

Drownings in Canada

and other water-related injuries

10 Years of Research

Module 5 *Fishing*



Canadian
Red Cross

2009

*This research is dedicated to the 889 persons
who died during fishing in Canada between 1991 and 2000.
May the evidence of the circumstances of their deaths be a guide
to safety for Canadians who fish for recreation, subsistence,
or work, and for professionals and decision makers
with a duty to protect the vulnerable.*

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Drownings and Other Water-Related Injuries in Canada, 1991-2000
Module 5: Fishing

For a pdf version of this module, please visit our website at www.redcross.ca

This Visual Surveillance Report was developed and written by Dr. Peter Barss in collaboration with the Canadian Red Cross and with the assistance of Cait Beattie. Sophie Lapointe, research technician, carried out the data analysis.

Data collectors included volunteers and staff of the Canadian Red Cross and the Lifesaving Society. Data collection was made possible through the assistance and co-operation of provincial coroners, medical examiners, their statistical staff, and the National Association of Coroners. Financing of the work was done collaboratively by sharing resources and staff. Data collection mainly involved the Canadian Red Cross, the Lifesaving Society, and provincial coroners. Data coding, verification, and entry were supported by the Canadian Red Cross and the Lifesaving Society, and carried out by Isabelle Masson, Peter Barss, and Sophie Lapointe.

The National Search and Rescue Secretariat and the Canadian Red Cross Society funded data analysis and writing, as well as editing, design, and layout of this 10-year report. Shelley Dalke of the Canadian Red Cross coordinated this process. The Canadian Red Cross translation department supervised the translation of this module with the assistance of Cait Beattie; additional revisions in French were completed by Monique Edwards. The Canadian Coast Guard and Transport Canada sponsored the project and monitored its progress. The Research Institute of the McGill University Health Centre provided administrative support for data management.

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Module 5: Fishing

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wearalifejacket.com

A website supported by The Cook-Rees Memorial Fund For Water Search And Safety.

A central location of information on how to find and choose the best flotation device for various water-related activities, and to learn about recent advances in lifejacket design for individual comfort, style and protection.

Sport and safety organizations, policy makers and the media can also consult the website to share knowledge, research and drowning prevention campaigns to help inform the public about the need to wear a lifejacket in, on and around the water.

INTRODUCTION

Fishing is a popular activity for Canadians. This began long ago with First Nations and Inuit peoples, with fishing as an essential source of food for subsistence life. Later, after colonization, recreational and occupational fishing became important for leisure, the economy, and a healthy diet.

First Nations people were masters of the canoe, and Inuit mastered the freezing waters of the Arctic with their ingenious kayaks. These elegant, swift and silent boats were key to survival itself by fishing and hunting. Later, particularly on the Atlantic coasts, sailing vessels small and large were used for commercial fishing. Nowadays, most recreational fishing is done from small open powerboats and canoes, occupational from large powerboats, and subsistence fishing from large and small powerboats and canoes. Recreational fishing also occurs from the shore, in water by wading, and on the ice.

This report includes 10 years of research on deaths during fishing in Canada. It focuses on the incidence or rate of death and trends during 1991-2000, and on personal, equipment, and environment risk factors.

This research has been prepared to provide an epidemiologic profile for prevention. Injury incidents are often multifactorial. Nevertheless, a favourable change in a single factor can be sufficient to tip the balance sufficiently away from danger in favour of safety to prevent an incident from occurring. This is pre-emptive action in the pre-event phase. The use of appropriate safety equipment or action can prevent injury even if an incident does occur; in this case, injury is aborted or reduced in the event phase. Finally, post-event phase activities such as rapid intervention with lifesaving, first aid, appropriate methods of rewarming, CPR, and so forth after an injury has occurred can minimize, stop, or reverse the progression of damage from any injuries sustained during the event phase.

The findings are based upon annual data abstraction of information about each incident collected by coroners and police, and recorded in provincial and territorial coroners' files across Canada. The data in this report required more than 10 years of dedicated work by voluntary Red Cross and other data collectors, managerial and research professionals. The details of each incident were recorded in 15-page structured questionnaires and converted into electronic format for analysis. Each year's data collection, transformation into electronic format, and analysis requires about two year's work. The analysis of 10 years of data, including trends, is naturally much more complex than for a single year.

Due to the fact that much of the work was done on a voluntary basis, the total costs of collecting, analyzing, and reporting on incidence and risk factors of 5,900 drowning deaths, including the deaths described in this report, was accomplished for the modest amount of about \$C2 million, and has already resulted in averting hundreds of deaths, with about \$C500 million savings in direct and human capital costs. Our hope is that this report will help to bring about similar savings in lives and economic losses specifically for immersions and trauma during an important Canadian outdoor activity, fishing.

STUDY POPULATION AND TIME PERIOD All drownings and other water-related injury deaths in Canada were monitored between 1 January 1991 and 31 December 2000; during this period there were 5900 water-related deaths, including 5535 drownings with or without hypothermia reported, 92 immersion hypothermia deaths without drowning, and 273 other injuries. In the 1996 census, the total population of Canada was 30,300,000. Thus, the fishing deaths in 1991-2000 occurred on the background of about 303 million person years of exposure to risk for all ages. As denominators for incidence and trends for 1991-1995, we used 1991 census data, for 1996-2000, the 1996 census population, and for 1991-2000 the mean of the 1991 and 1996 census populations. We chose these two years since they are actual census data, and not the less valid inter-censal projections.

DROWNING AND IMMERSION HYPOTHERMIA For the purposes of this paper, an immersion death was classified as a drowning if drowning was included in the coroner's report, based upon the autopsy or other findings. The death was classified as hypothermia without drowning only if the autopsy or other coroner's finding excluded drowning as among the causes of death. Drownings with and without hypothermia were analyzed together. This was done because hypothermia is reported inconsistently, due to lack of clear criteria for such a diagnosis as well as lack of training in immersion deaths on the part of some coroners. On the other hand, immersion hypothermia without drowning tends to be based on lack of autopsy findings of drowning, and other supporting factors that exclude drowning, such as wearing of a flotation device.

COLD WATER IMMERSION DEATHS Our selection criteria for cold water immersion deaths included: drowning and immersion hypothermia as reported by coroner, immersion hypothermia without drowning as reported by coroner, immersion hypothermia and some other cause as reported by autopsy, hypothermia and some other cause as reported by the Red Cross or Lifesaving data collector, immersion death in the presence of ice as reported by coroner or police report, immersion death in presence of extremely cold water temperature ($<10^{\circ}\text{C}$) as reported by coroner or police, cold month of incident, defined as November to April, and snowmobile travel. We did the selection in a descending manner, not counting or reselecting previously included incidents twice.

ETHNICITY Because of greater exposure among aboriginal peoples to boat and snowmobile travel, and communities or homes near the water, the proportion of victims among First Nations and Inuit peoples is provided. Aboriginal status was considered definite if the victim was classified as such in the coroner, police, or autopsy files by coroner, police, or pathologist. Probable aboriginal status was assigned if the address corresponded to a known reserve and if the family name was known to be aboriginal. The definition of aboriginal varies, but they are thought to represent at least three to four percent of the Canadian population.

NATIONAL SURVEILLANCE DATABASE In the early 1990's, the Canadian Red Cross implemented a national drowning surveillance database. This was developed with collaboration of public health injury prevention professionals, all provincial coroners, and other water-safety organizations including the Coast Guard and Lifesaving Society. The database was funded to provide a sound research basis for national water-safety programs, by monitoring the incidence and circumstances of all water-related injury deaths in Canada on an annual basis. It includes annual information from 1991 onwards (Canadian Red Cross, 2001). An epidemiologic profile of all water-related injury deaths is available (Red Cross 2003, 2005).

METHODS

DATA COLLECTION The surveillance database relies upon annual structured reviews of the mandatory coroner and police reports for all water-related deaths. A 48-item questionnaire is used to obtain data on cause of death, activity and purpose of activity, along with personal, equipment, and environment risk factors. Project managers supervise voluntary data collectors in each province.

DATA VERIFICATION AND ANALYSIS All completed questionnaires are verified and corrected at national level by a medically trained injury epidemiologist and demographer. Verification is highly structured and includes such issues as admissibility, completeness, internal consistency of responses, and consistency from year to year. Data entry is done with appropriate quality controls, including double entry and comparison for keystroke errors. Data are analyzed annually, but for this paper 10 years of data were used. Since coroners take a year or more to finalize all cases and data collection and analysis nearly another year, reporting tends to lag the incidents by about two years. This is not of major consequence for prevention, since major trends usually occur slowly.

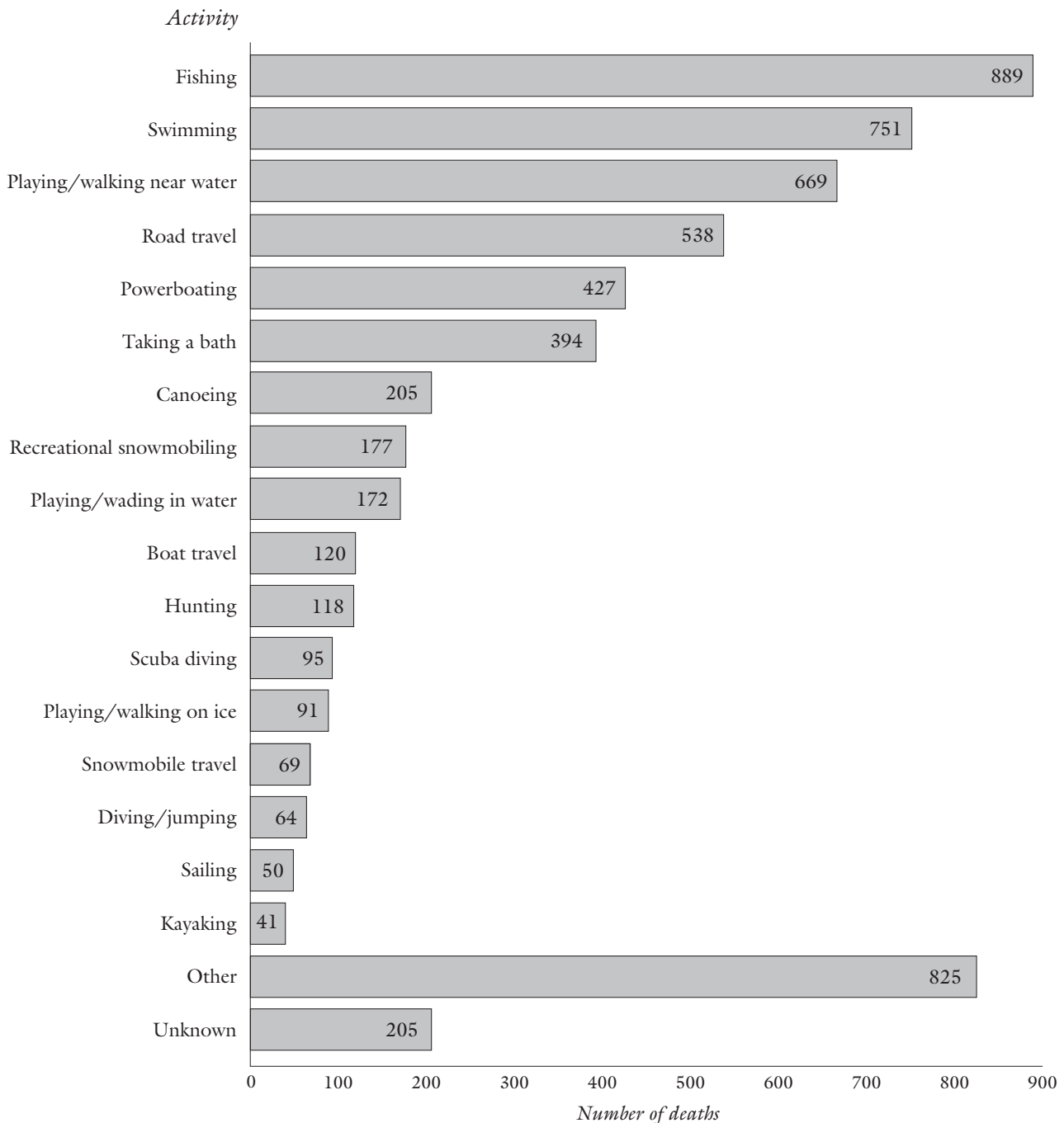
In the early development years, the analytical work was considered research. In later years, much of the analysis was done by a research technician and was considered surveillance. Detailed reports on new topics, such as the present paper, were considered research. Hence it was possible to provide both surveillance and a research basis for new programming. Recommendations were also supported by periodic monitoring of the scientific literature on injury prevention in international citation databases.

RESULTS

OVERVIEW

Fishing is an activity that is frequently associated with drownings and other water-related fatalities in Canada. Indeed, fishing accounted for 15% of all water-related deaths during 1991-2000, claiming more victims than any other activity (Figure 1).

Figure 1 **WATER-RELATED FATALITIES BY ACTIVITY, CANADA 1991-2000 (n=5,900)***



* Includes death from all causes: drowning with or without hypothermia, immersion hypothermia without drowning, and trauma; and for all categories of activity: boating, aquatic, non-aquatic, bathing, and land and air transport

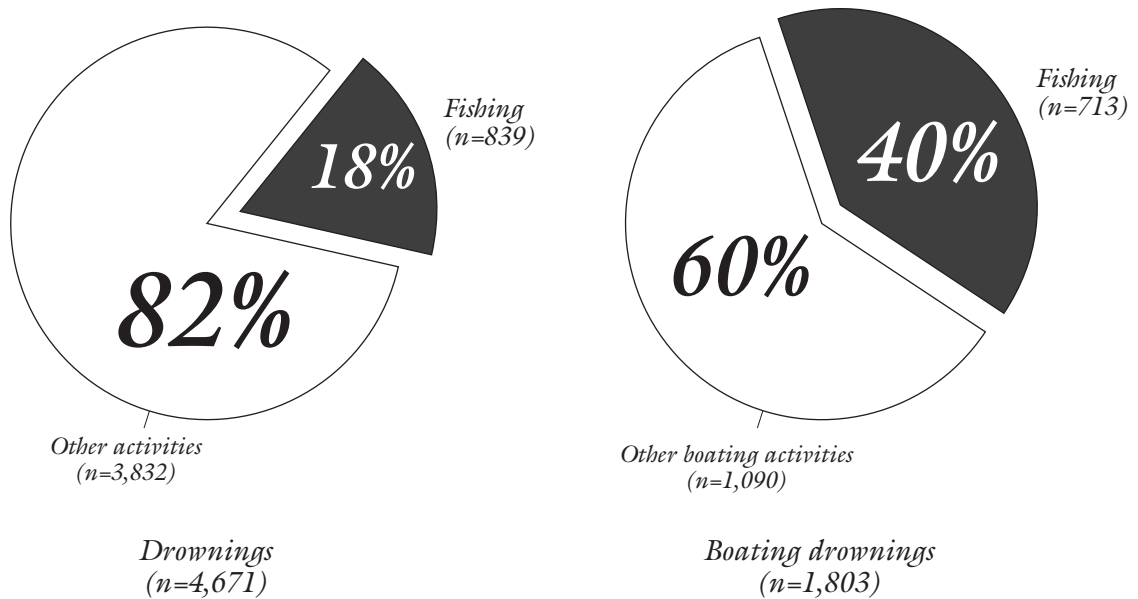
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

OVERVIEW

DROWNINGS Fishing accounted for 15% of all drownings (851/5,535), 18% of drownings other than land and air transport drownings (839/4,671), and 40% of boating drownings (713/1,803) (Figure 2).

Figure 2

FISHING AS A PROPORTION OF DROWNINGS* AND OF BOATING DROWNINGS, CANADA 1991-2000 (n=4,671)



* Excludes land & air transport drownings

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

NON DROWNINGS Fishing also accounted for 10% of all water-related injury deaths other than drownings (38/365), including 28% of immersion hypothermia deaths (26/92), and 4% of trauma deaths (12/273).

TRAUMA All 12 trauma fatalities involved males 15 years and older. 8 deaths were associated with recreational activities, 4 with occupational activities. 8 deaths occurred during boating (collision 4, other/unknown 4), while 2 resulted from falls into water and 2 from airplane crashes. Fishing trauma deaths are not discussed further in this report.

Fishing Immersion Deaths

This module examines immersion deaths — that is, deaths resulting from drowning and/or immersion hypothermia — associated with fishing. There were 877 such deaths in Canada during 1991-2000, representing 16% of all immersion deaths (Figure 3).

TREND The number of fishing immersion deaths dropped from 488 to 389 between 1991-1995 and 1996-2000, representing a 25% decrease in the overall rate of fatality for this activity.

TYPE OF ACTIVITY 84% of fishing immersion deaths took place during boating; 11% during non-aquatic activities (i.e. fishing from shore and ice fishing); 3% during aquatic activities (i.e. fishing by wading in water); and 1% during land and air transport, mostly involving vehicles on ice for ice fishing (Figure 3).

PURPOSE Recreational fishing accounted for 77% of fishing immersion deaths, occupational for 18%, and subsistence or daily living for 5% (Figure 4). Occupational fishing mainly involved commercial fishing, but also included aquaculture and guiding.

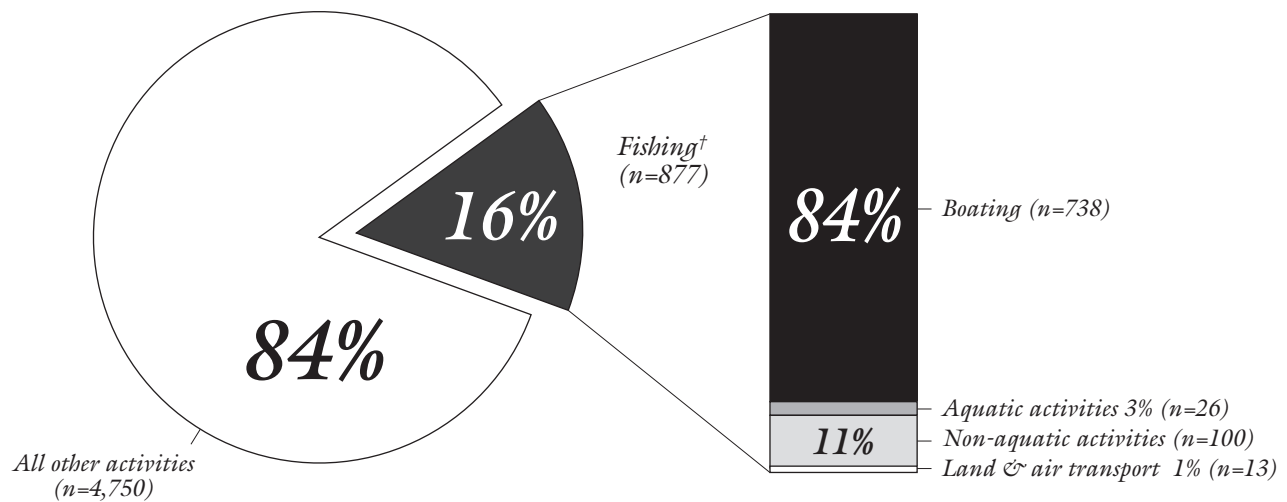
TYPE OF FISHING Fishing from a boat made up 84% of fishing immersion deaths, followed by fishing from shore 9%, ice fishing 4%, and fishing in water 3% (Figure 5).

TYPE OF FISHING BY PURPOSE Whether fishing for recreation, occupation or daily life, the majority of victims were fishing from a boat. Most non-boating fatalities were recreational, although 15% of daily living victims were fishing from shore (Figure 6).

TYPE OF INCIDENT 36% of fishing immersion deaths resulted from capsizing during boating. Other boating incidents included falling/jumping overboard, swamping, and collision. Non-boating incidents included falling into water from shore, falling through ice, and falling in or being swept away by current while wading (Figure 7).

