematic literature reviews to establish the current evidence base for a mandatory wear law. The literature on PFD use and efficacy in preventing drowning has been summarized. Any literature pertaining to the efficacy of legislative measures to mandate PFD use in jurisdictions where this has occurred were examined, in the context of other potential interventions to promote PFD use, and other legislative efforts to mandate the use of injury prevention gear. In addition, a survey was conducted of various legislative jurisdictions that have considered similar legislation in order to determine what barriers and opportunities they encountered in their processes. Finally, an examination was made of parallel cases of legislative intervention to prevent injuries in Canada and elsewhere, specifically the cases of mandatory seatbelt legislation, and mandatory bicycle helmet legislation.

Block Three

The legislative and policy context for any proposed new regulation must be considered. A summary of current statutes and case law pertaining to personal liability of boat owners for drowning incidents involving their craft, whether the owner is present or not, has been made. In addition, key informant interviews were conducted with policy makers, researchers, drowning prevention advocates and other associated stakeholders, to ascertain the likely opportunities and barriers to successfully advocating for legislation on this matter. In addition, our international environmental scan and survey discussed in Block Two, provided insights into these issues in various U.S. states and abroad.

Block Four

Finally, the fourth block of research focused on public attitudes towards drowning prevention, PFD use, and mandatory wear regulation. A literature review was followed by a public opinion poll to determine the ripeness of the issue and societal will to accept new legislation on this matter.

Methodologies

Following are the specific methodologies employed in addressing the research questions in each of the above blocks.

Blocks 2 & 3: International/U.S. surveys

Several methods were used to gather input from a wide range of international experts on drowning and PFD legislation. The primary method of data collection was an online survey, which was completed by 45 respondents around the world. As well, a number of people contacted to participate in the international survey were unable to complete the survey online, but offered comments either by e-mail or in a semi-structured telephone interview. The information collected from these sources was supplemented with various searches using the Internet and PubMed (an online database of MEDLINE journal articles).

Blocks 2 & 3: Key Informant Interviews with Canadian Stakeholders

To inform the planning and development of a putative program to work toward PFD legislation, 12 semi-structured interviews were conducted with a variety of Canadian informants such as researchers, policy makers, drowning prevention advocates, recreational organizations, and law enforcement.

Block 3: Legal Issues

In order to understand the legal context for any potential legislative solutions to address recreational boating drownings in Canada, a memorandum was developed that summarizes the legal issues pertaining to personal liability of the owner of a small craft in the event of drowning during the operation of his craft. Canadian superior courts' decisions and relevant statutory provisions on the issue were examined.

Block 4: Public Opinion Poll

In order to poll the Canadian public regarding their opinions on the notion of legislation requiring recreational boaters in small watercraft to wear a PFD while on the water, telephone interviews were conducted with 1,000 Canadians.

CONCLUSIONS AND RECOMMENDATIONS

General Conclusions

The initial purpose of this research project was to develop a background research paper articulating more fully the issues surrounding mandatory PFD wear legislation for recreational boaters in small craft in Canada. The results of the four blocks of research conducted are somewhat complex and this in turn speaks to the complexity of the issues involved in seeking change in public policy. Four general conclusions due arise from the research:

1. **Boating related drownings warrant action**
2. **PFD wear is the risk factor to address to prevent these drownings**
3. **Mandatory wear legislation is the intervention to employ to increase PFD wear**
4. **Such legislation should be feasible in Canada**

Boating Related Drownings Warrant Action

Data from 1991 to 1999 indicate that an average of 140 recreational boaters drown every year in Canada. Boating related drownings resulted in 2,767 potential years of life were lost to Canadians in 1999. The true magnitude of the problem may be greater still. It has been estimated, that up to 43% of drownings are misclassified.

In comparison to the rest of the developed world, Canada's drowning rates are nearly twice as high as those in the United States, approximately four times higher than in Scotland, seven times higher than in England, and 12 times higher than those in France, although it must be remembered that Canada has the highest boat ownership rates for those countries. Future research relating drowning to hours of boating exposure in Canada is thus warranted.

