

MARINE INVESTIGATION REPORT
M01L0112

MAJOR WATER INGRESS

SCALLOP DRAGGER *ALEX B. 1*

OFF HAVRE-SAINT-PIERRE, QUEBEC
29 SEPTEMBER 2001



The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Marine Investigation Report

Major Water Ingress

On the Scallop Dragger *Alex B. 1*
off Havre-Saint-Pierre, Quebec
29 September 2001

Report Number M01L0112

Synopsis

Around 1000 on 29 September 2001, while the fishing vessel *Alex B. 1* was dragging for scallops in fine weather off Havre-Saint-Pierre, Quebec, water was discovered in the engine compartment. All compartments from the lazarette to the accommodation were flooded. Four bilge pumps were started but the rate of water ingress exceeded the capacity of the pumps.

The scallop drag was hauled aboard and the vessel made for the nearest port, Havre-Saint-Pierre. About one-half nautical mile from the wharf, the main engine stopped. Another fishing vessel, the *Andy C*, responded to a call for assistance. The *Alex B. 1* was then towed into port. Portable pumps were used to pump the vessel dry. While the vessel was aground alongside the wharf at low tide, a hole was discovered in the hull below the waterline on the port side in way of the lazarette.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 Particulars of the Vessel

	<i>Alex B. 1</i>
Official Number	372092
Port of Registry	Paspébiac, Quebec
Flag	Canada
Type	Scallop dragger (since 2001)
Gross Tonnage ¹	18.7
Length	13.4 m
Draught	F: 1.4 m A: 2 m
Cargo	Scallops
Crew	5
Built	Of wood by Onésime Doiron of Pokesudie, N.B. in 1977; hull covered with fibreglass in 1998
Propulsion	One General Motors Allison diesel, 123 BHP (brake horsepower)
Owners	Private owner

1.1.1 Description of the Vessel

The vessel was originally designed for ground-fishing, and was operated mainly in Chaleur Bay from 1977 to 1984 under the name *Le Réjean L.* by its first owner, then from 1985 to 2000 under the name *Alex B. 1* by the second owner. In early 2001, the vessel was sold to a fishing business. Since the third owner held a scallop fishing licence, the vessel's rigging was converted to that purpose at Havre-Saint-Pierre.



¹ Units of measurement in this report conform to International Maritime Organization standards or, where there is no such standard, are expressed in the International System of units.

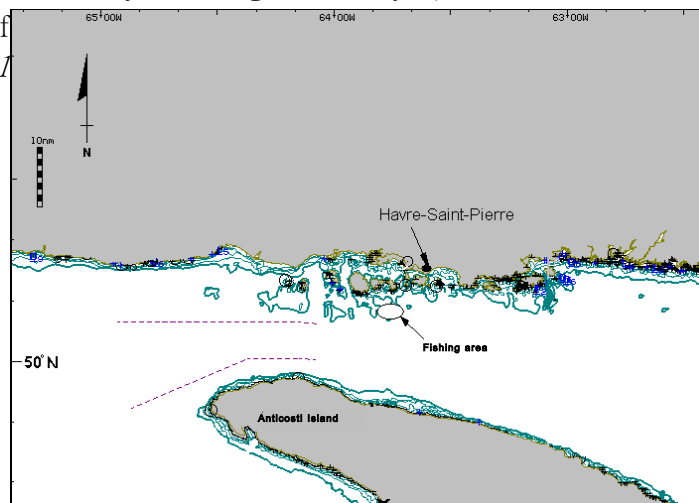
1.2 History of the Voyage

Around 0445 on 29 September 2001, the *Alex B. 1* set off from Havre-Saint-Pierre with a crew of five on board and made for a fishing area off Samuel Island.² Around 0600, the crew commenced dragging for scallops in about 30 m of water. Fishing proceeded without incident; every half-hour, the drag was hauled aboard, emptied, then deployed again.

While doing his rounds in the engine compartment around 1000, the operator observed that there was about 20 cm of water in the bilge, despite the fact that the automatic bilge pump was running. He immediately switched on a second bilge pump and, five minutes later, the compartment was drained. When the operator returned to the engine compartment about half an hour later, he again observed an ingress of water. This time, the water was 35 cm deep, high enough to touch the main engine. He again started the second bilge pump, then went to inspect the fish hold. This compartment, which is normally dry, now contained about 40 cm of water. The operator examined the lazarette and noted that the water level, at a depth of about 60 cm, was much higher than usual. The operator then started the two remaining electric bilge pumps, one in the fish hold and the other in the engine compartment.