Figure 3

FISHING IMMERSION DEATHS* AS A PROPORTION OF ALL IMMERSION DEATHS BY TYPE OF ACTIVITY, CANADA 1991-2000 (n=5,627)

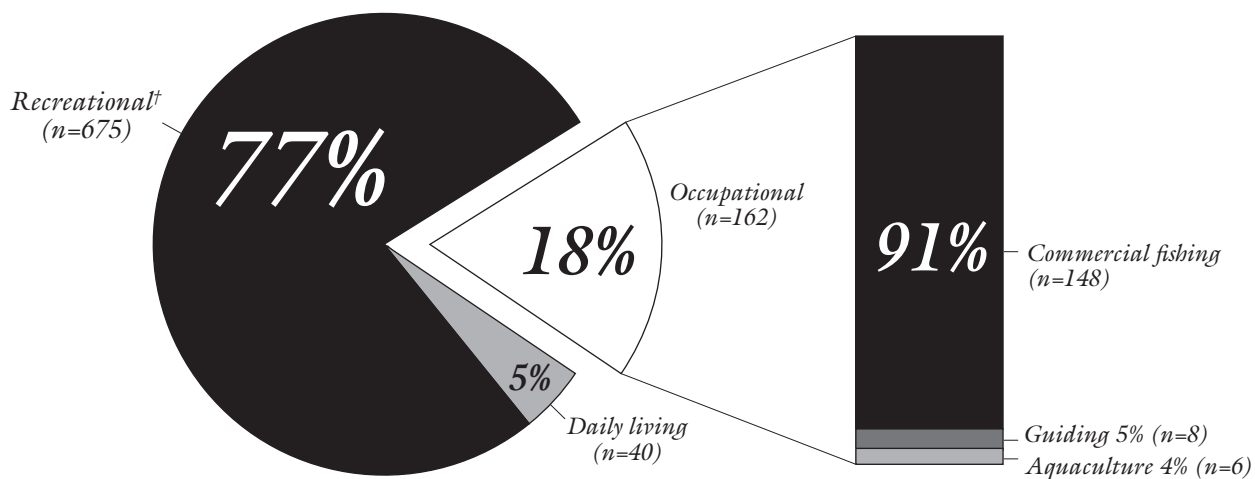


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Included 851 deaths by drowning with or without hypothermia and 26 deaths by immersion hypothermia alone

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 4 FISHING IMMERSION DEATHS* BY PURPOSE OF ACTIVITY, CANADA 1991-2000 (n=877)

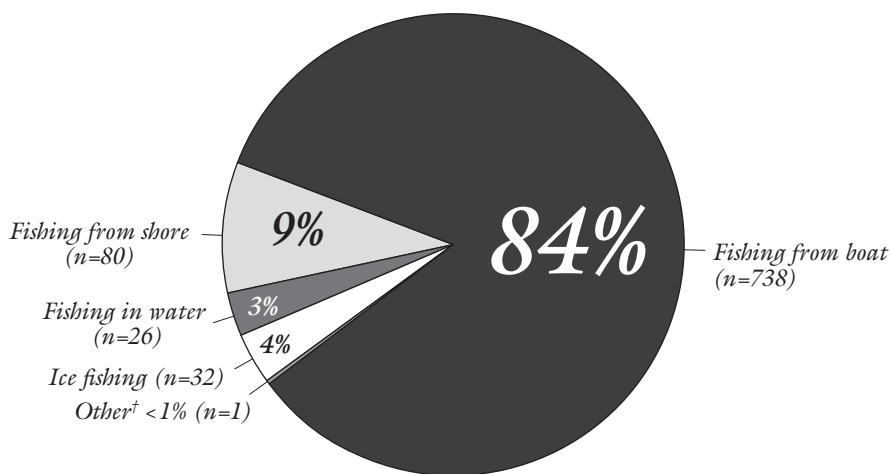


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† One recreational fisherman drowned while attempting rescue

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 5 FISHING IMMERSION DEATHS* BY TYPE OF FISHING, CANADA 1991-2000 (n=877)



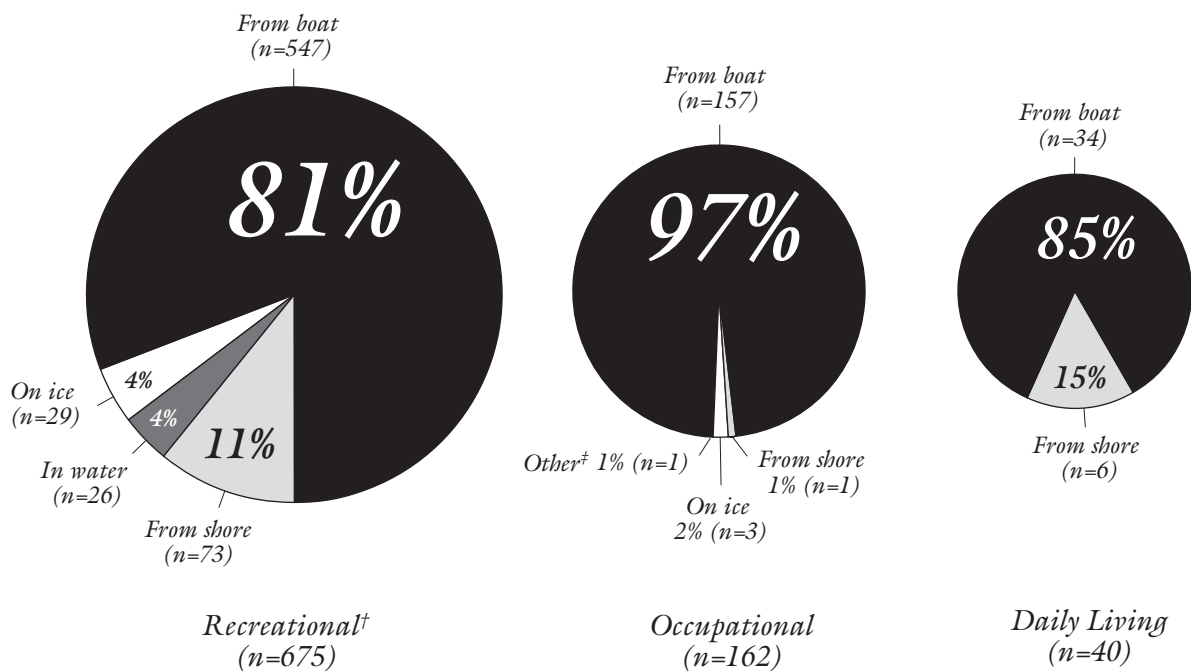
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Airplane crash en route to fishing location

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 6

FISHING IMMERSION DEATHS* BY TYPE OF FISHING & PURPOSE OF ACTIVITY, CANADA 1991-2000 (n=877)



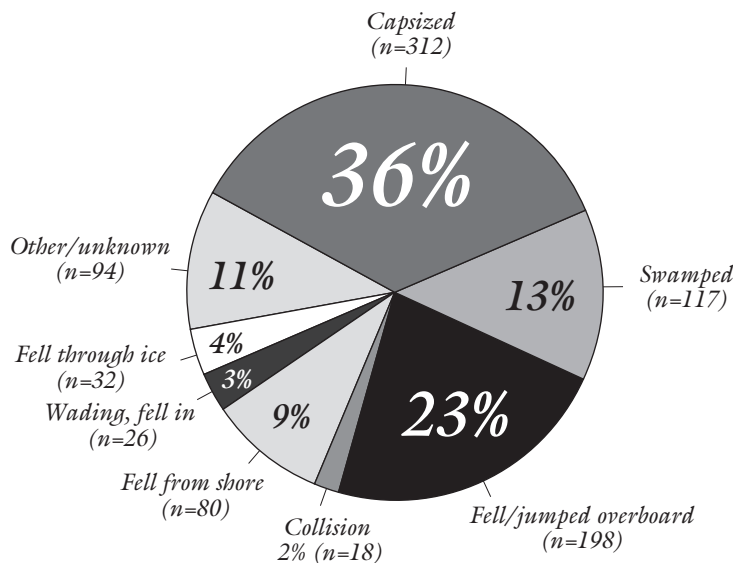
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† One recreational fisherman drowned while attempting rescue ‡ Airplane crash en route to fishing location

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 7

FISHING IMMERSION DEATHS* BY TYPE OF INCIDENT, CANADA 1991-2000 (n=877)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

PERSONAL RISK FACTORS

AGE AND SEX Nearly all fishing immersion deaths involved adult males. The main risk group for prevention was males 15 to 75 plus years, with a wide peak at 25-75 and older. Women and children less than 15 were at low risk. The greatest reduction in fatality rates between 1991-1995 and 1996-2000, 31%, was seen among 25-44 year olds (Figure 8).

ALCOHOL For persons 15 years and older, alcohol was involved or suspected in at least 34% of cases, possibly more since alcohol was unknown for 30% (Figure 9).

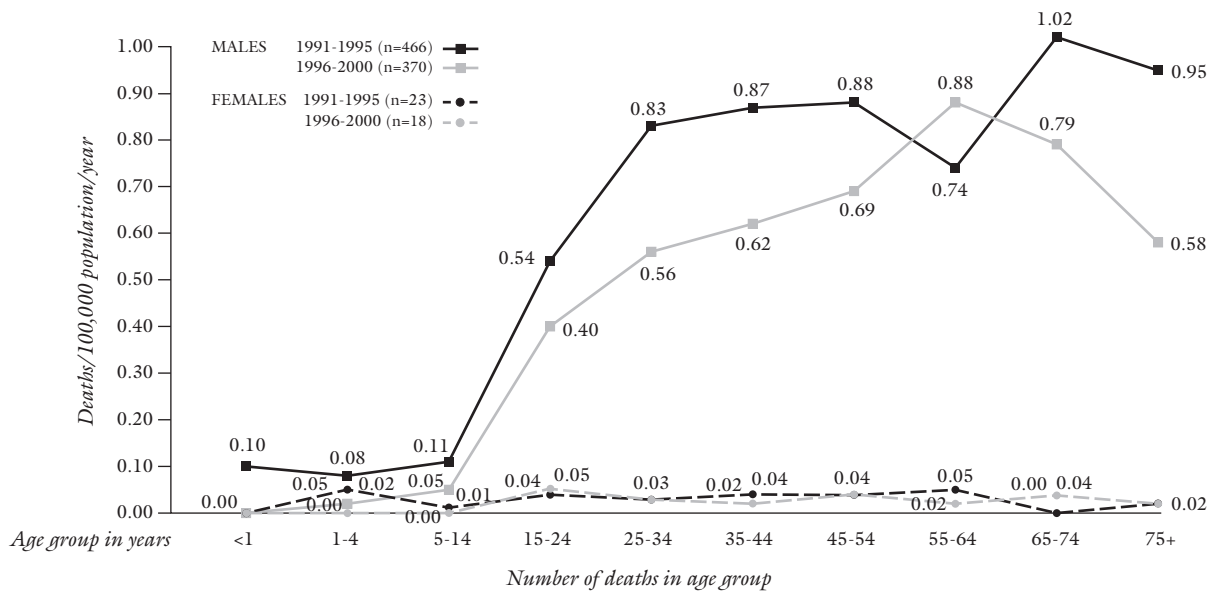
ETHNICITY At least 11% of victims were aboriginal, probably more given that ethnicity was unknown for 33% of victims.

SWIMMING ABILITY Swimming ability was unknown for 69% of victims. Of the remainder, 58% were weak or non-swimmers, 23% were strong or average swimmers, and 20% had unspecified ability.

BOATING EXPERIENCE For boating victims, experience was unknown for 61%. Of the remainder, 83% were experienced boaters and 17% were inexperienced or occasional boaters.

Figure 8

RATE AND NUMBER OF FISHING IMMERSION DEATHS* BY AGE & SEX, CANADA 1991-2000 (n=877; 836 MALES, 41 FEMALES)†



MALES	1991-1995	1	3	11	55	107	97	67	44	44	23
	1996-2000	0	1	5	41	67	77	65	55	38	16
FEMALES	1991-1995	0	2	1	4	4	5	3	3	0	1
	1996-2000	0	0	0	5	3	2	4	1	2	1

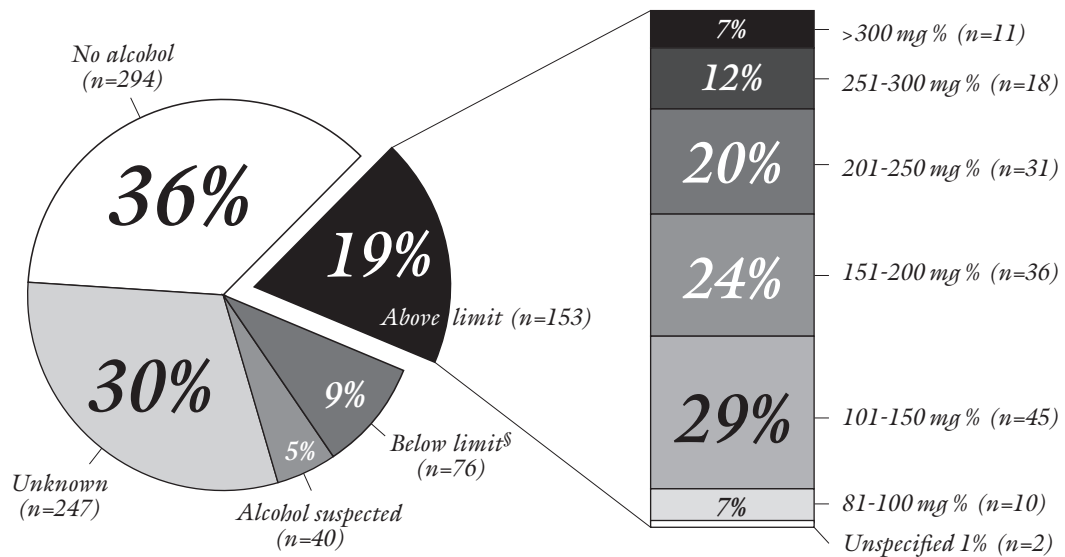
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Age unknown for 19 victims (males 13, 5; sex unknown, imputed male 1, 0)

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 9

BLOOD ALCOHOL LEVELS* FOR FISHING IMMERSION DEATHS,† CANADA 1991-2000 (VICTIMS ≥15 YEARS OF AGE; n=853)‡



* Legal limit is 80 mg % † Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
 ‡ This figure excludes 43 victims; decomposition rendered blood alcohol unreliable § 47 at 1-49 mg %, 23 at 50-80 mg %, 6 unspecified
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

EQUIPMENT FACTORS

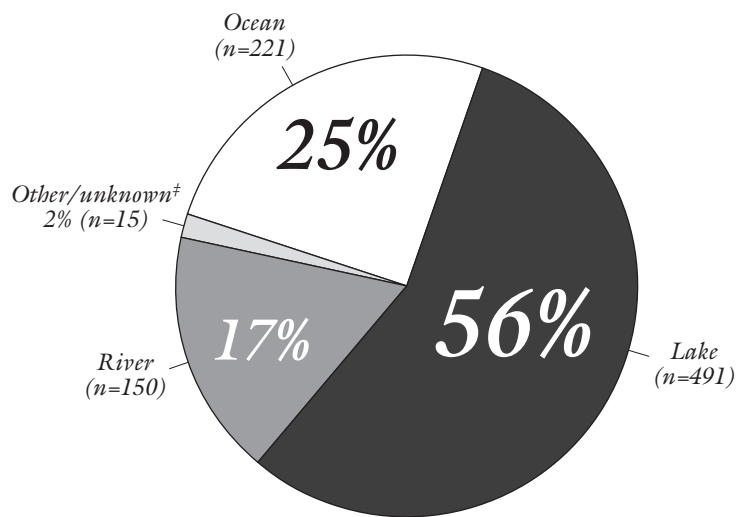
Flotation and other equipment factors are discussed later in this report.

ENVIRONMENT FACTORS

BODY OF WATER Overall, lakes were the most frequent body of water for fishing immersion deaths, followed by oceans and rivers. Body of water naturally varied by region (Figure 11).

OVERVIEW

Figure 10 FISHING IMMERSION DEATHS* BY BODY OF WATER,† CANADA 1991-2000 (n=877)

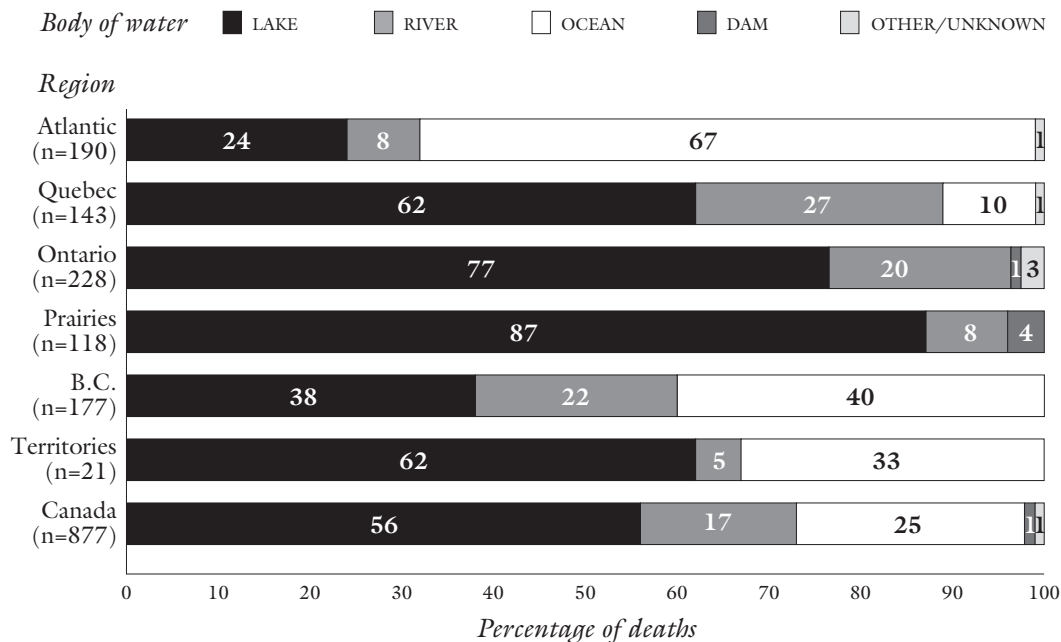


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† “Lake” includes pond and reservoir ‡ Included dam 8, canal 5, unknown 2

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 11 FISHING IMMERSION DEATHS* BY BODY OF WATER† & REGION, CANADA 1991-2000 (n=877)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † “Lake” includes pond and reservoir

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

OVERVIEW

TEMPERATURE Water and air temperatures were unknown or unreported for a majority of fishing immersion deaths (Figure 12). For the remainder, cold or extremely cold water was present in 99% of cases, and extremely cold or cold air in 69%.

WIND AND WAVES Wind and wave conditions were unknown for a majority of victims (Figure 12). Where these conditions were known, the wind was strong for 59% and waves were rough or stormy for 61% of victims.

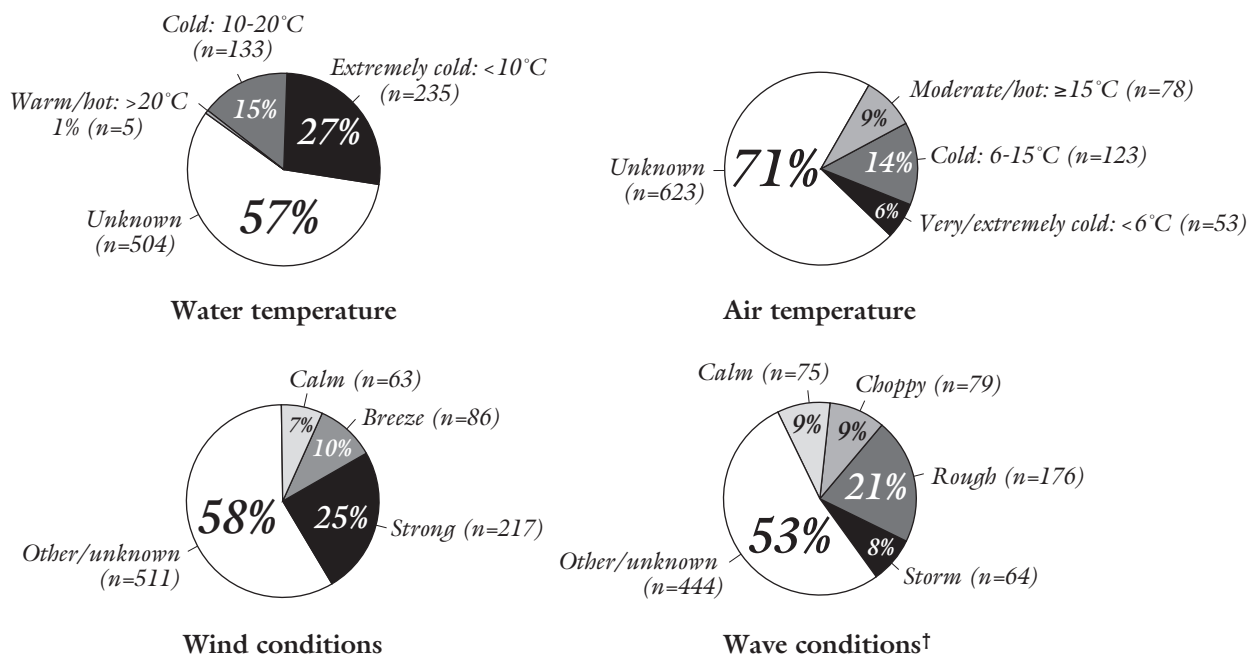
ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that cold immersion was a factor in at least 42% of fishing immersion deaths. (The overall percentage for all activities was 36%.)

LIGHT CONDITIONS A majority of fishing immersion deaths happened during daylight (Figure 13).

MONTH & DAY OF THE WEEK Deaths took place throughout the year, but most occurred between May and October (Figure 14). 41% took place on Saturday or Sunday.