The burden of these drowning fatalities is far from insignificant. The present study calculated indirect costs associated with boating drownings at over $30 million a year. This estimate is based on only the two thirds of the drowning deaths for 1999 for which accurate e-codes could be obtained and thus is a significant underestimate of the true burden. In addition, other costs such as search and rescue would also need to figure into an overall measure of economic burden. Thus the final economic burden must be quite high indeed. One study estimating the total to be about $80 million per year.

PFD wear is the risk factor to address

Numerous risk factors for drowning have been identified in the literature: however many of these, such as age and gender, aboriginal heritage, weather and water temperature are not amenable to direct intervention. Potential points of intervention in boating behaviour which could impact drowning rates include increasing swimming ability, decreasing alcohol consumption, decreasing reckless behaviour and increasing the use of floatation devices.

An examination of Canadian recreational boating fatalities in 1999 shows that only 14% of those who drowned were identified as non-swimmers or weak swimmers. There is considerable evidence that even those who are good swimmers can experience great difficulty in cold water, so swimming ability in warm water is not necessarily a good indicator of survival in cold water. In 1999, only 1% of all recreational boating drownings, In Canada, took place in warm water above 20°C. Thus increasing swimming ability does not hold much promise for preventing the majority of boating related drownings.

Alcohol was detected in 32% of all drowning victims (23% were above the legal limit) and was suspected in another 7% of recreational boating drowning deaths in 1999. It is

estimated that a boat operator with a blood alcohol concentration above .10 is more than 10 times as likely to be killed in a boating incident than boat operators with zero blood alcohol concentration. Alcohol consumption impairs judgment, the ability to focus and process information, as well as reaction time. At the same time, peripheral vision, night vision and depth perception deteriorate after consuming alcohol. It is clear that an intervention aimed at reducing alcohol consumption has the potential to save lives, however, only in the minority of cases.

Reckless behaviour is involved in some drowning incidents. The boat was overloaded in 10% of all drowning incidents, someone stood in the boat in 8% of all drownings, the boat operator made an abrupt turn that may have contributed to 6% of the deaths, the boat itself was unsafe in 6% of all cases, and the boat was speeding prior to 2% of all drowning incidents in 1999. Limiting such reckless behaviour would doubtless save lives, however, as can be seen in the majority of cases there has been no evidence found of reckless behaviour.

PFD wear is known to be quite low among those who have drowned. In the United States, the proportion of drowning victims found not wearing a PFD was 85% in 1991 and 84% in 2001. Similar data from Canada in 1999 show that 89% of boaters who drowned were not wearing a life jacket or PFD, and this ratio has been quite consistent throughout the past ten years of surveillance. Thus of the ready points of leverage for drowning prevention, increasing PFD wear has the greatest potential to affect drowning rates. In addition, the use of floatation devices has the potential to be effective for preventing drowning in the presence of each of the other risk factors as well.

In Canada, it is not currently mandatory to wear a lifejacket or PFD, although there is a requirement to have a PFD or lifejacket of the appropriate size on board for each person. One survey of recreational boaters found that 64% of respondents felt safe as long as their PFD was "in reach," while another study reported that 29% of the recreational boaters surveyed agreed strongly or somewhat with the statement that it is unnecessary to wear a lifejacket if they have one close at hand.

The evidence suggests that they are wrong. In 1999, 34% of all recreational boating fatalities and 56% of canoe drowning fatalities occurred after the boat capsized. The victim fell overboard in 20% of recreational boating drownings, and the boat became swamped in 13% of cases. Thus, unlike the situation with larger vessels, where there might be a period of time after the onset of an emergency to don a floatation device prior to immersion, in small vessels the event of involuntarily entering the water is often quite swift. It is thus, perhaps not surprising to learn that in 1999 a PFD was present, but not worn in 30% of all recreational boating drownings and that another 2% of victims were either wearing an unfastened PFD or a PFD that was the wrong size. There simply wasn't time to locate, don and fasten the proper PFD before entering the water.