The operator kept close watch on the water ingress while the crew shucked the catch. He quickly noted that the pumps were not keeping pace with the flooding and decided to haul in the drag and make for Havre-Saint-Pierre. Once the drag was stowed in its cradle, the *Alex B. 1* made full speed ahead while the crew bailed water from the compartments with buckets. About one-half nautical mile from the wharf at Havre-Saint-Pierre, the water level in the engine compartment was such that the engine suddenly stopped, at which point all the bilge pumps failed as well. The operator immediately broadcast a distress call on channel 16 of his VHF radiotelephone. While he was talking with the radio operator at the Marine Communication and Traffic Services (MCTS) Centre, his call was answered by the fishing vessel *Andy C*, which had been listening. The *Andy C* arrived at the position of the *Alex B. 1* within 10 minutes. The *Alex B. 1* was towed to shore near a wharf. During this time the Parks Canada vessel *Dryade No. 1* also assisted.

Two portable pumps were used to pump out the compartments. The keel touched bottom at low tide, and the vessel listed, revealing a hole in the port side planking. The water ingress was stopped temporarily, and on 26 October 2001, after being towed to Sept-Îles, Quebec, the *Alex B. 1* was hauled up on the shore for a detailed inspection of the hull.



² Known locally as Niapisca Island.

1.3 *Injuries to Persons*

No one was injured.

1.4 *Damage*

1.4.1 *Damage to the Vessel*

On both sides of the hull below the waterline in way of the lazarette, the fibreglass coating on the wood hull was severely damaged. Gaps in the fibreglass coating on each side were about 125 cm long and 50 cm wide, exposing the underlying wood. The wood planking showed deep scrape marks, indicating wear likely caused by repeated contact with the drag and steel cables on the hull. There was a hole, measuring approximately 10 cm in diameter, in the wood planking on the port side.



1.4.2 *Damage to the Environment*

There was no apparent damage to the environment.

1.5 Weather Information

On the morning of 29 September 2001, there were sunny conditions, winds were light, and the sea was calm.

1.6 Certification

1.6.1 Commercial Fishing Vessel Inspection Certificate

Under current *Small Fishing Vessel Inspection Regulations* (SFVIR), the *Alex B. 1* was required to be inspected every four years. Since its inspection at Newport, Quebec, on 28 May 1998, the *Alex B. 1* held a Commercial Fishing Vessel Inspection Certificate, limited to home trade Class 3 voyages³ with a crew of four, including the operator; the certificate was valid to 27 May 2002.

Validity of the certificate was subject to the following conditions:

- that the vessel not carry bulk herring or capelin;
- that a technician verify the firefighting equipment annually; and
- that an accredited agent verify the liferafts annually.

These additional clauses were stamped on the Vessel Inspection Certificate by the Transport Canada inspector.⁴

Given that the shipowner had applied for financial assistance from the Quebec Department of Agriculture, Fisheries and Food (MAPAQ) to purchase the *Alex B. 1*, the vessel was inspected on 16 May 2001 by a representative of MAPAQ for the purpose of a ship mortgage. MAPAQ inspections are carried out to assess the value of the vessel and not to determine its seaworthiness or the fishery to which it is suited. The inspection report indicated a probable service life of eight years, and made note of the addition of cable drums, winches, stern A-frame, a cargo boom and a drag hoist pulley.

1.6.2 Personnel Certification

As of 31 December 2002, Transport Canada statistics showed there were 20 183 Canadian fishing vessels not exceeding 60 gross tons, representing approximately 94% of all fishing vessels operating in Canada.

³ The vessel is never more than 20 miles from shore and the distance between suitable safe harbours en route does not exceed 100 miles.

⁴ Current pro-forma certificates contain this information printed near the bottom of the certificate itself, not stamped.

The gross tonnage of the *Alex B. I* does not exceed 60 tons. Under the *Crewing Regulations*, neither the operator nor any other member of the four-person crew was required to hold a certificate.