Figure 12

FISHING IMMERSION DEATHS* BY ENVIRONMENTAL RISK FACTORS, CANADA 1991-2000 (n=877)

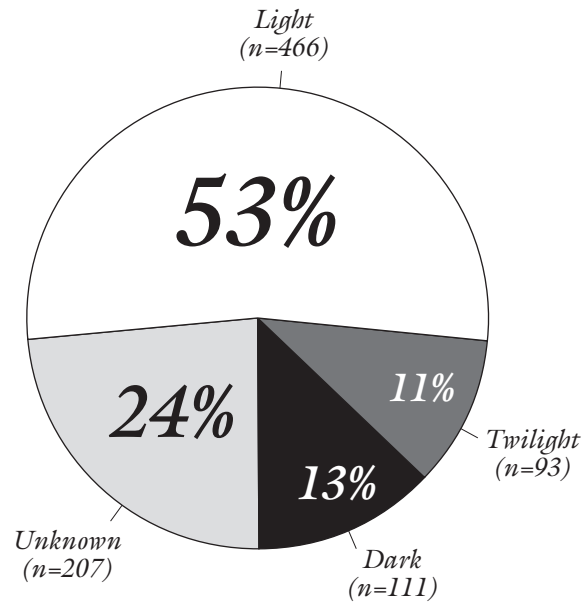


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Wave conditions were considered irrelevant for 35 deaths

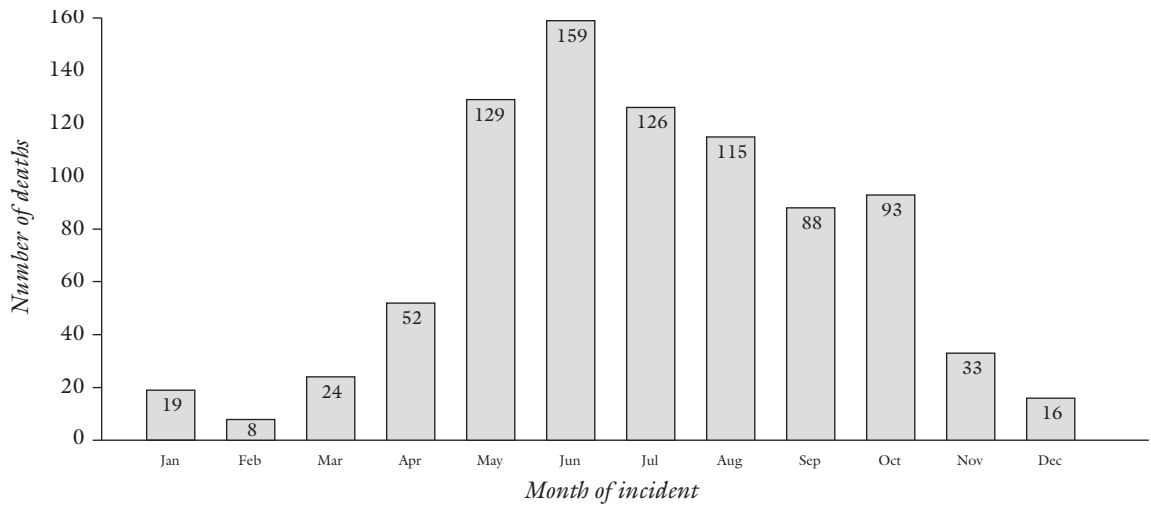
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 13 FISHING IMMERSION DEATHS* BY LIGHT CONDITIONS, CANADA 1991-2000 (n=877)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2005

Figure 14 FISHING IMMERSION DEATHS* BY MONTH OF INCIDENT, CANADA 1991-2000 (n=877)[†]



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
[†] Month unspecified for 15 deaths
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

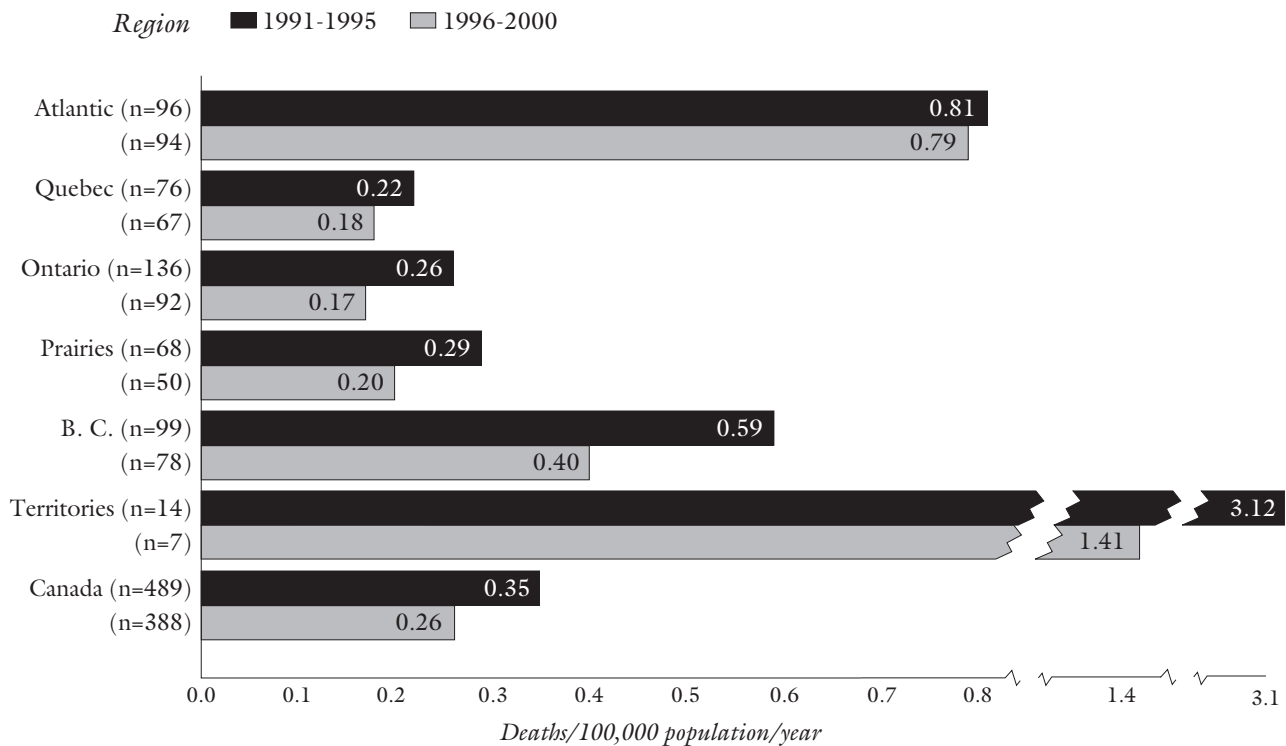
OVERVIEW

RATES AND TRENDS BY REGION The highest rates of fishing immersion death were in the Northern Territories and the Atlantic region. Improvement was seen in all regions between 1991-1995 and 1996-2000, although the reduction was only 3% in Atlantic Canada and 14% in Quebec, compared with reductions of between 30 and 55% in all other regions. The overall decrease for Canada was 26% (Figure 15).

ACCOMPANIMENT 68% of victims were accompanied by at least one adult, while 27% were alone, and 2% were accompanied by minor(s) only. Accompaniment was unknown for 3%.

RESCUE An acute rescue for a potentially survivable victim of fishing immersion was carried out in only about 33% of incidents, mainly by companions or bystanders (91%). Of these victims, 26% underwent CPR and/or rescue breathing.

Figure 15 **RATE AND NUMBER OF FISHING IMMERSION DEATHS* BY REGION, CANADA 1991-2000 (n=877)**



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

FISHING FROM A BOAT

As seen in Figure 5, fishing from a boat was the most frequent type of fishing, accounting for 738 deaths and 84% of all fishing immersion deaths during 1991-2000.

PURPOSE Most deaths occurred during recreational fishing, followed by occupational and daily living (Figure 16).

FLOTATION Only 10% of victims who died from immersion while fishing from a boat were reported to be properly wearing a flotation device (Figure 17).

TYPE OF BOAT Nearly half of boating victims died while fishing from small open powerboats, followed by large powerboats and canoes (Figure 18).

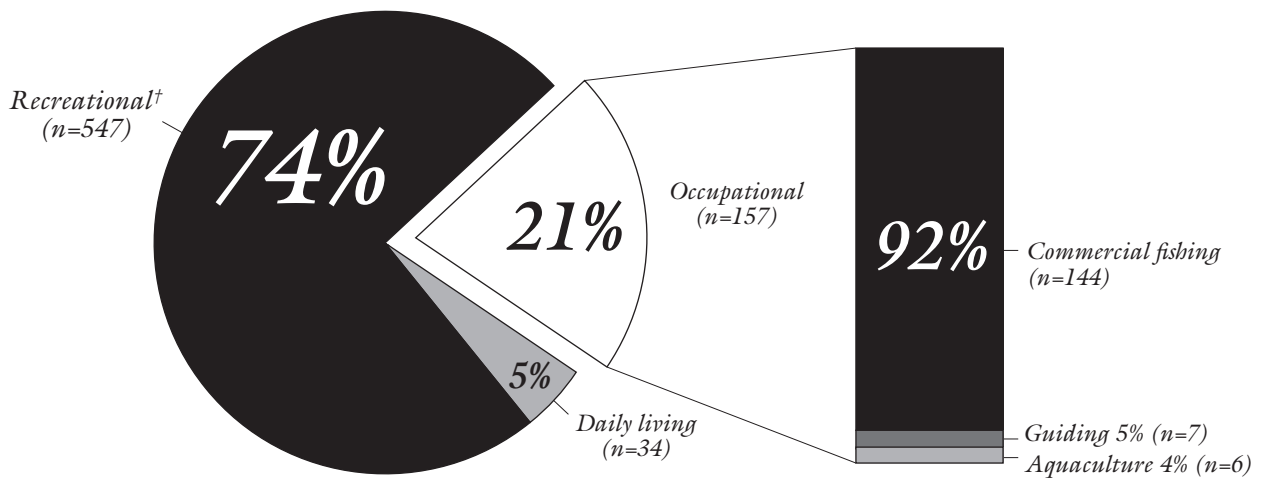
TYPE OF BOAT BY PURPOSE Recreational incidents most frequently involved small open powerboats, whereas occupational incidents were more likely to involve large powerboats. Daily living incidents were divided primarily among canoes, small open powerboats, and large powerboats (Figure 19).

RISK FACTORS BY PURPOSE Environmental conditions such as rough water and strong winds were frequent risk factors for fishing immersion deaths during boating, particularly for occupational fishing. Recreational incidents were more likely to involve the behaviour of the victim, such as standing up and/or urinating from the boat, or driving recklessly. Recreational boaters were also more likely to experience technical difficulty. Overloading was a factor for a number of occupational and recreational incidents, as was standing up in the boat for daily living victims (Figure 20).

TREND The number of immersion deaths during fishing from a boat dropped from 418 to 320 between 1991-1995 and 1996-2000, representing a decrease in the fatality rate per 100,000 population per year of 28% between the two periods.

Figure 16

FISHING IMMERSION DEATHS* DURING BOATING BY PURPOSE OF ACTIVITY, CANADA 1991-2000 (n=738)



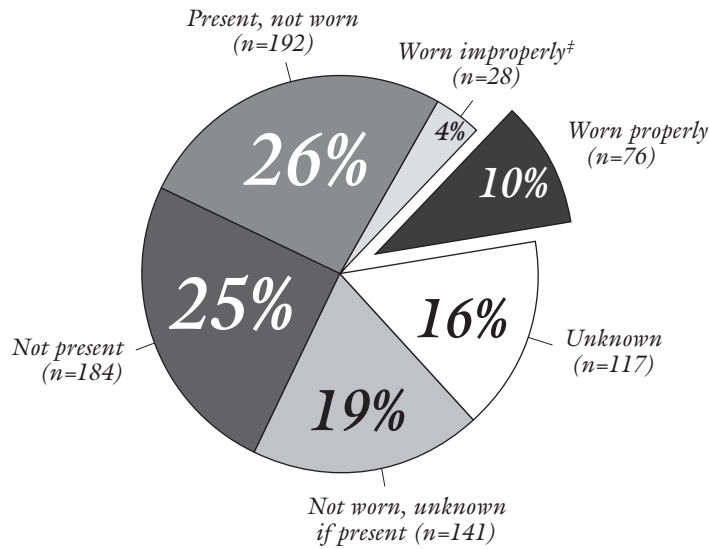
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† One recreational fisherman drowned while attempting rescue

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 17

FISHING IMMERSION DEATHS* DURING BOATING BY USE OF A FLOTATION DEVICE,† CANADA 1991-2000 (n=738)



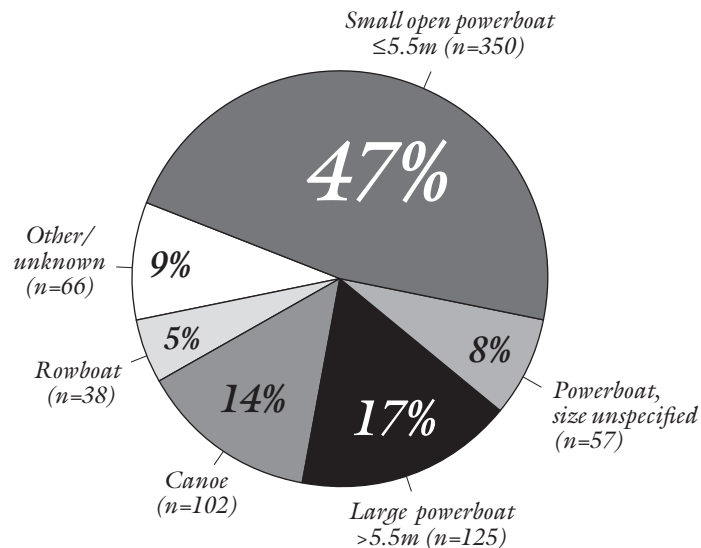
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Personal flotation device (PFD) or lifejacket ‡ Not fastened or inappropriate size

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 18

FISHING IMMERSION DEATHS* DURING BOATING BY TYPE OF BOAT, CANADA 1991-2000 (n=738)

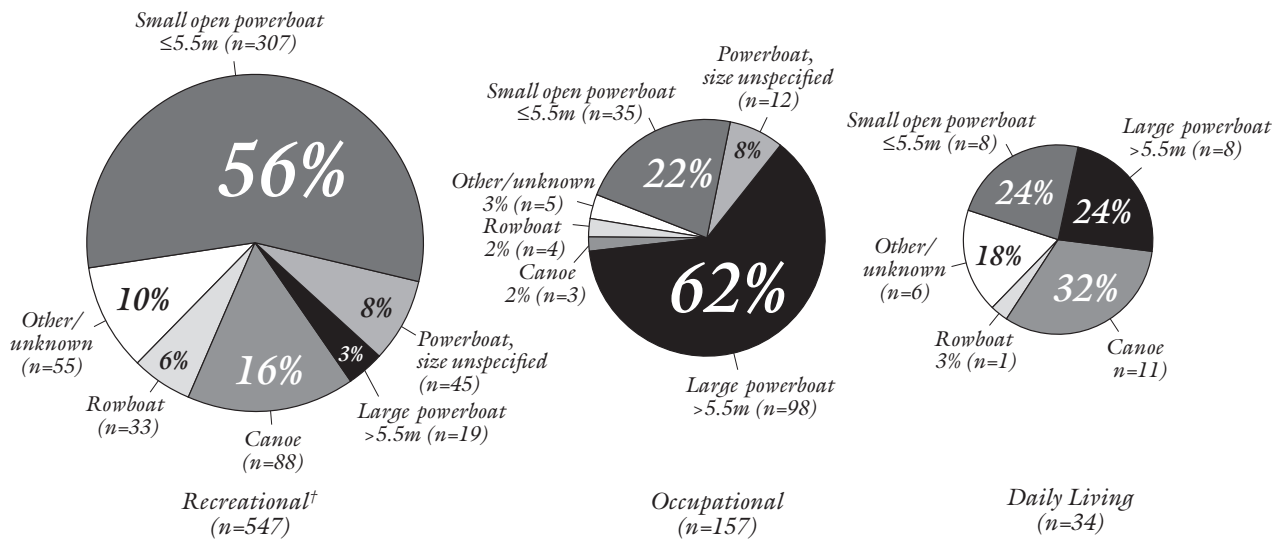


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

FISHING FROM A BOAT

Figure 19 FISHING IMMERSION DEATHS* DURING BOATING BY TYPE OF BOAT AND PURPOSE, CANADA 1991-2000 (n=738)

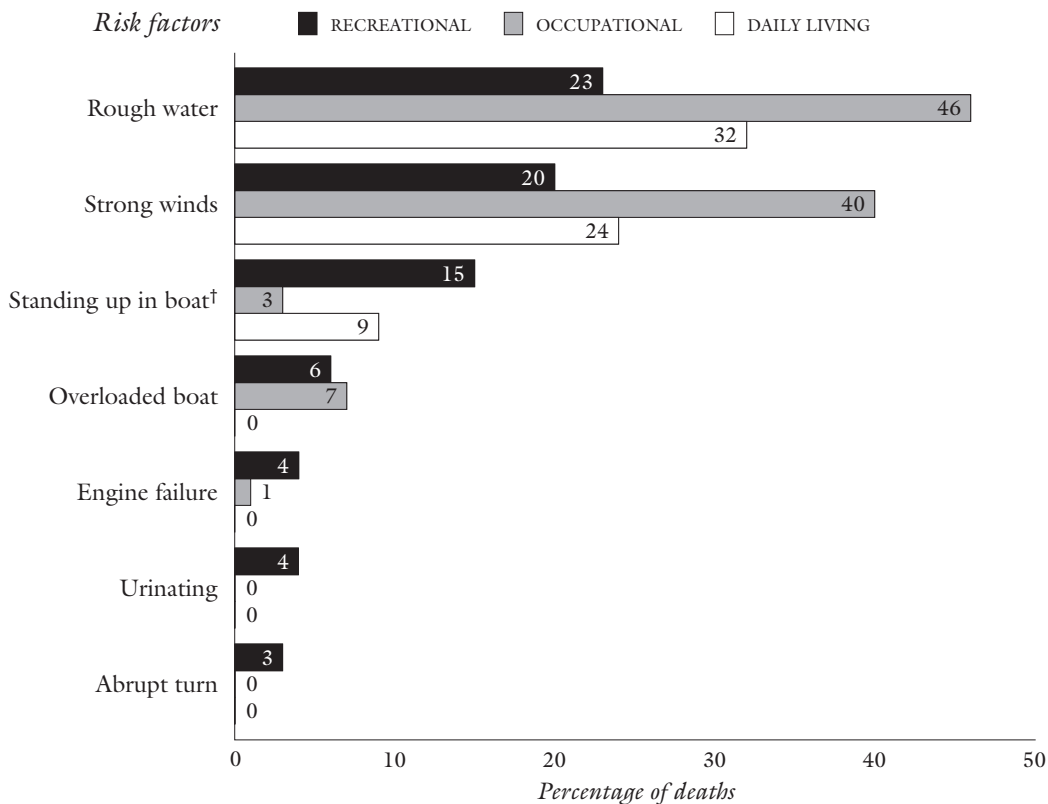


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† One recreational fisherman drowned while attempting rescue

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 20 FISHING IMMERSION DEATHS* DURING BOATING BY RISK FACTORS AND PURPOSE, CANADA 1991-2000 (n=738)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Other than to urinate

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

There were 547 deaths from recreational fishing during boating, accounting for 74% of all fishing immersion deaths during boating.

TYPE OF INCIDENT 41% of deaths resulted from capsizing, 27% from falling overboard and 15% from swamping. Other incidents included jumping overboard and collision (Figure 21).

PERSONAL RISK FACTORS

AGE AND SEX Nearly all recreational fishing deaths during boating involved adult males; women and children under 15 were at very low risk. Rates were high for all males 15 and older, particularly those 35-74 years. Improvement seen for most male age groups 15 and over between 1991-1995 and 1996-2000 (Figure 22).

ALCOHOL For persons 15 years and older, alcohol was involved or suspected in at least 40% of cases, probably more since alcohol was unknown for 27% (Figure 23).

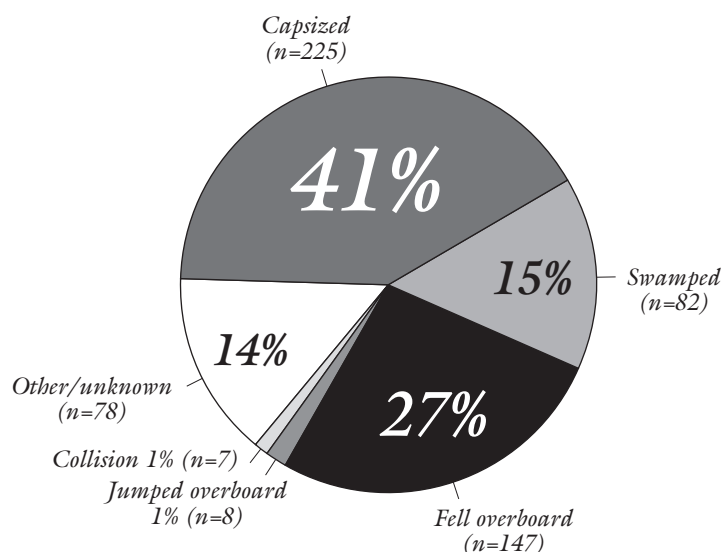
ETHNICITY At least 6% of victims were aboriginal, possibly more given that ethnicity was unknown for 38% of victims.

SWIMMING ABILITY was unknown for 66% of victims. Of the remainder, 56% were weak or non-swimmers, 24% were strong or average swimmers, and 19% were swimmers of unspecified ability.

BOATING EXPERIENCE was unknown for 73% of victims. Of the remainder, 69% were experienced boaters and 31% were inexperienced or occasional boaters.