In addition for most people who are suddenly immersed in cold water, where most Canadian boating takes place, respiratory problems are a serious danger. People immersed in water below 15°C will immediately experience breathing difficulties, beginning with a "large aspiratory gasp". During this initial gasp, the individual breathes in close to total lung capacity, which creates a sensation of breathing difficulty or suffocation that could contribute to a feeling of panic. After this initial gasp of air, the individual experiences uncontrollable hyperventilation, which can cause dizziness and confusion, as well as muscle spasms. For these reasons, the initial cold shock in the first few minutes of immersion "probably accounts for the majority of near-drowning incidents and drowning deaths following accidental immersion in open water below 15°C." Clearly, if a person was wearing a PFD (properly fastened) before being immersed in

cold water, his or her chances of surviving the "cold shock" phase of immersion would be significantly higher.

Finally, research studies show that the ability of muscles to contract, grip strength, and manual dexterity all deteriorate quickly after being immersed in cold water and the body literally becomes "numb" with cold. Thus, clearly a person's ability to manipulate either a manually or orally-inflatable flotation device, tighten the straps or buckle a flotation device, climb out of the water, or engage in any other self-rescue activities requiring manual dexterity, muscle coordination, or handgrip strength will become increasingly difficult in frigid water. Given that most Canadian water is cold, for most of the year, and that it is in cold water where most Canadians lose their lives, PFDs must be worn and not merely carried if they are to have any chance to prevent drowning.

Mandatory Wear Legislation is the Intervention to Employ

While the vast majority of recreational boaters do comply with the law and carry flotation devices for all persons on board, observational studies suggest that only 21% of adult recreational boaters actually wear a PFD. Reasons for <u>not</u> wearing a flotation device while participating in recreational boating seem to be based upon boater perceptions about PFDs that fall into four broad categories: the perception that there is a low risk of drowning and that usage of a PFD is therefore unnecessary, the perception that wearing a PFD restricts movement and interferes with performance of activities, the perception that wearing a PFD is uncomfortable, the perception that wearing a PFD is a sign of fear. Numerous attempts have been made to increase wear rates including: mandatory boater education, social marketing, incentive programs, redesign of PFDs and standards, and legislation.

Evidence suggests that there is very little difference in the PFD wear rates of those who have taken a boating safety course versus those who have not. Similarly, in the United States, some research suggests that there is only a six to seven percent decrease in the accident rates of those who have taken a boating education course. Thus, mandatory boater safety education alone may not have a dramatic impact on PFD wear rates.

Most social marketing and incentive programs have not been evaluated, however when they have, the results are often disappointing. One survey conducted in western Canada found that 84% of the target group recalled having seen boating safety messages, and the most commonly recalled message was to wear a lifejacket. Of course the low prevalence of lifejacket and PFD use noted above speaks to the ultimate success of these efforts.

Changes to the design and standards for PFDs to address some of the concerns noted by boaters above, have the potential to impact on wear rates. However, prior research, as well as the current study, found that the vast majority of boaters are unaware of these developments.

Finally, there are a few jurisdictions, which have attempted to make PFD wear mandatory through legislation. There seem to be few formal evaluations of the impact of legislation requiring children to wear a PFD. However, one U.S. Coast Guard study of PFD wear rates concluded that the wearing of lifejackets was directly proportional to current mandatory wear laws. As well, analysis of drowning statistics reveals that the rate of children drowning in states that require children to wear lifejackets (1.22 for every 1,000 accidents) is lower than that of states that do not mandate PFD wear for children (1.31 drownings for every 1,000 accidents). Although these findings are not conclusive, the results suggest that PFD wear legislation increases the likelihood of wearing a PFD, and this may in turn have led to a decrease in the number of drownings in states with PFD wear legislation. It is claimed that Tasmania in

Australia, the one jurisdiction with across the board legislation mandating PFD wear for all boaters, now has a 95% compliance rate and a significant increase over the already relatively high wear rates before the law was enacted (49% of adults and 88% of children routinely wore PFDs while boating).

Thus, while there is a paucity of good evaluation data for any interventions designed to promote PFD use, it does seem that legislation is potentially a powerful intervention. Legislation has been effective in other injury prevention domains, such as seat belts and bicycle helmets.