Nonetheless, the *Crewing Regulations* require that fishers receive marine emergency duties (MED) training in basic safety, level A-1. This important provision was originally to apply to fishers effective 30 July 2000. However, the Regulations were amended in March 2002 and the effective date was postponed to 30 July 2002. Moreover, the requirement is to be phased in over five years. As a result, the requirement will not be fully in force until 01 April 2007. Neither the operator nor any other member of the crew had received MED training.

It is noteworthy that the *Competency of Operators of Pleasure Craft Regulations* require that operators of pleasure craft hold proof of competency.

1.7 *Personnel History*

1.7.1 *Vessel Owner*

The owner of the *Alex B. I* gained his fishing experience, in part, as the owner/operator of four fishing vessels before purchasing the *Alex B. I*. He did the major alteration of the *Alex B. I* himself in the spring of 2001, converting it to a scallop vessel.

In September 2000, while on a fishing voyage on his previous vessel, the *Geronimo I*, the owner/operator and his crew of two abandoned the vessel and boarded a liferaft after broadcasting a distress call on the VHF radiotelephone. The vessel sank in fine weather in less than one hour. The crew was picked up shortly afterwards. The *Geronimo I*, formerly a crabber, had been converted for scallop fishing by the owner. The modifications had been inspected by a Transport Canada surveyor due to its coincidence with its four-year inspection regime. Some modifications related to watertightness were required by the Transport Canada inspector after the major alteration to bring the vessel into compliance with the regulations.

1.7.2 *Operator*

The operator of the *Alex B. I* had nine years experience as a fisher's helper; he gained his experience mainly in the scallop fishery. This was his first season as operator.

1.8 *Certification for Fishers and Fisher's Helpers*

1.8.1 *Bureau d'accréditation des pêcheurs et des aides-pêcheurs*

On 04 August 1999, the *Loi sur le Bureau d'accréditation des pêcheurs et des aides-pêcheurs du Québec* came into force. Pursuant to the Act, and under the supervision of the Comité sectoriel de main-d'oeuvre des pêches maritimes (CSMOPM), the Bureau d'accréditation des pêcheurs et des aides-pêcheurs (BAPAP) was created in 1997. Located in Grande-Rivière, Quebec, BAPAP is

overseen by a board of directors which acts as legal authority for all aspects of accreditation. Pursuant to the *Règlement sur la reconnaissance de la compétence professionnelle des pêcheurs et des aides-pêcheurs*, BAPAP is mandated to:

- issue and update record books for fishers and fisher's assistants;
- issue certificates for fishers, fisher's assistants and apprentice fishers;
- grant exemptions as required; and
- administer annual fees.

To qualify for a fisher's certificate or a fisher's assistant certificate, the Regulations require that applicants must hold a professional fishing diploma or proof of equivalent competency.⁵ The equivalent competency is defined in the Regulations as including an experience component and a training component. As defined in the Regulations, training as a fisher's assistant consists of:

1. Advanced sea rescue	5. Collision regulations
2. Sea emergency duties	6. Fishing technology
3. Responsible fishing (2 out of the 10 courses offered)	7. Preserving and handling fish on board
4. Organization and teamwork	8. VHF radio

Fishers, however, are required to take training on only the first four subjects. It is presumed that most fishers have already mastered subjects 5 to 8 through on-the-job training and several years of experience. The Regulations came into effect on 13 September 2001. Fishers have until 31 December 2006 to meet the requirements of the Regulations.

In 2000-2001, CSMOPM implemented measures with a view to instill a learning culture in the commercial fishing and aquaculture sector. The following measures have been taken to date:

- a study of the economic benefits of investments in training;
- newsletter was founded, to be published periodically;
- a Web site was launched; and
- an awareness program to promote the concept of professional accreditation for fisher's assistants.

⁵ Except where an exemption is granted under Section 12 of the Regulations.

1.8.2 Professional Fish Harvesters Certification Board

On 26 July 1996, the government of Newfoundland and Labrador enacted the *Professional Fish Harvesters Act*. Pursuant to the Act, the Professional Fish Harvesters Certification Board (PFHCB) was created in 1997, with a mandate similar to that of BAPAP in Quebec. PFHCB recognizes three levels of qualification: apprentice fisher, professional fisher level I, and professional fisher level II. The Board issues level I and level II certificates based on the applicant's experience and training. The PFHCB may also conduct inquiries based on a code of fishing ethics, and take disciplinary action including fines and/or temporary or permanent suspension of the offender's certificate.