Figure 21

IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY TYPE OF INCIDENT, CANADA 1991-2000 (n=547)

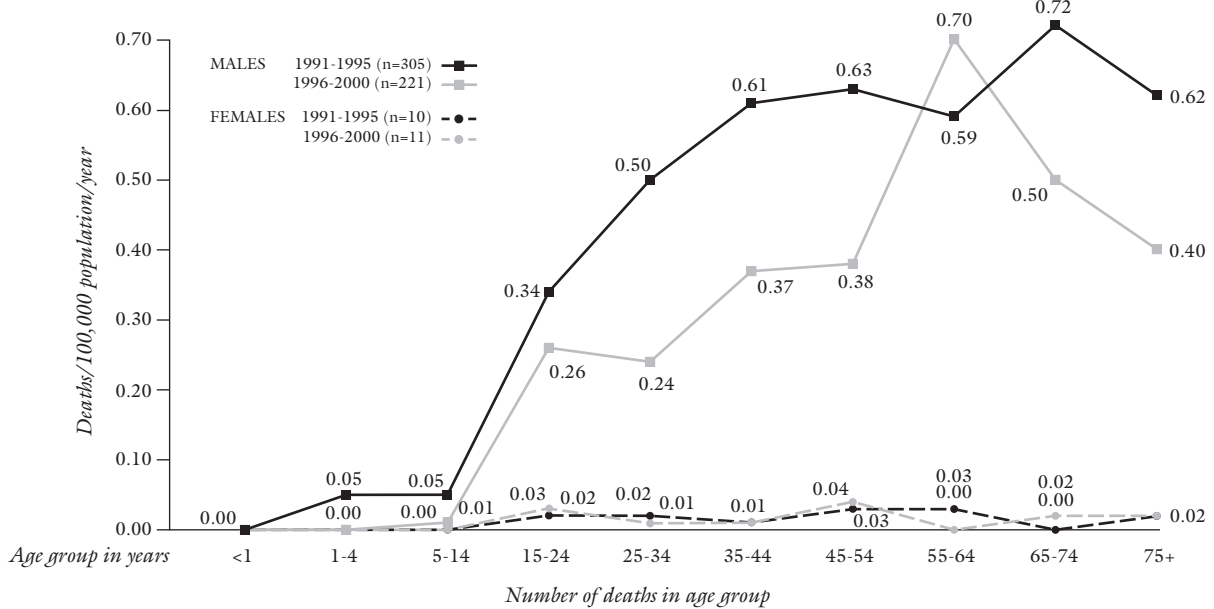


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 22

RATE AND NUMBER OF IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY AGE AND SEX, CANADA 1991-2000 (n=547)[†]



		Number of deaths in age group									
MALES	1991-1995	0	2	5	35	64	68	48	35	31	15
	1996-2000	0	0	1	27	29	46	36	44	24	11
FEMALES	1991-1995	0	0	0	2	2	1	2	2	0	1
	1996-2000	0	0	0	3	1	1	4	0	1	1

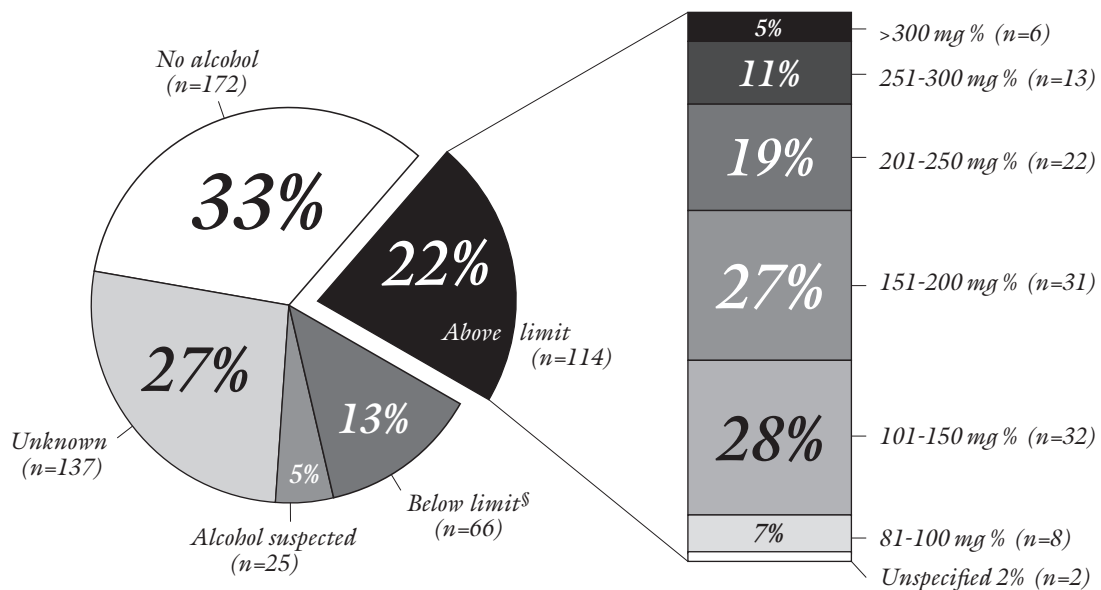
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

[†] Age unknown for 5 victims (males 1, 3; sex unknown, imputed male 1, 0)

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 23

BLOOD ALCOHOL LEVELS* FOR IMMERSION DEATHS[†] DURING RECREATIONAL FISHING FROM A BOAT, CANADA 1991-2000 (VICTIMS ≥15 YEARS OF AGE; n=539)^{‡§}



* Legal limit is 80 mg % † Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

[‡] This figure excludes 25 victims; decomposition rendered blood alcohol unreliable § 39 at 1-49 mg %, 22 at 50-80 mg %, 5 unspecified

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

EQUIPMENT FACTORS

FLOTATION The profile for recreational victims was similar to that for all boating victims (see Figure 17), with 11% of victims reported to be correctly wearing a flotation device.

TYPE OF BOAT As seen in Figure 19, at least 56% of recreational incidents took place in small open powerboats.

ENVIRONMENT FACTORS

BODY OF WATER Lakes were most frequent, followed by rivers and the ocean (Figure 24).

TEMPERATURE Water and air temperatures were unknown or unreported for a majority of deaths (Figure 25). For the remainder, cold or extremely cold water was present in 98% of cases, and extremely cold or cold air in 74%.

WIND AND WAVES Wind and wave conditions were unknown for a majority of victims. Where these conditions were known, the wind was strong for 55% and waves were rough or stormy for 57%.

ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that cold immersion was a factor in at least 34% of deaths.

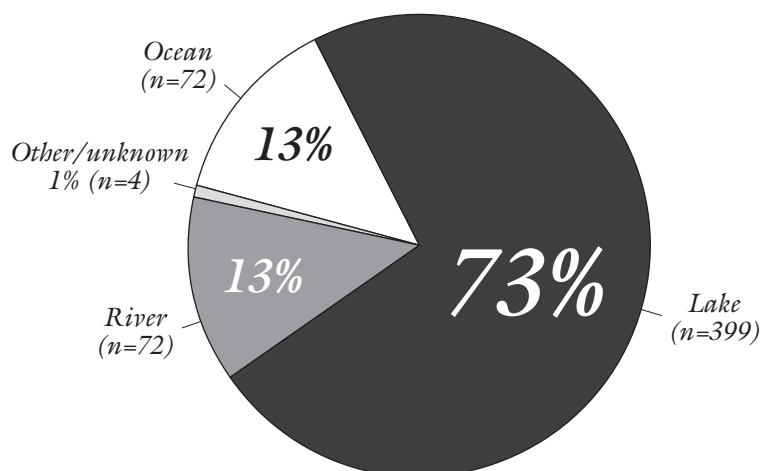
DISTANCE FROM SHORE was unknown for 56% of deaths. Of the remainder, 25% of immersions occurred within 15 metres of shore and 18% between 15 and 50 metres.

LIGHT CONDITIONS At least 53% of immersion deaths occurred in daylight, 12% at twilight and 10% in darkness. Light conditions were unknown for 26%.

MONTH & DAY OF THE WEEK 88% of fatalities occurred between May and October, with the highest number in May and June (Figure 26). Although drownings took place throughout the week, about 45% took place on Saturday or Sunday.

Figure 24

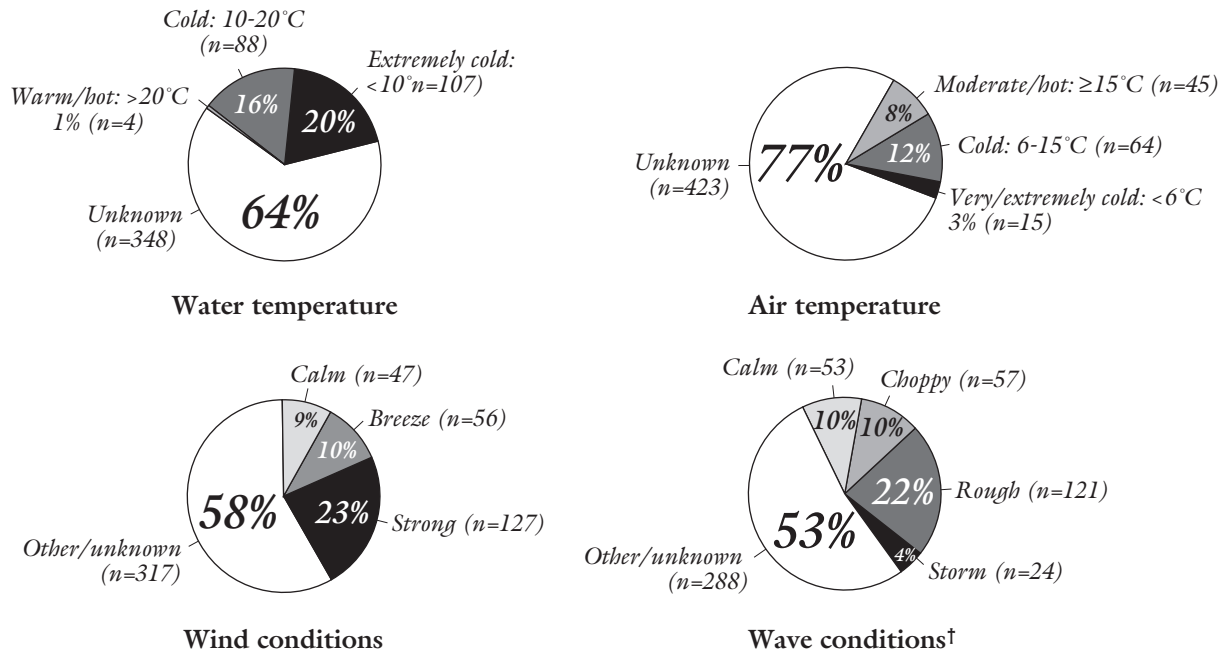
IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY BODY OF WATER,† CANADA 1991-2000 (n=547)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † "Lake" includes pond and reservoir
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 25

IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY ENVIRONMENTAL RISK FACTORS, CANADA 1991-2000 (n=547)



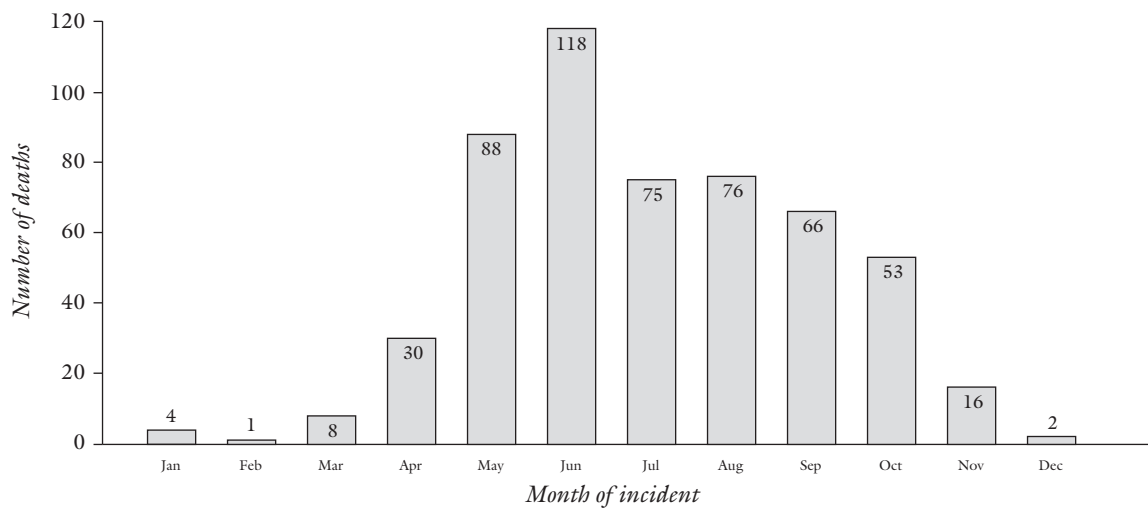
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Wave conditions were considered irrelevant for 4 deaths

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 26

IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY MONTH OF INCIDENT, CANADA 1991-2000 (n=547)†



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Month unknown for 10 deaths

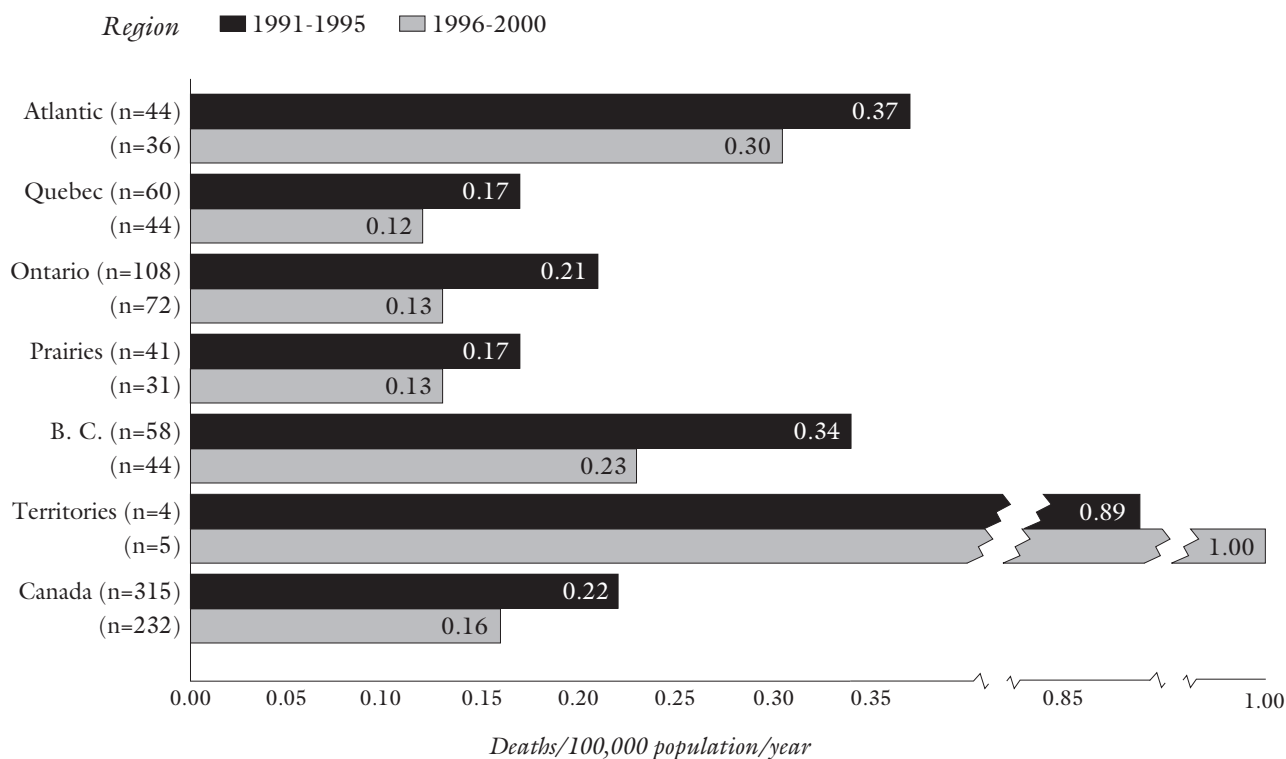
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

RATES AND TRENDS BY REGION The highest rates of fatality were seen in coastal regions, including the northern territories, the Atlantic provinces, and British Columbia. Between 1991-1995 and 1996-2000 there was significant improvement in all regions except the territories. The overall decrease for Canada was 30% (Figure 27).

ACCOMPANIMENT 70% of victims were accompanied by at least one adult, while 26% were alone, and 2% were accompanied by minor(s) only. Accompaniment was unknown for 3% of victims.

RESCUE An acute rescue for a potentially survivable victim of fishing immersion was carried out in only 31% of incidents, mainly by companions or bystanders (85%). Of these victims, 34% underwent CPR and/or rescue breathing.

Figure 27 **RATE AND NUMBER OF IMMERSION DEATHS* DURING RECREATIONAL FISHING FROM A BOAT BY REGION, CANADA 1991-2000 (n=547)**



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

There were a total of 162 occupational fishing immersion deaths in Canada during 1991-2000, 97% of which occurred during boating (see Figure 6). Occupational fishing accounted for 21% of all immersion deaths during fishing from a boat. Of these, 92% involved commercial fishing, 5% fishing guiding, and 4% aquaculture (see Figure 16).

TYPE OF INCIDENT In 46% of cases the boat capsized; other frequent circumstances included falling overboard and being swamped (Figure 28).

PERSONAL RISK FACTORS

AGE AND SEX Nearly all occupational fishing deaths during boating involved adult males; women and children under 15 were at very low risk. Rates were high for all males 15 and older, particularly for those 25-74 years. Overall the fatality rate decreased by 24% between 1991-1995 and 1996-2000, with improvement seen for most groups of males between 35 and 74 years, particularly for those 65-74 (Figure 29).

ALCOHOL was less frequently a factor for occupational incidents, though it was nevertheless involved or suspected for at least 10% of victims, possibly more since it was unknown for 48% (Figure 30).

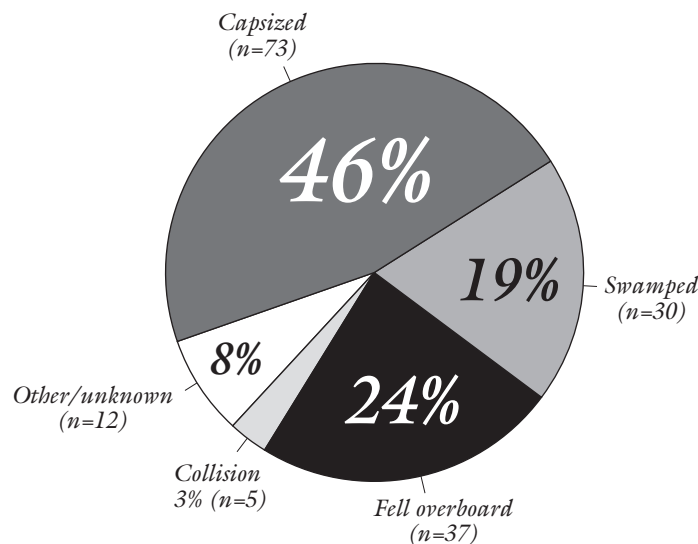
ETHNICITY At least 7% of occupational victims were aboriginal, perhaps more given that ethnicity was unknown for 25%.

SWIMMING ABILITY was unknown for 78% of victims. Of the remainder, 76% were weak or non-swimmers, 6% were strong or average swimmers, and 18% were swimmers of unspecified ability.

BOATING EXPERIENCE was unknown for 24% of victims. Of the remainder, 97% were experienced boaters and 3% were inexperienced or occasional boaters.

Figure 28

IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY TYPE OF INCIDENT, CANADA 1991-2000 (n=157)

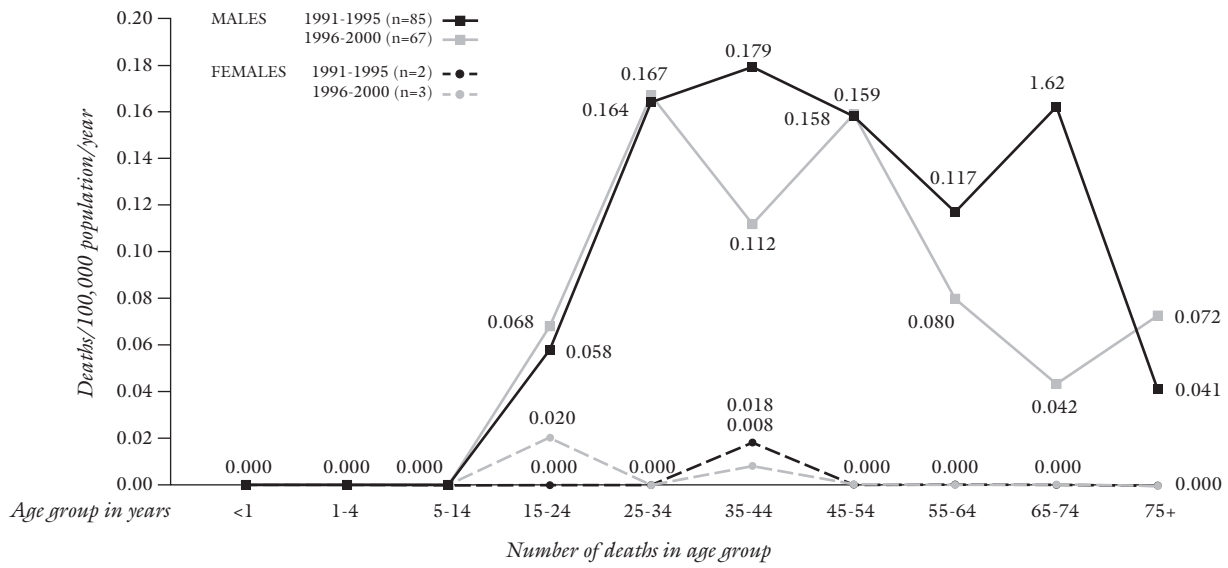


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 29

RATE AND NUMBER OF IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY AGE AND SEX, CANADA 1991-2000 (n=157)†



MALES	1991-1995	1996-2000	0	0	0	6	21	20	12	7	7	1
			0	0	0	7	20	14	15	5	2	2
FEMALES	1991-1995	1996-2000	0	0	0	0	0	2	0	0	0	0
			0	0	0	2	0	1	0	0	0	0

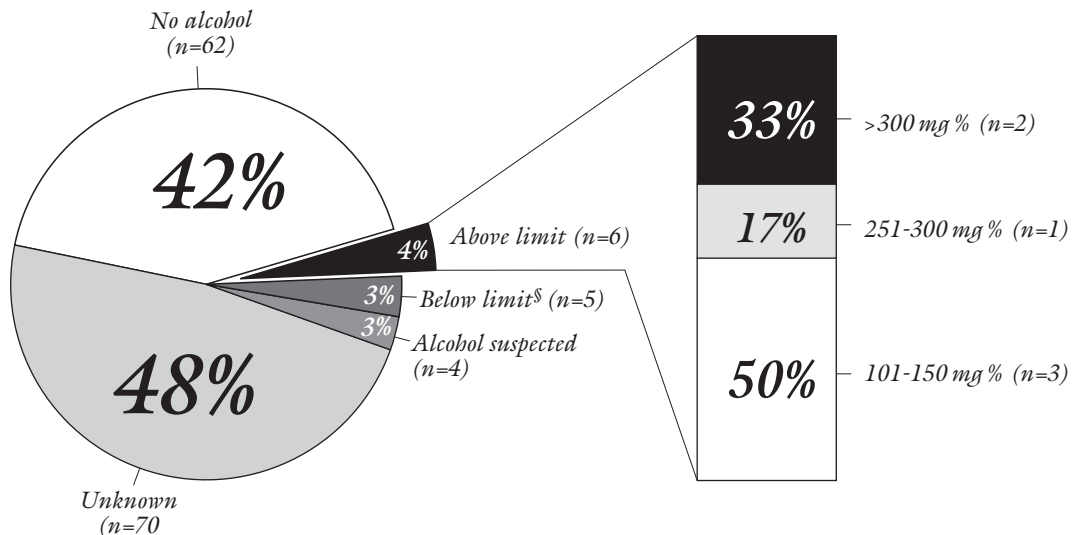
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Age unknown for 13 male victims (11, 2)

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 30

BLOOD ALCOHOL LEVELS* FOR IMMERSION DEATHS† DURING OCCUPATIONAL FISHING FROM A BOAT, CANADA 1991-2000 (VICTIMS ≥15 YEARS OF AGE; n=157)‡



* Legal limit is 80 mg % † Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

‡ This figure excludes 10 victims; decomposition rendered blood alcohol unreliable \$ 3 at 1-49 mg %, 1 at 50-80 mg %, 1 unspecified

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

EQUIPMENT FACTORS

FLOTATION The profile for occupational victims was similar to that for all boating victims (see Figure 17), with 10% of victims reported to be correctly wearing a flotation device.