Such Legislation Should be Feasible in Canada

A legal argument can be made for introducing mandatory wear legislation, which rests on the question of whether existing tort law clearly deals with the issue of liability in the event of a boating incident involving injury or death and how negligence for such incidents is determined. The present study found that judicial standards are inconsistent and various levels of Canadian courts have used different standards to determine the liability of boat owners. In particular, the courts are not agreed on some of the factors that determine liability of boat owners/operators: reasonable person test, emergency test, and the but-for test. Consequently, given the lack of clarity regarding the responsibility for safety gear in tort law, this lends some support to the argument for creating legislation since it would improve the consistency of decisions and would assist the courts in measuring the extent of a boat passenger's negligence. Specifically, mandatory wear legislation would ensure that boat users who fail to wear lifejackets or PFDs would be consistently judged to be guilty of contributory negligence. This would likely motivate small craft users to wear lifejackets or PFDs when on the water, which would in turn reduce drownings.

In addition to legal justification, any regulatory proposal must address certain considerations such as: public will, the existence of a problem warranting federal intervention, evidence that regulation is the best alternative, evidence that benefits of regulation would outweigh costs, and that any regulation has the potential to be enforced We have addressed the existence of the problem, and the evidence that regulation is the best alternative above. We turn now to the issues of public will, benefits and costs of regulation and enforcement.

Public Will

In our survey of international stakeholders the biggest barrier identified to obtaining legislation for jurisdictions that have it, were a reluctance on the part of the government to create legislation related to resistance or lack of enthusiasm on the part of the public toward such legislation. Similarly, respondents who represented jurisdictions that have not enacted PFD wear legislation also rated both a lack of public pressure as well as resistance amongst the public due to the value they place on personal freedoms as being the key barriers to introducing legislation.

There is a general belief among stakeholder groups both within Canada and abroad that the general public will be strongly opposed to any mandatory wear legislation. Our current survey demonstrated no such reaction. The vast majority (70-87%) of boaters and non-boaters of all ages supported the idea of mandatory wear legislation, with only 2-9% wanting it to be restricted to children, and only 5-7% being opposed. Additionally, Canadians surveyed indicated that if PFD wear legislation were enacted, the vast majority (84-93%) would comply with the law under all circumstances while only 2-5% claim they would defy a law that made wearing a PFD mandatory.

However, in order to demonstrate public will, it will be insufficient to present findings that the majority of people wouldn't oppose legislation. Rather it will be important to demonstrate that the public has been consulted at each stage of the policy process. Accordingly, it will be important to engage the public in open consultations, either through existing bodies for public participation in the regulator process or through highly visible special-purpose consultations (e.g. town hall meetings, additional surveys, etc.). Our Tasmanian informant(s) identified this process as a crucial step to success.

Evidence that the Benefits Outweigh the Costs

The current paper presents an estimate of the indirect costs associated with boating related drowning in Canada. However, this is inadequate justification on its own for a regulatory response. What is needed is a good estimate of the likely costs associated with regulation. Such an estimate (which might ultimately be obtainable from other jurisdictions, such as Tasmania) could then inform a cost-benefit, or cost-effectiveness study. In the interim, it can probably be argued, at least on common sense grounds, that it shouldn't be any more expensive to regulate mandatory wear of PFDs than the current regulations requiring that they be carried on board the craft. Thus, with just the improved evaluation data of the impact of legislation on drowning rates proposed above, it should be possible to make a provisional cost-benefit, or cost-effectiveness argument. Finally, the argument can be made that any additional resources committed to the enforcement of this regulation, can have spin-off benefits in terms of enforcement of other maritime regulations, already identified as under-enforced.

Evidence that the Regulation can be enforced

One of the most common arguments from various stakeholders opposing mandatory wear legislation is that given the vastness of Canadian waterways over which this law would apply, it would simply be impractical to enforce. Of course a similar argument could be made against any maritime law, and yet we have not left this domain unregulated.

Some additional research may aid arguments in this area. For example, as part of collecting evaluation data from jurisdictions in which legislation has been enacted, it should be possible to gain estimates of the degree of enforceability of such legislation.

In the meantime, two additional arguments can be made. First, it was felt similarly impractical to enforce seat-belt legislation in the early 1970s, yet that legislation has had a demonstrable effect on motorist behaviour in this country in the past 30 years. It has been suggested that in that instance, it was as much the public education campaign attending the enactment of the legislation, coupled with some high visibility enforcement, which had a greater impact on Canadian motorists than any ongoing program of enforcement. Second, it can again be argued, on the basis of common sense, that mandatory wear legislation can't be any harder to enforce than the current mandatory carry legislation, as the former requires carrying the PFDs in a more visible location than the latter.