1.8.3 Lack of Accreditation and Training

No other province in Canada has a regulatory system requiring basic training in fishing and accreditation for commercial sea fishers working on vessels not exceeding 60 tons, gross tonnage.

In 2000, Quebec's Commission de la santé et de la sécurité du travail (CSST), the CSMOPM and Transport Canada's Marine Safety Directorate (TCMS) conducted a joint educational campaign in the Gaspé/Magdalen Islands region to enhance awareness of marine safety among fishing vessel operators and owners and their fisher's helpers. Also, since 1997, the Direction de la santé publique of the Régie régionale de la santé et des services sociaux (Gaspésie/Îles-de-la-Madeleine), in a joint project with its partners, has been making public service announcements on safety on a seasonal basis through local newspapers and radio stations.

Over the past few years, efforts have been made to establish a joint committee that would provide some latitude for the CSST to take action on workplace health and safety in the fishing industry. Before proceeding with the plan, the CSST wants to prepare a memorandum of understanding with its partners to establish guidelines for inspections in keeping with their evaluation criteria, and thus intervene in health and safety matters in the fishing sector. Despite these efforts, no understanding or protocol has been finalized as yet. In another notable development, a fishing educational institution in Quebec has developed a number of courses on workplace health and safety for fishers. The courses are not yet offered, owing to a lack of staff.

1.9 Modifications to Fishing Vessels

1.9.1 Major Alteration of the Alex B. 1

In April 2001, the new owner undertook a major alteration of the *Alex B. 1* to convert it for scallop dragging. Besides a cargo boom and hydraulic winches installed on the main deck, an A-frame gallows was mounted at the stern, with two pulleys to hoist the drag. Holes were drilled in the main deck in way of the fish hold and lazarette to secure braces for the stern A-frame. To accommodate the electric and hydraulic wiring, several holes had been made in the transverse bulkheads between the lazarette and the fish hold and between the fish hold and the engine compartment. The electrical conduits were run through the holes but the holes were not sealed afterwards.

1.9.2 *Owner's Responsibilities*

The SFVIR require, for fishing vessels exceeding 15 tons, gross tonnage, but not exceeding 150 tons, gross tonnage, and not exceeding 24.4 m in length, that the vessel be inspected every four years. The foregoing notwithstanding, all owners are required to notify Transport Canada of any major modification affecting the seaworthiness of the vessel before subsequently putting to sea and to not wait until the next scheduled inspection.

Section 50 of the Regulations reads as follows:

Any alterations affecting the seaworthiness of a fishing vessel shall be equivalent to the standards of these Regulations and to the satisfaction of an inspector.

The TCMS office at Sept-Îles had received no information on the April 2001 major alterations of the *Alex B. 1*.

1.9.3 *Action Taken*

Further to its investigation into the sinking of the fishing vessel *Brier Mist*⁶ off Rimouski, Quebec, in November 1998, the Board noted that major modifications to the vessel had been made, yet the owner/operator had not requested an inspection by Transport Canada. Moreover, arising from its investigation of the December 1990 sinking of the fishing vessel *Le Bout de ligne*⁷ in the Gulf of St. Lawrence, the Board recommended that Transport Canada undertake a safety awareness campaign directed at the owners, operators and crews of sea fishing vessels to alert them to the adverse effects that structural modifications or additional equipment had on a vessel's stability.⁸ The Board also recommended that Transport Canada consider ways of ensuring that a record be kept of structural modifications and the addition of any heavy

⁶ TSB Report M98L0149.

⁷ TSB Report M90L3033.

⁸ Recommendation M94-31, issued December 1994.

object, and that such information be considered when small fishing vessels are due for a re-assessment of their stability.⁹ Transport Canada has issued *Ship Safety Bulletins* (SSBs) to address this safety problem.¹⁰

1.10 Additional Information

1.10.1 The Scallop Drag

The scallop drag used by the *Alex B. I* is made up of three steel scallop rakes (see Figure 2). The three rakes (2) are rigged side-by-side and fastened to a steel beam (1), which is in turn fastened to a bridle and drag line. A wooden beam is fastened aft of the three rakes (3) to stabilize the drag on the seabed.