TYPE OF BOAT As seen in Figure 19, 62% of occupational incidents took place in large powerboats, 22% in small powerboats and 8% in powerboats of unknown size.

ENVIRONMENT FACTORS

BODY OF WATER The ocean was the most frequent body of water for occupational incidents, followed by lakes and rivers (Figure 31).

TEMPERATURE Water temperature was unknown for 39% and air temperature for 61% of deaths (Figure 32). For the remainder, water was cold or extremely cold in all cases, and air was extremely cold or cold in 89%.

WIND AND WAVES Wind and wave conditions were unknown for 36% and 53% of victims respectively. Where these conditions were known, the wind was strong for 71% and waves were rough or stormy for 78% of victims.

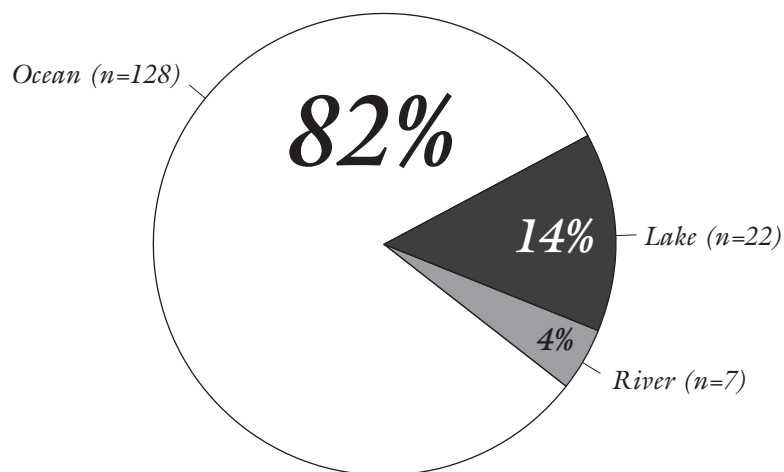
ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that cold immersion was a factor in at least 63% of deaths.

DISTANCE FROM SHORE This was unknown for 32% of deaths. Of the remainder, 16% of immersions occurred within 50 metres of shore.

LIGHT CONDITIONS At least 52% of immersions occurred in daylight, 6% at twilight and 23% in darkness. Light conditions were unknown for 19%.

Figure 31

IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY BODY OF WATER,† CANADA 1991-2000 (n=157)



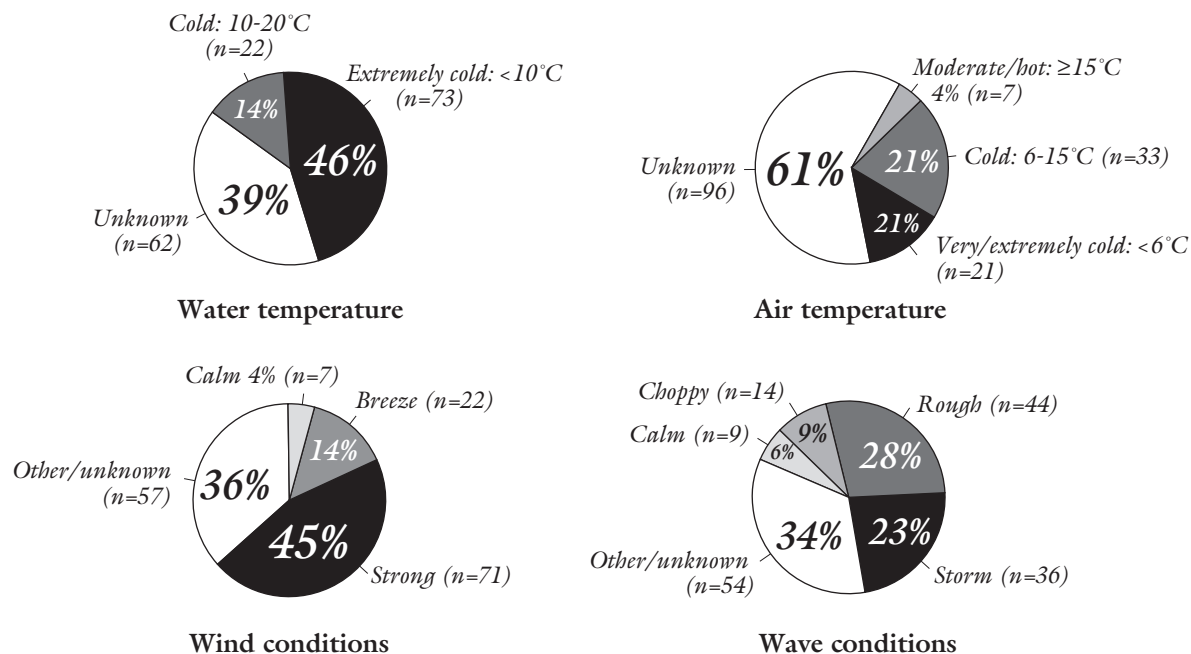
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Lake includes pond and reservoir

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 32

IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY ENVIRONMENTAL RISK FACTORS, CANADA 1991-2000 (n=157)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

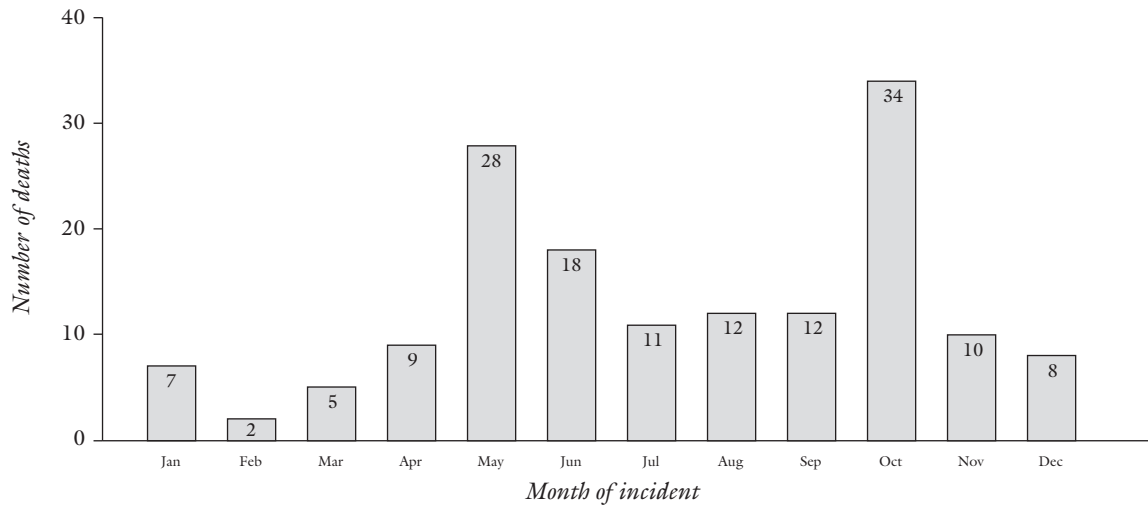
MONTH & DAY OF THE WEEK Occupational deaths occurred throughout the year, with peaks in May-June and October (Figure 33). While drownings took place throughout the week, 23% occurred on Tuesday and 18% on Sunday.

RATES AND TRENDS BY REGION The highest rate of fatality was seen in the Atlantic region, followed by British Columbia; there were no deaths in the northern territories. Between 1991-1995 and 1996-2000 there was significant improvement in British Columbia, the Prairies and Ontario; however, fatality rates increased for the Atlantic region and Quebec (Figure 34). The overall rate for Canada fell by 24%.

ACCOMPANIMENT 75% of victims were accompanied by at least one adult, while 20% were alone, and 1% were accompanied by minor(s) only. Accompaniment was unknown for 3% of victims.

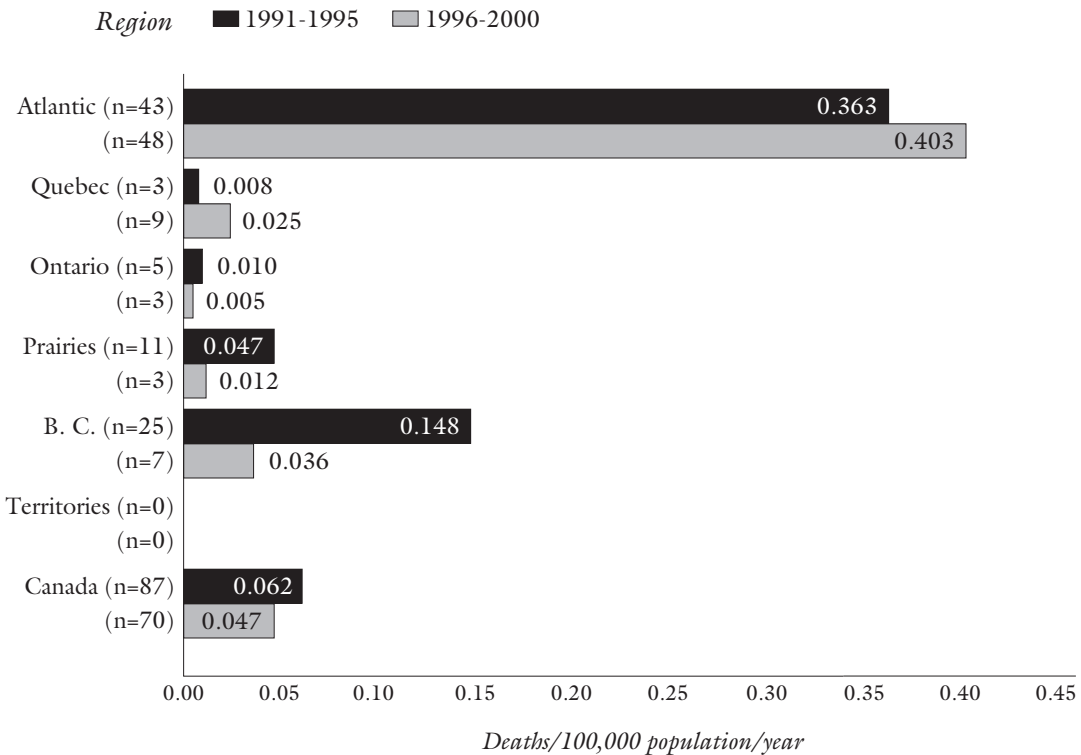
RESCUE An acute rescue for a potentially survivable victim of fishing immersion was carried out in only 30% of incidents, mostly by companions or bystanders (75%). Of these victims, 40% underwent CPR and/or rescue breathing.

Figure 33 IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY MONTH OF INCIDENT, CANADA 1991-2000 (n=157)[†]



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Month unknown for 1 death
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 34 RATE AND NUMBER OF IMMERSION DEATHS* DURING OCCUPATIONAL FISHING FROM A BOAT BY REGION, CANADA 1991-2000 (n=157)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

There were 40 fishing immersion deaths during daily life in Canada during 1991-2000; 34, 85%, of these deaths involved fishing from a boat (see Figure 6). Daily living accounted for 5% of all fishing immersion deaths during boating (see Figure 16). Daily living fishing is also referred to as subsistence fishing.

TYPE OF INCIDENT The most common type of incident resulted from capsizing, followed by falling overboard, collision, and swamping (Figure 35).

PERSONAL RISK FACTORS

AGE AND SEX Most victims were males between 15 and 74; however, 24% of victims were women and children, a higher proportion than for recreational or occupational fishing.

ALCOHOL Alcohol was present or suspected for at least 29% of victims over 15 years, possibly more since it was unknown for 33%.

ETHNICITY Nearly all daily living victims were aboriginal (Figure 36).

SWIMMING ABILITY Swimming ability was unknown for 77% of victims. Of the remainder, 71% were weak or non-swimmers, and 29% had unspecified ability.

BOATING EXPERIENCE Boating experience was unknown for 38% of victims. Of the rest, 95% were experienced boaters, while 5% were inexperienced or occasional boaters.

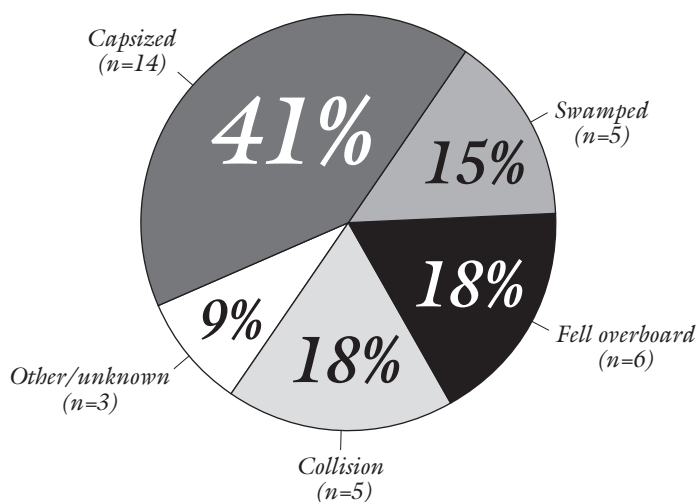
EQUIPMENT FACTORS

FLOTATION Only 1 person, or 3% of victims, was reported to be correctly wearing a flotation device (Figure 37).

TYPE OF BOAT As seen in Figure 19, daily living incidents were divided among canoes, large powerboats and small powerboats.

Figure 35

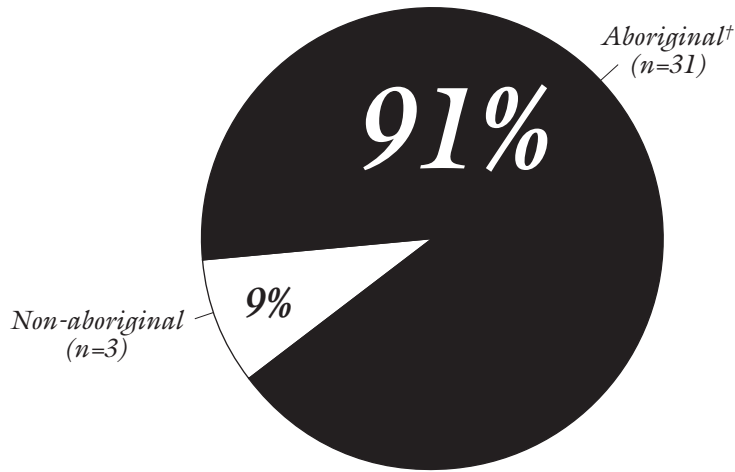
IMMERSION DEATHS* DURING SUBSISTENCE FISHING FROM A BOAT BY TYPE OF INCIDENT, CANADA 1991-2000 (n=34)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 36 IMMERSION DEATHS* DURING SUBSISTENCE FISHING FROM A BOAT BY ETHNICITY, CANADA 1991-2000 (n=34)

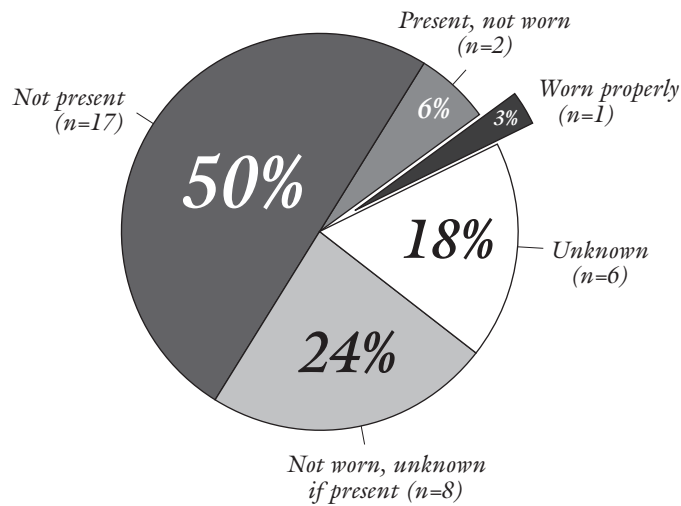


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Includes definite & probable aboriginals (First Nations, Inuit & Metis)

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 37 IMMERSION DEATHS* DURING SUBSISTENCE FISHING FROM A BOAT BY USE OF A FLOTATION DEVICE,† CANADA 1991-2000 (n=34)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† Personal flotation device (PFD) or lifejacket

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

ENVIRONMENT FACTORS

BODY OF WATER The most frequent bodies of water were lakes and the ocean (Figure 38).

TEMPERATURE Water temperature was unknown for 35% and air temperature for 56% of deaths. For the remainder, water was cold or extremely cold in all cases, and air was extremely cold or cold for 33%.

WIND AND WAVES Wind and wave conditions were unknown for 32% and 44% of victims respectively. Where these conditions were known, the wind was strong for 70% and waves were rough or stormy for 63% of victims.

DISTANCE FROM SHORE was unknown for 47% of deaths. Of the remainder, 6% of immersions occurred within 2 metres of shore and 17% between 2 and 50 metres.

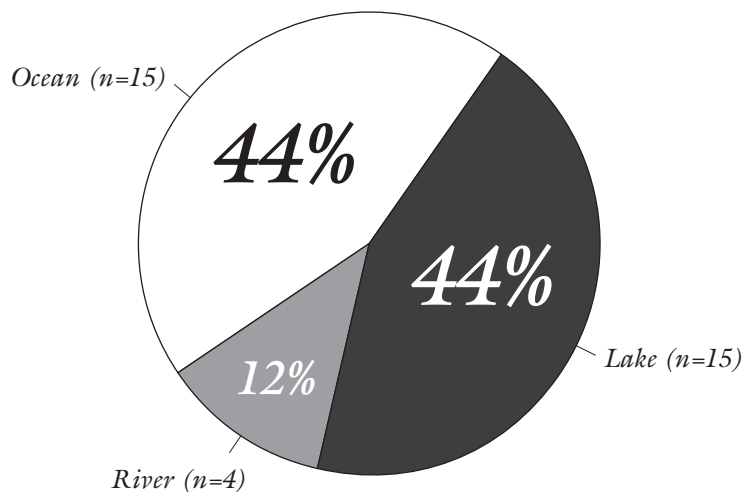
ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that cold immersion was a factor in at least 50% of deaths.

LIGHT CONDITIONS At least 50% of immersion deaths occurred in daylight, 21% at twilight and 6% in darkness. Light conditions were unknown for 24%.

MONTH & DAY OF THE WEEK 66% of daily living deaths took place from June to September; 38% occurred in July alone. While drownings took place throughout the week, 79% occurred between Saturday and Tuesday.

Figure 38

IMMERSION DEATHS* DURING SUBSISTENCE FISHING FROM A BOAT BY BODY OF WATER,† CANADA 1991-2000 (n=34)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† "Lake" includes pond and reservoir

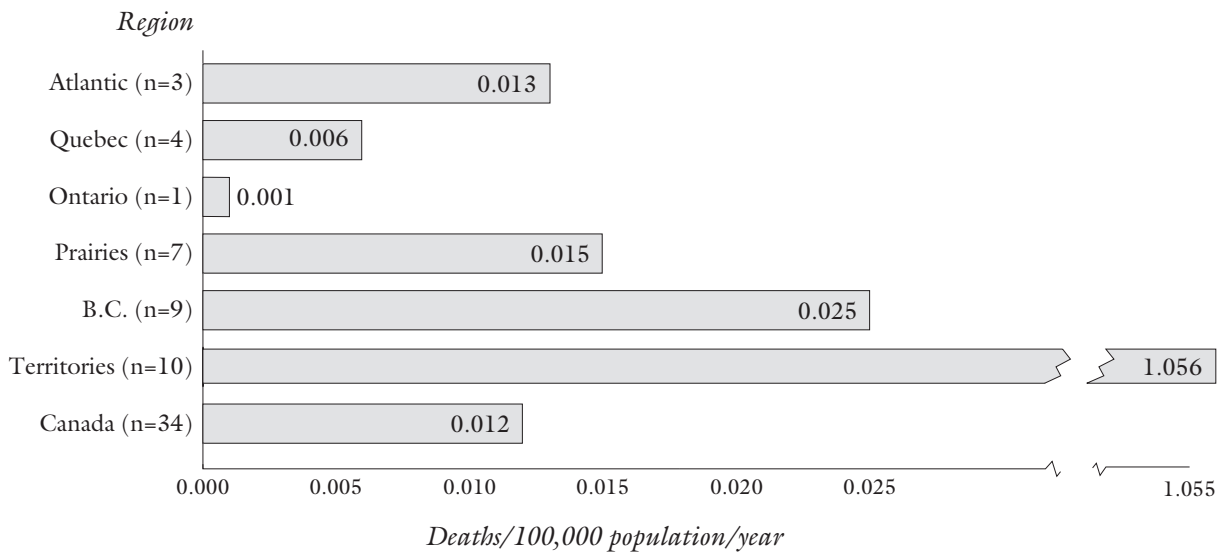
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

RATES BY REGION AND TRENDS The highest rate of fatality was seen in the northern territories, followed by British Columbia, the Prairies and the Atlantic region. The lowest rate was seen in Ontario (Figure 39). The rate was about the same during the 2 periods, with 16 deaths during 1991-1995 and 18 during 1996-2000.