Recommendations

Four general conclusions arise from this report namely: boating related drownings warrant action, PFD wear is the risk factor to address in preventing boating related drownings, mandatory wear legislation is the intervention to employ to increase PFD wear rates, and finally that such legislation should be feasible in Canada. It is thus the recommendation of these authors that:

The PFD Task Force, and the Canadian Safe Boating Council as a whole, work toward mandatory PFD wear legislation.

However, the research also suggests that the climate is not quite ready for adoption of such legislation, at least among key stakeholder groups. Thus should the Canadian Safe Boating Council decide to move forward in promoting legislation, it is recommended that they develop a strategy of research and public education in support of (and in parallel to) working toward this end. Specifically we recommend that the PFD Taskforce:

- Craft a timeline for achieving milestones in the policy creation process.
- Identify a champion organization respected by stakeholders in recreational boating and identified as an experienced lobby group to lead a promotion initiative for mandatory wear legislation. The CSBC is likely the best candidate for this role.
- Partner with their counterparts in other jurisdictions such as Tasmania to conduct evaluations of the efficacy and cost-benefits associated with mandatory wear legislation, where it has been enacted.
- Draft a list of stakeholders that should be included in policy consultations
- Demonstrate voter support for a legislative initiative to policy makers through public consultations, such as town hall meeting, and through involvement of public representatives in any coalitions that would work toward legislation
- Develop a communications strategy including:
    - Developing a position paper arguing for mandatory wear legislation, with briefing notes.
    - Developing new communications vehicles to educate the public and policy makers about issues not currently widely understood, such as: the physical realities faced by unexpected immersion including the physiology of cold water shock, recent changes to standards and design for PFDs, etc.
    - Including media representatives in any coalitions that would work toward legislation
    - Employing good social marketing principles to present positive boating safety messages that position PFD wear as an integrated part of aquatic activity
- Promote the broad enforcement of boating regulations to yield untapped benefits of existing legislation and to engage stakeholders who are unsatisfied with the enforcement of existing regulations.

CSBC Action Plan

While the focus of the analysis, conclusions and recommendations of the Will it Float? Report was from a Canadian perspective, the inclusion of international data, where available and relevant, and the interviews of the 45 international representatives has created great interest in the Will it float? Report internationally. The CSBC has shared the findings of the study internationally and is committed to working with our international counterparts to achieve the mutual goal of an increased PFD/lifejacket wear-rate.

The CSBC received the results of the study in September 2003 and the CSBC membership unanimously approved the following motion at the Annual General Meeting:

> "That the CSBC membership accept the Background Research Paper Regarding mandatory Wear legislation in Canada that was written and presented by SMARTRISK and develop and implement an action plan based on the building of stakeholder consensus to advocate for the required wearing of PFDs/lifejackets by boaters while on the water".

The report was sent to respondents who participated in the study from the USA and those from 11 other countries. The report has been presented at the 2003 National Association of State Bating Law Administrators (NASBLA) conference, at the International Boating and Water Safety Summit (IBWSS) in 2004 and the International Conference on Safety in Transportation (ICOSIT) in Italy in 2004.

Since September 2003, the CSBC has presented the study to boating stakeholder groups across Canada and will continue to do so for the next 12 months. The next stage will be hold Town Hall meetings to share the findings with individual boaters and the public.

The CSBC is currently amassing a file of endorsement letters from individuals and groups across Canada who support mandatory legislation for all passengers on smaller vessels. As legislation for lifejackets/PFDs is under federal jurisdiction, this file will be turned over to a federal government department (likely Transport Canada), who will champion the legislation process.

Contact Information: **Barbara Byers, Chair, Canadian Safe Boating Council**

322 Consumers Road

Toronto, ON M2J 1P8

Canada

Email: barbarab@lifeguarding.com

Phone: 416-490-8844

Fax: 416- 490-8766

Supplemental Documentation: The Will it float? Report and a Power Point presentation are available upon request.