ACCOMPANIMENT 76% of victims were accompanied by at least one adult, while 21% were alone, and 3% were accompanied by minor(s) only.

RESCUE An acute rescue for a potentially survivable victim was carried out in only 26% of incidents, mainly by companions or bystanders (89%). Of these, 33% underwent CPR and/or rescue breathing.

Figure 39 **IMMERSION DEATHS* DURING SUBSISTENCE FISHING FROM A BOAT BY REGION, CANADA 1991-2000 (n=34)**



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

There were 139 fishing immersion deaths in Canada during 1991-2000 that did not involve boating; 80, or 58%, of non-boating victims were fishing from shore.

TYPE OF INCIDENT The most frequent incident involved falling into water from the shoreline; a number of other victims fell from a dock, a cliff or a bridge (Figure 40).

PURPOSE The majority of victims were engaged in recreational fishing (Figure 41).

PERSONAL RISK FACTORS

AGE AND SEX All victims were 5 years and older; 98% were male (Figure 42). Boys between 5 and 14 years accounted for 11% of deaths, a higher proportion than for other kinds of fishing. The highest rates were seen for males 15-34 and those over 75.

ALCOHOL Alcohol was present or suspected for 44% of victims over 15 years, possibly more since alcohol was unknown for 21% (Figure 43).

ETHNICITY At least 60% of victims were aboriginal, possibly more since ethnicity was unknown for 38%.

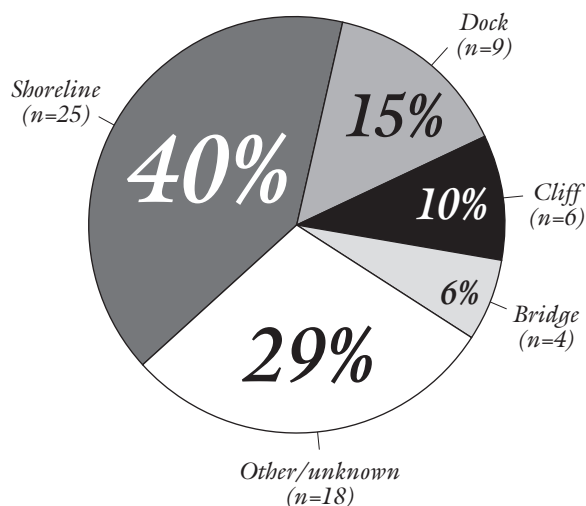
SWIMMING ABILITY This was unknown for 59% of victims. Of the remainder, 52% were weak or non-swimmers, 21% were average or strong swimmers, and 27% had unspecified ability.

EQUIPMENT FACTORS

FLOTATION Flotation was considered irrelevant in most cases, although a response was provided for 21% of victims. Of these, none was reported to be wearing a flotation device.

Figure 40

IMMERSION DEATHS* DURING FISHING FROM SHORE BY TYPE OF INCIDENT,† CANADA 1993-2000* (n=62)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

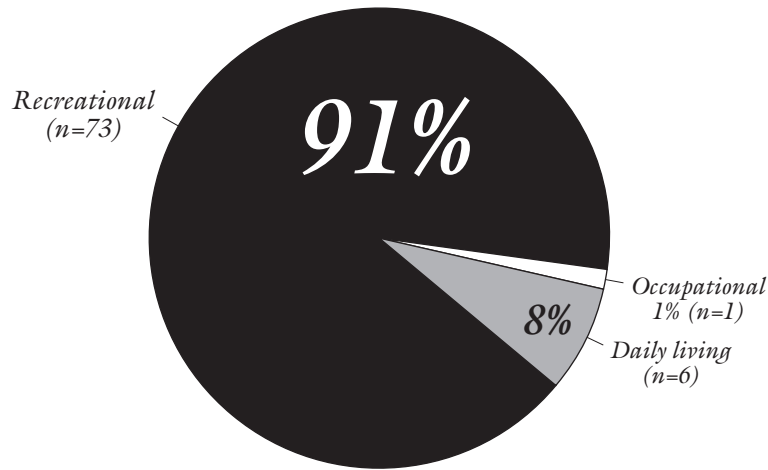
† Victims fell into water from various locations ‡ This information was not available for 1991-1992

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

FISHING FROM SHORE

Figure 41

IMMERSION DEATHS* DURING FISHING FROM SHORE BY PURPOSE, CANADA 1991-2000 (n=80)

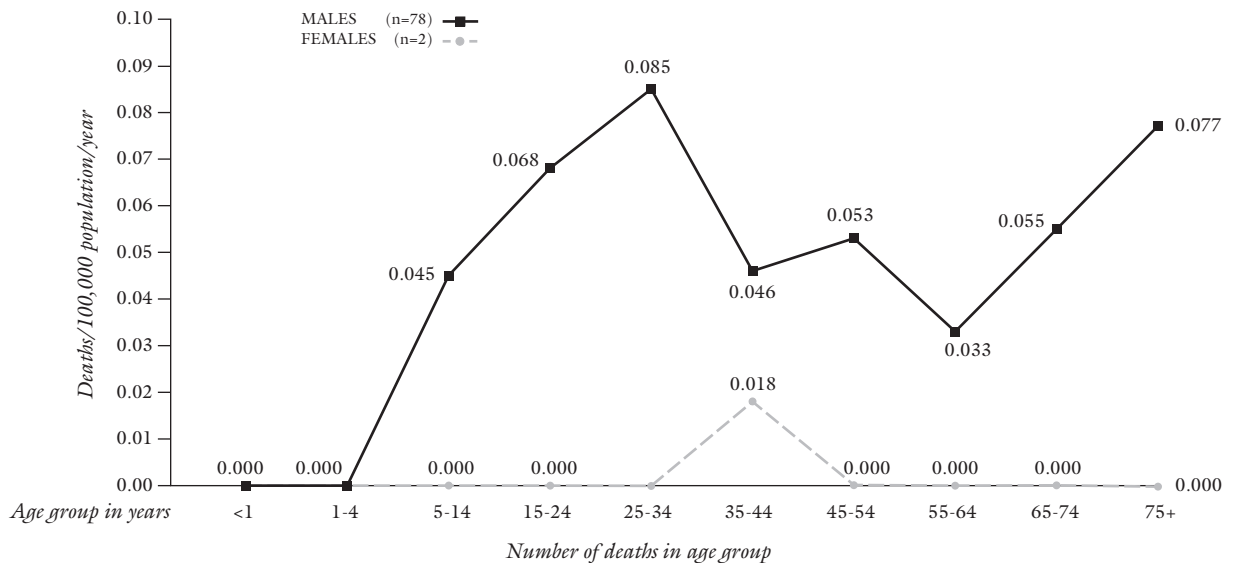


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 42

RATE AND NUMBER OF IMMERSION DEATHS* DURING FISHING FROM SHORE BY AGE & SEX, CANADA 1991-2000 (n=80)†



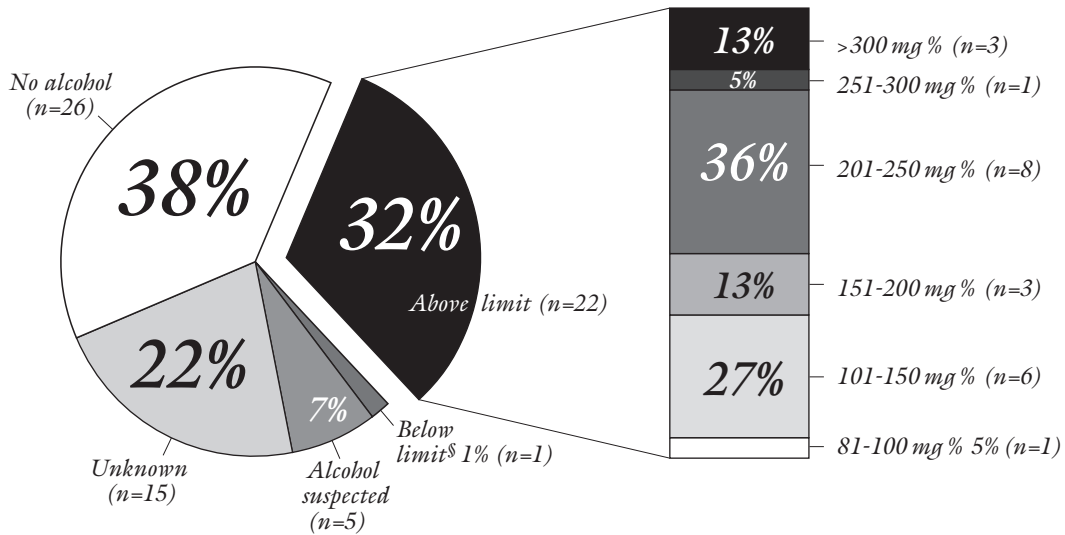
	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+
MALES	0	0	9	14	21	11	9	4	5	4
FEMALES	0	0	0	0	0	2	0	0	0	0

* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Age unknown for 1 male victim

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 43

BLOOD ALCOHOL LEVELS* FOR IMMERSION DEATHS† DURING FISHING FROM SHORE, CANADA 1991-2000 (VICTIMS ≥15 YEARS OF AGE; n=71)‡



* Legal limit is 80 mg % † Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

‡ This figure excludes 2 victims; decomposition rendered blood alcohol unreliable § 1 at 1-49 mg %

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

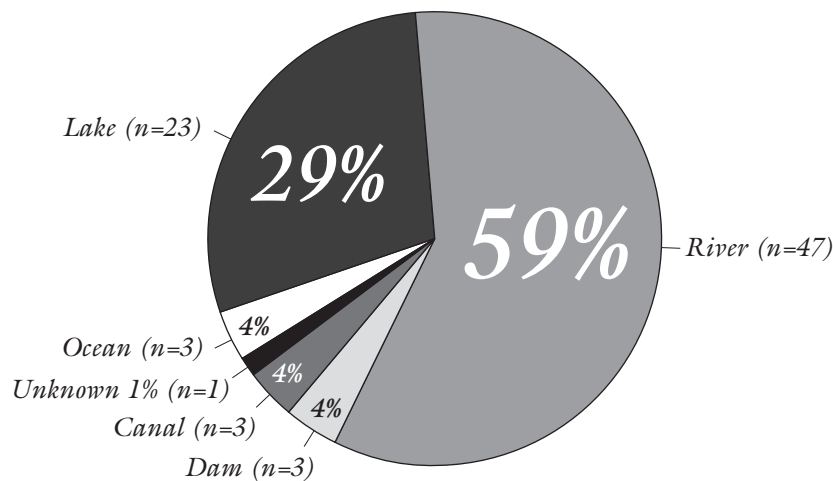
ENVIRONMENT FACTORS

BODY OF WATER Rivers were the most frequent body of water for immersion deaths during fishing from shore, followed by lakes (Figure 44).

CURRENT A probable factor in most river or dam incidents was current; in fact, strong or extreme current conditions were present in every case for which current was known (Figure 45).

Figure 44

IMMERSION DEATHS* DURING FISHING FROM SHORE BY BODY OF WATER,† CANADA 1991-2000 (n=80)



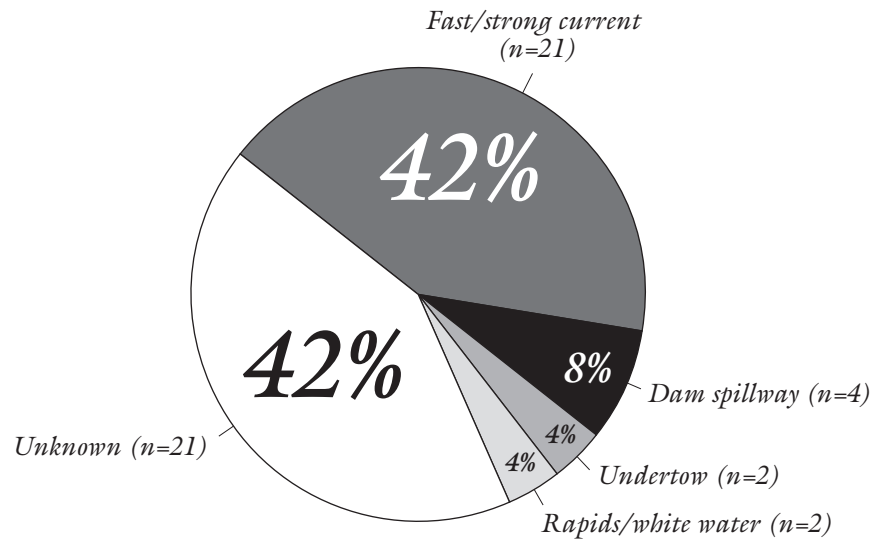
* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

† “Lake” includes pond and reservoir

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 45

RIVER OR SPILLWAY IMMERSION DEATHS* DURING FISHING FROM SHORE OR DAM BY TYPE OF CURRENT, CANADA 1991-2000 (n=50)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

TEMPERATURE Water temperature was unknown for 76% and air temperature for 69% of deaths. For the remainder, water was cold or extremely cold in all cases, and air was extremely cold or cold in 60%.

ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that extremely cold water played a role in at least 31% of deaths.

LIGHT CONDITIONS At least 54% of immersion deaths occurred in daylight, 8% at twilight and 15% in darkness. Light conditions were unknown for 24%.

MONTH & DAY OF THE WEEK 74% of immersion deaths during fishing from shore occurred between May and August; there were no deaths in December or January (Figure 46). While deaths took place throughout the week, 69% occurred between Friday and Monday.

RATES BY REGION AND TRENDS Rates across the country were similar, except for British Columbia, which had a rate double the national average (Figure 47). The overall number of immersion deaths during fishing from shore was similar during the 2 periods, with 44 during 1991-1995 and 36 during 1996-2000.

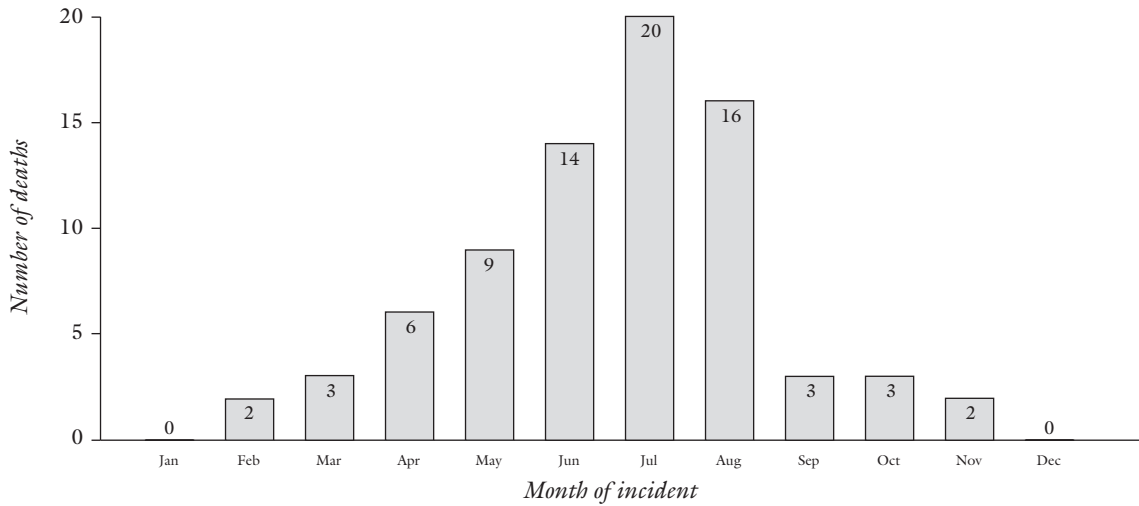
ACCOMPANIMENT 48% of victims were accompanied by at least one adult, while 42% were alone, and 4% were accompanied by minor(s) only. Accompaniment was unknown for 6% of victims.

RESCUE An acute rescue for a potentially survivable victim was carried out in 62% of cases, mainly by companions or bystanders (72%). Of these victims, 42% underwent CPR and/or rescue breathing.

FISHING FROM SHORE

Figure 46

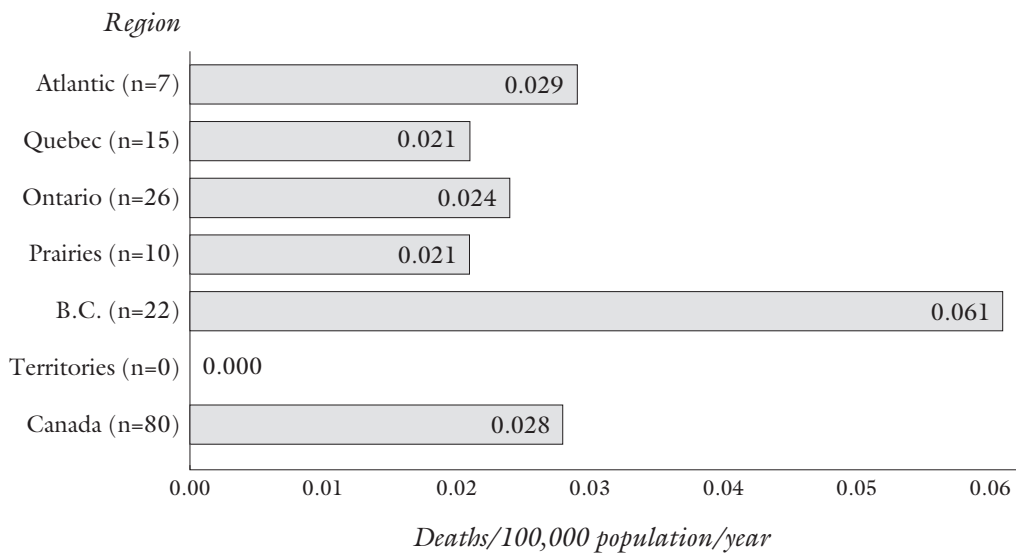
IMMERSION DEATHS* DURING FISHING FROM SHORE BY MONTH OF INCIDENT, CANADA 1991-2000 (n=80)†



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Month unknown for 2 deaths
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 47

RATE AND NUMBER OF IMMERSION DEATHS* DURING FISHING FROM SHORE BY REGION, CANADA 1991-2000 (n=80)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

FISHING IN WATER

In Canada during 1991-2000 there were 26 immersion deaths involving fishing in water (i.e. by wading), representing 19% of all non-boating fishing victims.

PURPOSE All victims were engaged in recreational fishing.

PERSONAL RISK FACTORS

AGE AND SEX All victims were 5 years and older; 96% were male. The highest rates were seen for victims 25-54 and 65-74 years (Figure 48).

ALCOHOL Alcohol was present or suspected for 21% of victims over 15 years, possibly more since it was unknown for 33%.

ETHNICITY 4% of victims were aboriginal, possibly more since ethnicity was unknown for 27%.

SWIMMING ABILITY Swimming ability was unknown for 65% of victims. Of the remainder, 56% were average or strong swimmers, 33% were weak or non-swimmers, and 11% had unspecified ability.

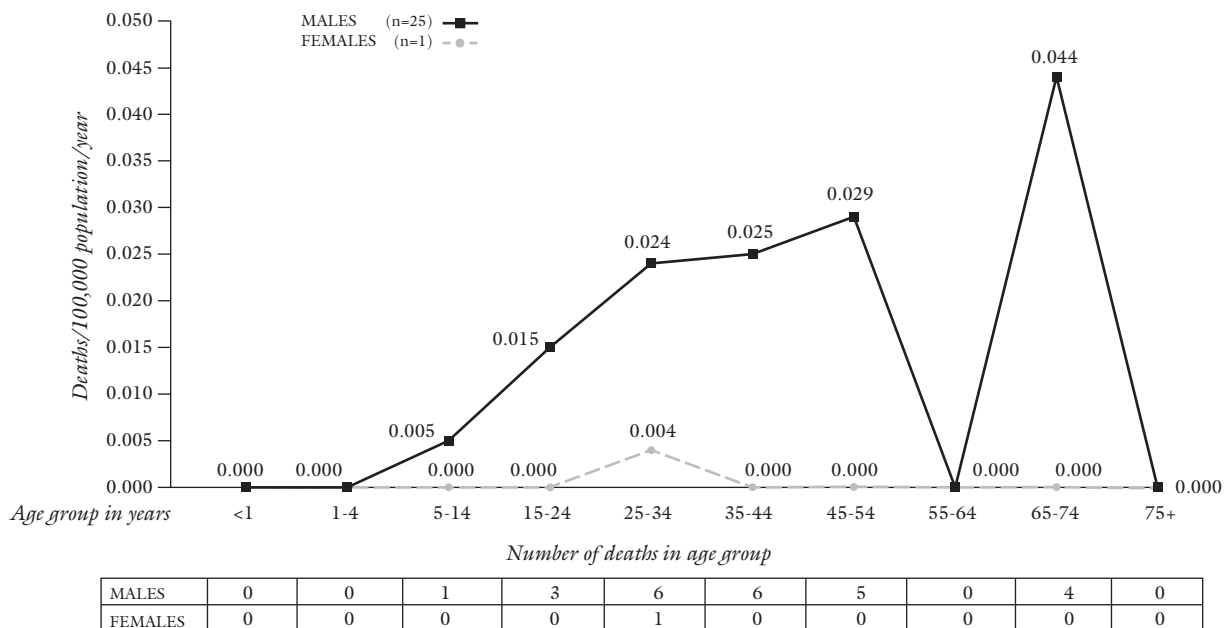
EQUIPMENT FACTORS

FLOTATION Flotation was considered to be irrelevant in 23% of cases. For the remainder, a flotation device was worn correctly by only 5%.

OTHER EQUIPMENT At least 27% of victims were wearing waders when the incident occurred.

Figure 48

RATE AND NUMBER OF IMMERSION DEATHS* DURING FISHING IN WATER BY AGE & SEX, CANADA 1991-2000 (n=26)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

ENVIRONMENT FACTORS

BODY OF WATER Rivers were the most frequent body of water for immersion deaths during fishing in water, followed by lakes and dams (Figure 49).

CURRENT Current was a probable factor in at least 90% of river or dam incidents (Figure 50).

DISTANCE FROM SHORE For 54% of deaths, distance from shore was unknown. Of the rest, 92% occurred within 15 metres of shore, and 8% more than 50 metres from shore.

TEMPERATURE Water temperature was unknown for 73% of cases; for the remainder, it was cold (10-20°C) for 86% and warm (>20°C) for 14%. Air temperature was unknown for 58% of deaths; for the remainder, it was cold (6-15°C) for 45% and moderate-hot (>15°C) for 55%.

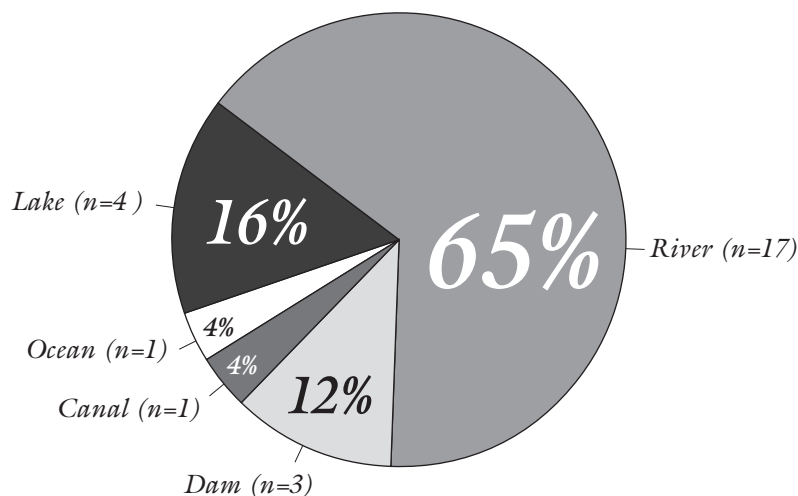
ICE AND COLD WATER Based on the criteria used in Module 2 of this series (*Ice & Cold Water*), it is probable that cold immersion was a factor in at least 35% of deaths.

LIGHT CONDITIONS AND TIME OF DAY 73% of immersion deaths occurred during daylight, 19% at twilight, and 4% in darkness; 4% were unknown. All incidents took place between 6 a.m. and 10 p.m., most frequently between 2 and 6 p.m.

MONTH & DAY OF THE WEEK All immersion deaths during fishing in water occurred between April and October; 69% took place in the summer months of June through August (Figure 51). 4% of deaths took place on Tuesday and none on Wednesday; the remainder were fairly evenly divided between Thursday and Monday.

Figure 49

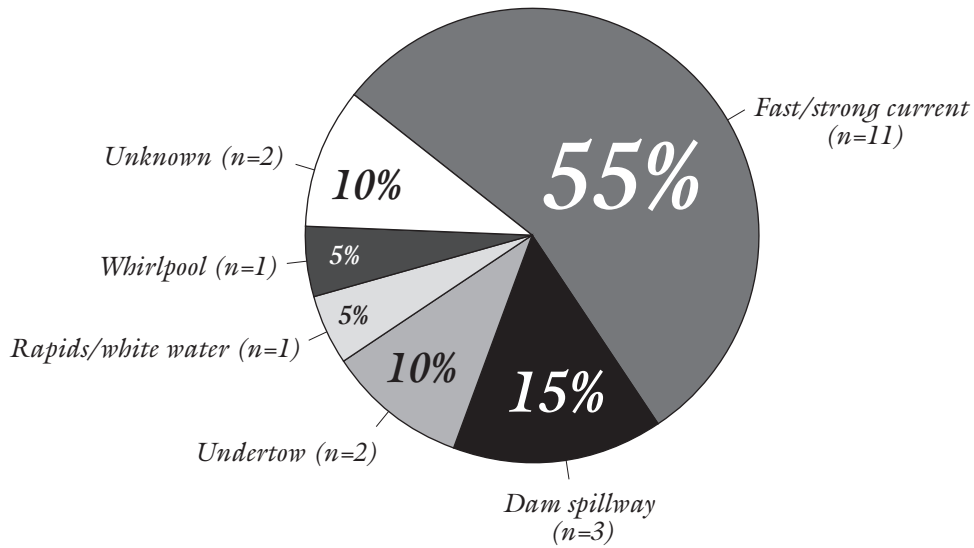
IMMERSION DEATHS* DURING FISHING IN WATER BY BODY OF WATER,† CANADA 1991-2000 (n=26)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † "Lake" includes pond and reservoir
 Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 50

RIVER OR DAM IMMERSION DEATHS* DURING FISHING IN WATER BY TYPE OF CURRENT, CANADA 1991-2000 (n=20)

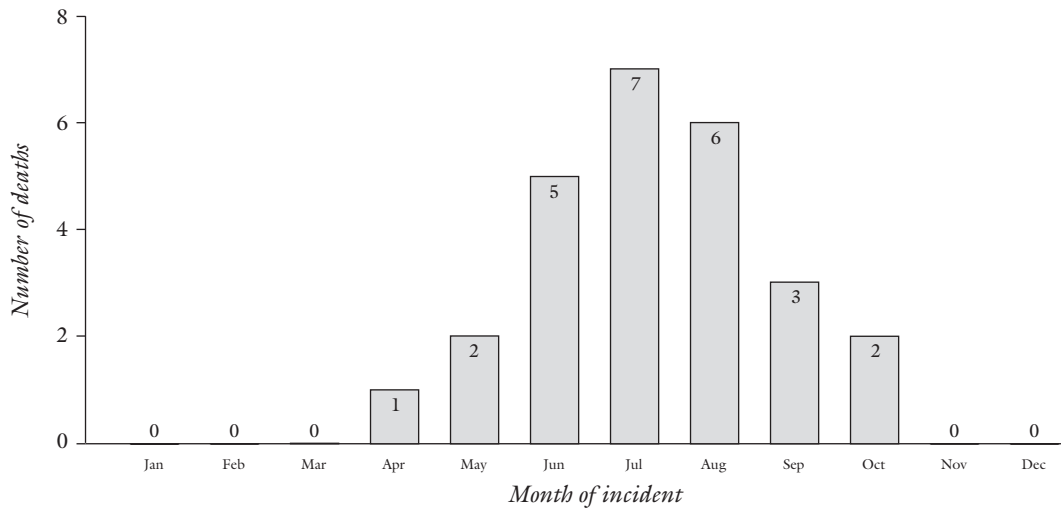


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 51

IMMERSION DEATHS* DURING FISHING IN WATER BY MONTH OF INCIDENT, CANADA 1991-2000 (n=26)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

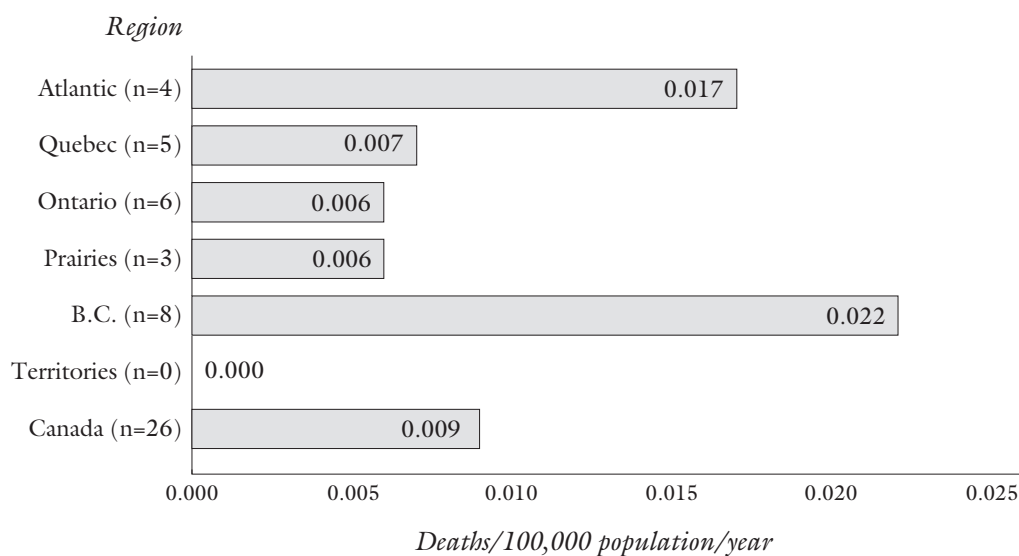
FISHING IN WATER

RATES BY REGION AND TRENDS Rates were higher in the coastal regions; however, the numbers are small and differences could have occurred by chance (Figure 52). The overall number of immersion deaths during fishing in water was similar during the two periods, 11 during 1991-1995 and 15 during 1996-2000.

ACCOMPANIMENT 50% of victims were alone, while 42% were accompanied by at least one adult, and 4% by minor(s) only. Accompaniment was unspecified for 4%.

RESCUE An acute rescue for a potentially survivable victim was carried out in 54% of incidents, always by companions or bystanders. Of these victims, 57% underwent CPR and/or rescue breathing.

Figure 52 **RATE AND NUMBER OF IMMERSION DEATHS* DURING FISHING IN WATER BY REGION, CANADA 1991-2000 (n=26)**



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

ICE FISHING

In Canada during 1991-2000 there were 32 immersion deaths during ice fishing, representing 23% of all non-boating fishing victims.

PURPOSE 91% of victims were engaged in recreational, 9% in occupational fishing.

TYPE OF INCIDENT 34% of cases involved motorized vehicles on ice (e.g. car, snowmobile, all terrain vehicle); the remaining victims were on foot.

PERSONAL RISK FACTORS

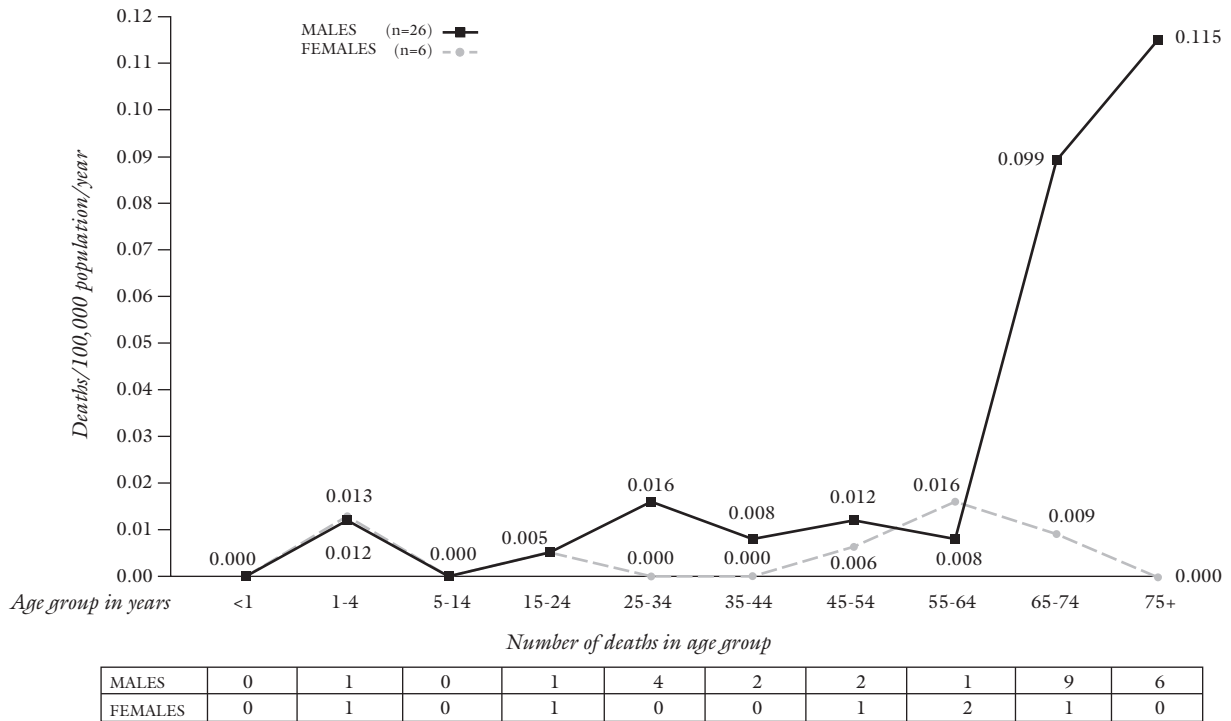
AGE AND SEX Ice fishing immersion death rates were high only for persons 65 years of age and over; 50% of victims were 65 to 75 years of age and older (Figure 53).

ALCOHOL was present or suspected for 29% of victims over 15 years, possibly more since alcohol was unknown for 29%.

ETHNICITY At least 50% of victims were aboriginal, possibly more since ethnicity was unknown for 25%.

Figure 53

RATE AND NUMBER OF IMMERSION DEATHS* DURING ICE FISHING BY AGE & SEX, CANADA 1991-2000 (n=32)



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

EQUIPMENT FACTORS

FLOTATION Flotation was considered to be irrelevant in most cases, although a response was provided for 31% of victims. Of these, none was correctly wearing a flotation device, though one was present for 20% of victims but either not worn or worn incorrectly. A flotation cushion was reported to be present in one case.

OTHER EQUIPMENT No other safety equipment (e.g. survival suits, ice picks) was reported for ice fishing victims.

ENVIRONMENT FACTORS

BODY OF WATER Most ice fishing deaths occurred in lakes (Figure 54).

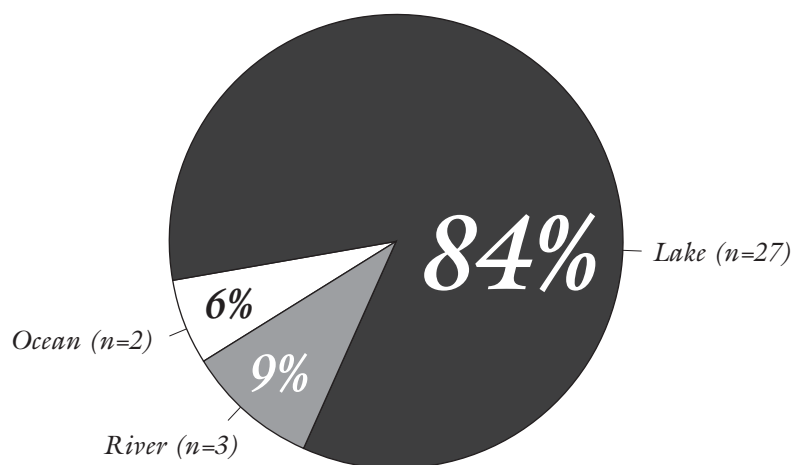
ICE CONDITIONS Thin ice was a factor in 56% of immersions. Other conditions included cracked ice, open hole and honey-combed ice (Figure 55).

LIGHT CONDITIONS AND TIME OF DAY 53% of victims died during daylight, 6% at twilight, and 16% in darkness; for 25% light conditions were unknown. Where time of day was known, all incidents took place between 6 a.m. and midnight, with most occurring between 10 a.m. and 6 p.m.

MONTH & DAY OF THE WEEK All incidents occurred between October and April; 62% occurred in December, January and March (Figure 56). While immersions took place throughout the week, 30% occurred on Saturday and only 3% on Sunday.

Figure 54

IMMERSION DEATHS* DURING ICE FISHING BY BODY OF WATER,†
CANADA 1991-2000 (n=32)

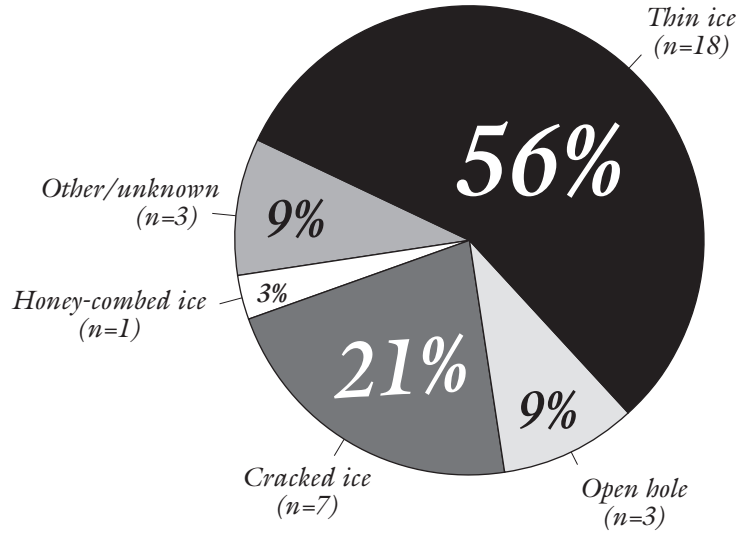


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † "Lake" includes pond and reservoir
Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

ICE FISHING

Figure 55

IMMERSION DEATHS* DURING ICE FISHING BY ICE CONDITIONS, CANADA 1991-2000 (n=32)

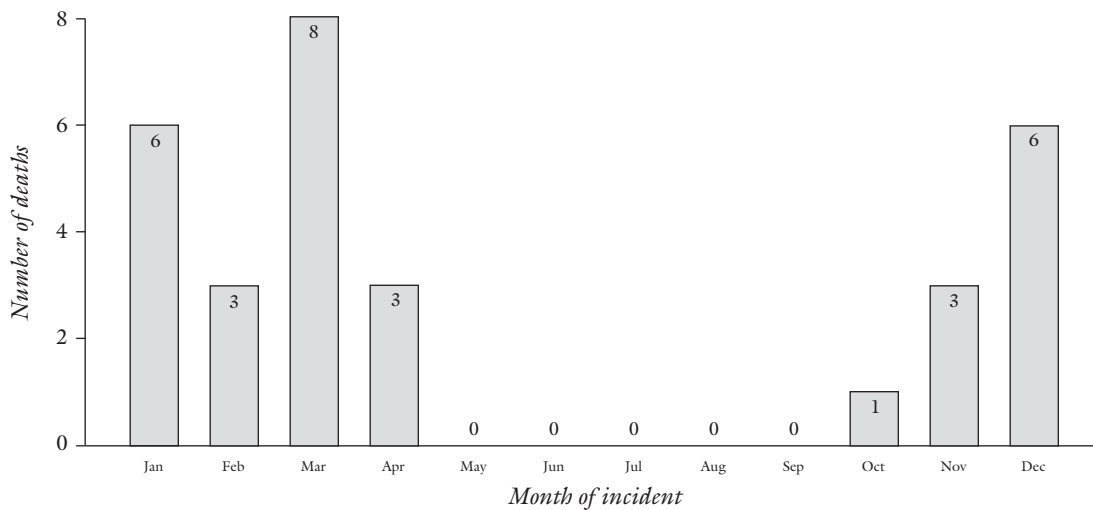


* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Figure 56

IMMERSION DEATHS* DURING ICE FISHING BY MONTH OF INCIDENT, CANADA 1991-2000 (n=32)†



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities † Month unknown for 2 deaths

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

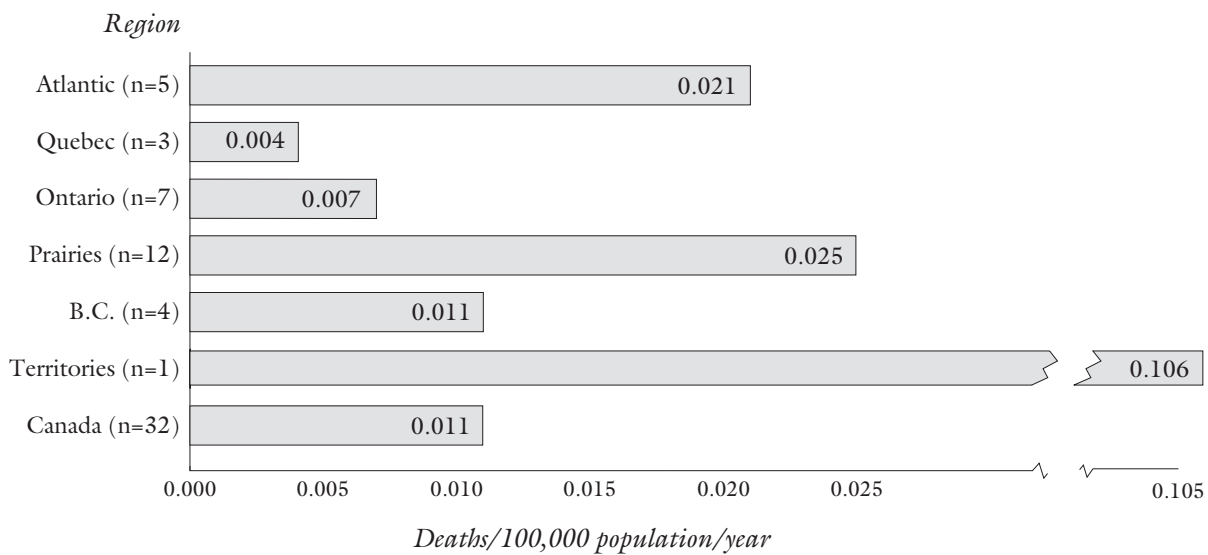
ICE FISHING

RATES BY REGION The northern territories had the highest rate of ice fishing immersion death (though only 1 fatality), followed by British Columbia and the Atlantic region, for whom rates were about 3 times those seen in the central provinces (Figure 57). The overall number of immersion deaths during ice fishing was similar during the two periods, 15 during 1991-1995 and 17 during 1996-2000.

ACCOMPANIMENT 66% of victims were alone, while 34% were accompanied by at least one adult.

RESCUE An acute rescue for a potentially survivable victim was carried out in only 22% of incidents, always by companions or bystanders. Of these victims, 14% underwent CPR and/or rescue breathing.

Figure 57 **RATE AND NUMBER OF IMMERSION DEATHS* DURING ICE FISHING BY REGION, CANADA 1991-2000 (n=32)**



* Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Fishing was the activity most frequently associated with water-related fatalities in Canada during 1991-2000, accounting for 15% of all deaths (889/5,900). Fishing represented 16% of immersion deaths (i.e. drowning and/or hypothermia), 18% of drownings apart from land and air transport, and 40% of boating drownings.

Fishing from a boat accounted for 84% of fishing immersion deaths; the remainder involved fishing from shore, fishing in the water (i.e. wading), ice fishing, or, in one case, travelling to a fishing destination by bush plane. A majority of incidents occurred during recreational fishing.

COMMON RISK FACTORS

Nearly all fishing victims were adult males, extending through all ages to the very elderly; few victims were women or children less than 15 years of age. Alcohol was a probable factor in at least 1 in 3 deaths, though it was less frequent for occupational incidents. Where swimming ability was known, a majority of victims were weak or non-swimmers. Surprisingly, many boating victims were experienced boaters, so boating experience was not necessarily protective.

Failure to properly wear a flotation device was a major risk factor, not only for boaters but also for those fishing from shore, in the water, or through ice. In some cases flotation devices were present, but many victims fell into the water and would not have been able to retrieve and put one on in the adverse conditions associated with most fatal incidents, especially when combined with poor swimming ability.

Small open boats were most frequently associated with fatal **boating** incidents, with the exception of commercial fishing, where larger boats were often involved. Wind and waves were common factors. Cold immersion was a factor in at least half of boating deaths. Cold water and adverse weather were even more common for occupational incidents, with cold immersion a factor in about 2 in 3 occupational deaths. Higher fatality rates were seen in coastal regions, particularly in the Atlantic provinces and the northern territories. Many recreational boating incidents occurred within 50 metres of shore.

For those **fishing from shore or in the water**, current was an important risk factor for rivers and near dams. Current-related fatalities were most common in British Columbia, followed by the Atlantic region.

Nearly all **ice fishing** victims were over 65 years of age, most were alone, and at least half were aboriginal. A snowmobile or other motorized vehicle was involved in about 1 in 3 cases.

TRENDS

There was a 26% reduction in the overall rate of fishing immersion fatality between 1991-1995 and 1996-2000. The greatest improvement was seen in British Columbia and the northern territories. In the Atlantic region there was some improvement for recreational fishing, but the large decrease in occupational fishing incidents seen in British Columbia did not occur in the Atlantic region. Further research could help determine whether the overall reduction in fishing fatalities was due to improved safety practices or to changes in exposure to fishing activity.

HOW TO PREVENT FISHING IMMERSION DEATHS

MODIFY PERCEPTION OF RISK

Fishing deaths were often the result of multiple risk factors which interacted to compound the level of risk. Many victims were out in adverse weather, fishing in cold water with fast current, few were wearing basic protection such as a flotation device, many were weak or non-swimmers, and many had consumed alcohol. This suggests that many fishers, even those described as experienced boaters, have a flawed perception of risk. Hence a key issue

in prevention is teaching fishers, and those who undertake fishing from time to time, to modify their perception of risk to a more realistic level.

WEAR FLOTATION

The importance of wearing an approved flotation device during boating is generally acknowledged, but flotation should be a key element of prevention for all types of fishing. Those who fish from shore, in the water, or on ice should consider the consequences of an unexpected immersion.

Nowadays, few Canadians are reckless enough to ride in a vehicle without the protection of a safety belt, but it must be worn, not simply present. Just as we cannot decide to put on a safety belt during a crash, it is not generally feasible to find, retrieve, and put on a flotation device once a water-related incident is underway.

Since comfort is a key factor in the wearing of flotation devices, comfortable flotation needs to be developed and marketed effectively.

BOAT SMART

Since 5 in 6 fishers who died from immersion were fishing from boats, boating safety is a priority for prevention.

PERSONAL FACTORS Boating experience did not appear to be protective, suggesting that experience alone without appropriate knowledge, attitudes and practices may give a false sense of security. Therefore, it is essential that research-based training in key elements of boating safety be included in boating education programs. The presence in society or in local communities of a safety culture for boating can also be considered a positive factor.

Many victims were weak or non-swimmers, so fishers who use boats, and indeed all fishers, should obtain training in swimming. Since rescue is seldom available in remote locations, and many incidents occur relatively close to shore, boaters need to be capable of self-rescue, including swimming to shore when this is the appropriate choice. And since alcohol was a major risk factor for both operators and passengers, it should be prohibited on board, as it is in cars.

EQUIPMENT FACTORS Flotation and hypothermia protection have already been discussed, and are major priorities for fishers in boats. Another important factor is the type of boat. The fact that many fishers are lost during adverse weather conditions with high winds and large waves suggests that their small open boats may not be designed for such conditions. Flotation, freeboard, and other design features are often at a minimum in order to make boats less expensive. Hence some sort of safety rating system of small- to medium-sized boats might be helpful, so that purchasers have an idea of the wind and wave conditions a boat has been designed to withstand. Many cars are now fitted with temperature sensors, and the same should be true for boats and/or motors, with warning alerts when water temperature is below 15°C. Since adverse weather is a factor, wind and wave sensors could also be helpful, together with a simple weather radio.

ENVIRONMENT FACTORS Cold water was a frequent factor in boating incidents, since fishers tend to be out on the water early and late in the season, when air temperatures may be deceptively warm compared with water temperatures. As well, reverse temperature stratification that occurs when water is close to the freezing point can cause surface temperatures to be colder than deeper water, intensifying cold shock in the event of an immersion. Adverse weather was another factor frequently associated with fishing immersion deaths. However, this ultimately relates back to personal factors, since knowledge and attitudes influence the decision to go out or stay out when adverse conditions arise.

Since environmental hazards were present in a majority of occupational fishing incidents, and basic safety equipment such as flotation devices and cold protection were rarely used, special attention to issues of safety may be needed for commercial fishers, including owners and captains of vessels.

UNDERSTANDING HAZARDS AND PREVENTION OF COLD IMMERSION

Fishers, especially those who fish in the ocean, large lakes, and fast rivers, and during spring and fall when the hazards of cold immersion are greater, should be familiar with how to avoid cold immersion and how to respond when it occurs. It is highly recommended that all fishers review Module 2 of this series, *Ice & Cold Water*. A brief summary of its main points is reproduced here.

The *four stages of death* from cold immersion (Brooks/Transport Canada, 2003; Golden & Hervey, 1984), include:

- STAGE 1.** Gasping and cold shock
- STAGE 2.** Swimming failure
- STAGE 3.** Hypothermia
- STAGE 4.** Post-rescue collapse

Most cold-water immersion deaths occur during the first two stages, rather than from generalized hypothermia. Knowledge of the effects of these stages is essential for prevention, and should be well understood by all fishers. Unexpected falls into water can occur at any time without warning. Because immersion in cold water at $\leq 15^{\circ}\text{C}$ can kill almost immediately without the presence and proper use of flotation equipment, any immersion is potentially fatal and should be avoided if at all possible.

Flotation is essential to minimize the degree of immersion as well as to prevent submersion of the airways. Prevention of hypothermia is necessary mainly where immersion is prolonged, such as during incidents far from shore on large lakes or oceans, or near dangerous rocks and cliffs in rough seas. Prevention of post-rescue collapse after prolonged immersion involves appropriate handling of a victim during and after rescue.

Since they are least understood and most important for the general public, now consider details of stages 1 and 2 of the event phase of cold immersions:

STAGE 1. GASPING/COLD SHOCK Death can occur rapidly during the first few minutes of immersion from so-called cold shock. The use of the term “shock” for this stage could be misleading, since in most types of clinical shock the blood pressure drops dangerously low, whereas in response to cold it can rise very high. It is helpful to remember that the “shock” or stress of sudden immersion in cold water leads to various responses by the body, the most serious of which is involuntary gasping respirations, which, if the airways are below the surface when this response occurs, can lead to *aspiration of water* resulting in drowning. A temporary decrease in or loss of consciousness due to the effects on the brain of rapid deep breathing (hyperventilation) could also be fatal in the context of immersion (Mantoni et al., 2007). Death may also occur as a result of cardiac arrhythmias. The biochemical effects of hyperventilation on muscles might also impair the ability to swim or tread water.

STAGE 2. LOSS OF MANUAL PERFORMANCE Next in the time sequence is *loss of strength in the limbs* due to cooling of muscles and nerves. Nerves may fail to signal muscle to contract, and muscle may be unable to contract (Tipton and Golden, 2006). First to go may be the fine muscles of the hands. Ability to hang on to an overturned boat is lost, the individual is unable to perform activities such as putting on or fastening a flotation device, and, more gradually, loses the ability to swim effectively. The effects of stage two may result from both local cooling and from the shutdown of blood to the limbs in response to cold. Limb strength is necessary for a person floating in water to help keep the face turned away from wind and waves so that water is not aspirated into the lungs. If the victim is unable to keep the airways above the surface or away from waves, drowning will occur.

On a positive note, it was found in experiments in Sweden and the United Kingdom that volunteers were able to swim for at least an hour in water at 10°C , and most swam for 90 minutes (Tipton et al., 1999). Even among volunteers who swam for 90 minutes in water at 10°C , the problem leading to swim failure was not hypothermia, which by definition is generalized and affects the core of the body, but rather local muscle cooling of the limbs.

Other experiments with swimmers wearing a personal flotation device (PFD) showed that they were able to swim an average of 889 metres in water at 14°C and 650 metres at 10°C before swim failure (Wallingford et al., 2000, Kenny et al., 2000). During another study in Canada of both novice and expert swimmers, it was observed that both groups could swim for about 45 minutes in 10°C water before incapacitation. The expert swimmers could swim faster and were able to swim an average 1.4 km, compared with 820 m for the novices, with an average distance for both groups of 1.1 km (Lounsbury 2004, Lounsbury and Ducharme 2005). However, these results may not always apply to an unexpected injury incident in dark and/or stormy conditions.

Now consider some *practical implications* of the four stages of death from immersion. First, for people who fall into very cold water, *protection of the airway* from gasping associated with sudden exposure to cold is very important. Otherwise, water can be inhaled and drowning initiated rapidly. Hence from a practical perspective, this stage is a phase of *gasping/acute drowning* and also of sudden cardiovascular effects. For prevention of sudden drowning, use of appropriate flotation helps keep the body higher and the mouth and nose out of the water to minimize inhalation, i.e., prevents submersion of the head during this critical phase. Appropriate flotation should also help to avoid submersion of the airways if consciousness or use of muscles is temporarily impaired due to hyperventilation. Specialized flotation devices are now available to boost the body high out of the water during this stage of immersion. Other protection of airways such as splashguards has been recommended.

Whatever the equipment that happens to be available, the victim of a sudden cold immersion should concentrate on protecting their airway from cold water inhalation until their breathing stabilizes and gasping stops (Ducharme, 2006). This would include avoiding swimming for a few minutes during the cold shock period, until the massive gasping, rapid breathing, high blood pressure, and rapid heart rate have a chance to subside. Only then should the individual decide on a course of action.

Practical implications of the sequence of progression and rapidity of loss of strength of hands and later limbs, known as the *incapacitation phase*, include the fact that hanging on to an overturned boat is a reasonable survival strategy only if rescue will be rapid. If rescue is delayed, the immersed person will lose the ability to hang on — this can occur within 10-15 minutes — or even to keep the face away from wind and waves, and will drown. Unfortunately, with both nerve conduction and muscle contraction blocked, and with no blood flowing to the limbs, mind cannot control matter.

Hence if one is immersed in cold water, unable to climb out of the water onto a stable object, drifting away from shore, and rapid rescue is unlikely, it may be preferable to swim to safety, especially if the distance is not too great, one is a good swimmer, and wearing a flotation device, i.e., immediate self-rescue. Red Cross drowning data support such an approach (Sawyer and Barss 1998). As noted above, it may be feasible to swim up to about one kilometre in cold water.

On the other hand, if the distance is great and/or rapid rescue by others is known or probable, the victim should immediately make every effort to get as much of the body as possible out of the water as quickly as possible if there is something to climb onto; although it may feel colder out of the water than in, it is always better to be out of the water (Tipton and Golden, 2006). If this cannot be achieved in the first 10 to 20 minutes or so, it may rapidly become impossible due to loss of hand and arm strength. Other options include raising the probability of detection and rescue by immediate use of flares and other measures (Ducharme, 2006). This must be done right away, as the ability to open and deploy flares is also rapidly lost in cold water. As noted by Ducharme, *the goal or ultimate objective is not to preserve body heat, but to move out of the water as quickly as possible.*

Furthermore, since people have been found dead on shore after surviving an initial cold immersion, those who fish in isolated conditions should always carry a change of warm dry clothing in a waterproof float bag so that if immersion does occur, dry clothing can be donned immediately upon reaching shore.

DON'T UNDERESTIMATE CURRENT

Most deaths associated with fishing from shore or in the water occurred in rivers or dam spillways, where current was a probable factor. Anyone can slip and fall; if this occurs, boots or waders can fill rapidly, and the fisher can be swept away by the current.

Fishers should be educated about the tremendous power of current, how to swim at an angle towards the current to move towards the shore, and the specific hazards of circulating hydraulics at the base of dams. It would also be helpful if training pools for swimming could be fitted with an adjustable flow of current so that fishers and other swimmers could learn — under controlled conditions with experienced supervision — how to swim against the current and how to set a body angle to exit to either side. This would help fishers be more aware of the hidden dangers of current, how to avoid it, and what to do if caught in it. Once again, appropriate flotation and other protection against unexpected cold immersion can be highly protective, but are useless unless worn.

STAY SAFE ON ICE

Anyone who ventures onto ice should be equipped for survival with a flotation device and hypothermia protection. Other safety equipment includes ice picks and throw ropes. Ice fishing sites require careful scrutiny and monitoring at all times, since ice can gradually weaken under the pressure of a hut or a stationary vehicle. Current can also render the ice unreliable, so rivers, dams and lakes with current should be avoided. For those travelling to the fishing site by snowmobile or other vehicle, speeds should be kept very low so that open holes and thin ice can be observed and avoided. High speeds can also trigger high-energy waves that weaken the ice. Personal factors appear important for ice fishing deaths, since most victims were 65 and older, and many were aboriginals. Prevention efforts should therefore target these populations.

SPECIAL OPPORTUNITIES FOR LARGE GAINS IN PREVENTION

Immediate attention to **6 RISK FACTORS** could eliminate many fishing immersion deaths each year in Canada.

1. LACK OF FLOTATION

Safety equipment for event phase of fishing incidents

Legislation should be introduced to require that an approved flotation device be worn — not simply present — ideally by all fishers but at least by those in boats and in the water. This could eliminate up to 90% of all fishing immersion deaths and 14% of all immersion deaths in Canada, saving up to 80 lives per year. Legislation would need to be reinforced by appropriate education of fishers, decision makers, coast guard, and police. To encourage compliance, fishers could be trained in risk assessment for fishing as a relatively hazardous activity in a dangerous environment. Increasing the availability of comfortable, effective, affordable flotation devices appropriate for different types of fishing would also improve compliance.

2. COLD WATER

Safety equipment for event phase of fishing incidents

Since so many fishing immersion deaths involved extremely cold water, wearing cold protection when appropriate could dramatically improve survival rates for fishing immersion. Cold protection can be combined with flotation in a single device, or worn separately.

3. ADVERSE WEATHER*Safety equipment for pre-event phase of fishing incidents*

Since about half of all fishing immersion deaths involved adverse weather conditions such as high winds and large waves, improved observation and assessment of weather could save many lives. Simple weather radios, wind speed and water temperature sensors, and warning signals could help people avoid fishing when adverse conditions prevail.

4. POOR SWIMMING ABILITY*Swimming training for event phase of fishing incidents*

Although swimming ability was unspecified for many fishing victims, the available data suggest that many fishers are poor swimmers who would be unable to self-rescue. Since many fishing incidents occur when fishers are alone and in remote locations, poor swimming ability is a serious limitation for both boaters and other fishers who are swept away by river current. Good training in swimming — including dealing with current and with the immediate effects of cold immersion — could prevent up to 30% of fishing fatalities.

5. ALCOHOL CONSUMPTION*A personal risk factor for pre-event, event, and post-event phases of fishing incidents*

Alcohol is a risk factor for all phases of injury incidents. Legislation and enforcement together with training to limit alcohol consumption in, on, or around water and ice could prevent about 30% of fishing immersion deaths.

6. RIVER CURRENT*An environmental risk factor for pre-event, event, and post-event phases of fishing incidents*

Since up to 80% of non-boating incidents occurred in rivers or dam spillways, improved awareness of the hazards of current, and training in how to cope with it if immersed could help prevent about 15% of fishing immersion deaths.

When people participate in fishing activities without being prepared for the associated risks, predictable deaths occur. However, it is within the capacity of the government, the water-safety community and fishers themselves to prevent most of the fishing immersion deaths in Canada, saving about 80 lives and 150 million dollars per year. To achieve this goal, elected leaders and water-safety professionals must address these 6 key risk factors, implement appropriate regulations and enforcement, and target the fishing public for specific training in water safety. Fishers in turn must take greater responsibility for protecting themselves and others by upgrading their swimming, boating and lifesaving skills; revising their perception of risk; and taking appropriate action to minimize risk and avoid injury while fishing.

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Annex 1

ANNUAL SUMMARY OF NUMBERS AND PERCENTS* FOR INJURY FATALITIES DURING FISHING, CANADA 1991-2000 (n=889)

	1991		1992		1993		1994		1995		1996		1997		1998		1999		2000		1991-2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
IMMERSION DEATHS†	101	98	99	100	93	98	95	99	101	99	86	100	81	96	89	98	78	100	54	98	877	99
Recreational	77	76	88	89	72	77	67	71	80	79	67	78	61	75	63	71	61	78	39	72	675	77
Fishing from a boat	68	88	71	81	53	74	54	81	69	86	51	76	45	74	52	83	51	84	33	85	547	81
Fishing from shore	7	9	11	13	11	15	10	15	4	5	4	6	10	16	7	11	6	10	3	8	73	11
Fishing in water	1	1	2	2	1	1	0	0	7	9	8	12	4	7	0	0	2	3	1	3	26	4
Fishing on ice	1	1	4	5	7	10	3	4	0	0	4	6	2	3	4	6	2	3	2	5	29	4
Daily living: Subsistence fishing	7	7	2	2	0	0	5	5	3	3	5	6	2	2	5	6	7	9	4	7	40	5
Occupational	17	17	9	9	21	23	23	24	18	18	14	16	18	22	21	24	10	13	11	20	162	18
Commercial fishing	17	100	7	78	18	86	23	100	16	89	12	86	17	94	20	95	7	70	11	100	148	91
Aquaculture	0	0	1	11	1	5	0	0	1	6	1	7	0	0	0	0	2	20	0	0	6	4
Fishing guiding	0	0	1	11	2	10	0	0	1	6	1	7	1	6	1	5	1	10	0	0	8	5
TRAUMA DEATHS‡	2	2	0	0	2	2	1	1	1	1	0	0	3	4	2	2	0	0	1	2	12	1
TOTAL	103	12	99	11	95	11	96	11	102	11	86	10	84	9	91	10	78	9	55	6	889	100

* Values in unshaded areas refer to shaded totals above; values in lighter shaded areas refer to darker shaded totals above; immersion and trauma percents refer to bottom row totals; bottom row percents refer to 10-year total at right

† Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities ‡ Primary cause of death was injury other than drowning or hypothermia

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

Annex 2

REGIONAL SUMMARY OF NUMBERS AND PERCENTS* FOR INJURY FATALITIES DURING FISHING, CANADA 1991-2000 (n=889)

	NL		NS		PE		NB		QC		ON		MB		SK		AB		BC		NU/NT†		YT		CANADA	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
IMMERSION DEATHS†	80	99	67	99	12	100	31	100	143	99	228	99	37	100	36	97	45	98	177	98	9	100	12	100	877	99
Recreational	39	49	33	49	5	42	19	61	127	89	219	96	23	62	31	86	39	87	130	73	0	0	10	83	675	77
Fishing from a boat	34	87	27	82	5	100	14	74	104	82	180	82	18	78	25	81	29	74	102	78	0	0	9	90	547	81
Fishing from shore	3	8	3	9	0	0	1	5	15	12	26	12	4	17	1	3	4	10	16	12	0	0	0	0	73	11
Fishing in water	1	3	1	3	0	0	2	11	5	4	6	3	1	4	2	6	0	0	8	6	0	0	0	0	26	4
Fishing on ice	1	3	2	6	0	0	2	11	3	2	7	3	0	0	3	10	6	15	4	3	0	0	1	10	29	4
Daily living: Subsistence fishing	2	3	0	0	0	0	1	3	4	3	1	0	4	11	3	8	1	2	14	8	9	100	1	8	40	5
Occupational	39	49	34	51	7	58	11	35	12	8	8	4	10	27	2	6	5	11	33	19	0	0	1	8	162	18
Commercial fishing	39	100	31	91	7	100	10	91	9	75	6	75	9	90	1	50	5	100	31	94	0	0	0	0	148	91
Aquaculture	0	0	3	9	0	0	1	9	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	6	4
Fishing guiding	0	0	0	0	0	0	0	0	3	25	2	25	1	10	1	50	0	0	0	0	0	0	1	100	8	5
TRAUMA DEATHS‡	1	1	1	1	0	0	0	0	1	1	3	1	0	0	1	3	1	2	4	2	0	0	0	0	12	1
TOTAL	81	9	68	8	12	1	31	3	144	16	231	26	37	4	37	4	46	5	181	20	9	1	12	1	889	100

* Values in unshaded areas refer to shaded totals above; values in lighter shaded areas refer to darker shaded totals above; immersion and trauma percents refer to bottom row totals; bottom row percents refer to 10-year total at right † Data for Nunavut and Northwest Territories have been combined, since Nunavut was not a separate territory until 1999

‡ Includes drownings and immersion hypothermia deaths; excludes other non-drowning fatalities § Primary cause of death was injury other than drowning or hypothermia

Source: The Canadian Red Cross Society & the Canadian Surveillance System for Water-Related Fatalities, 2009

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