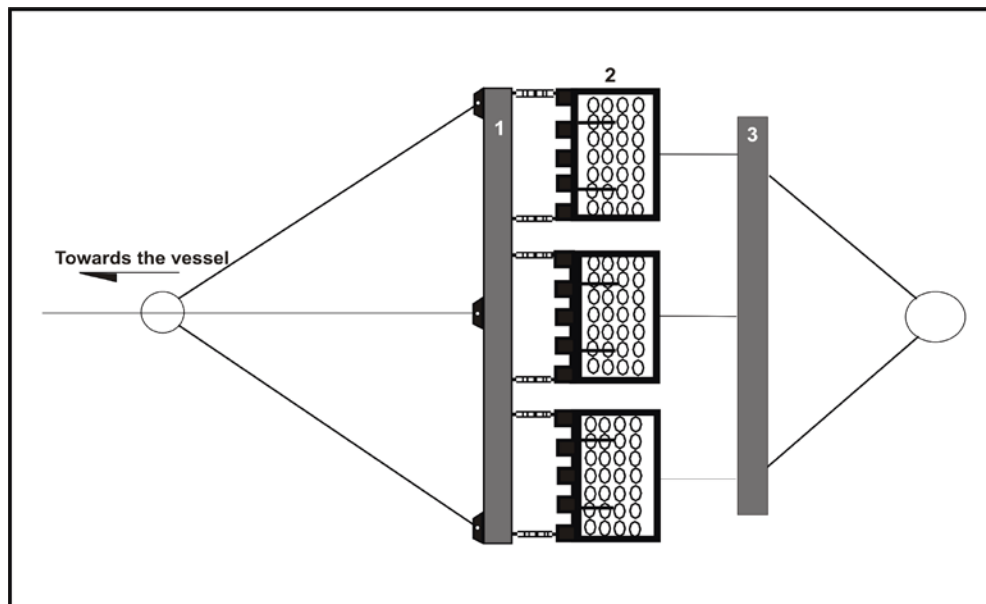


Figure 5 - The scallop drag

⁹ Recommendation M94-32, issued December 1994.

¹⁰ SSB 12/2000 and 16/1996.

1.10.2 Vessel Registration

Registration is a title system used to determine vessel ownership. It is similar to the system of titles used in real property registration. In Canada, registration is mandatory for vessels exceeding 15 tons, gross tonnage. Vessel registration services are delivered through nine TCMS regional offices, where applications are processed. The registration program is administered by a division of TCMS headquarters in Ottawa. However, when a change of title is entered, the contact information for the new owner is not sent to the regional inspectors; otherwise stated, at the present time, there is no mechanism allowing the exchange of information between the Registrar and the regional TCMS offices when a fishing vessel changes owner.

2.0 *Analysis*

In most cases, the more severe the consequences of an accident, the more attention it will attract, and the greater will be the call for change. On the other hand, innumerable events occur from day to day which, because they have become so commonplace or because they caused no fatalities, are soon forgotten. The subject occurrence falls within the latter category. Even though there were no serious consequences, the investigation revealed numerous safety deficiencies that have a direct impact on commercial fishing across Canada.

2.1 *Hull Protection*

Examination of the vessel revealed substantial wear on the hull in way of the lazarette. These patches of excessive wear are in way of the drag hoist pulleys that were mounted on the stern A-frame. The fibreglass coating was worn through and there were deep gouges in the wood planking. The scallop drag on the *Alex B. 1* is a conventional fishing rig, quite heavy and cumbersome to handle. The drag was hoisted aboard and redeployed twice every hour. Consequently, every time the rig was hoisted aboard or deployed, it came in contact with the hull. To protect against the resultant abrasion, protection is applied to the hulls of fishing vessels where the fishing gear touches the hull. Various types of protection are used: on steel hulls, steel or rubber half-rounds are installed; wooden hulls are protected by a second layer of planking, a thick coating of fibreglass, or pads made of teflon or rubber. All of these protective devices have proved effective for shielding the hull against repeated contact with the fishing gear. Apart from a thin coating of fibreglass that completely covered the hull, the *Alex B. 1* had no additional protection in way of the lazarette. In five months of fishing activity, the hull had been compromised to the extent that the integrity of the vessel and the safety of the crew were greatly diminished.

In the past three years, the *Brier Mist*, the *Geronimo 1* and the *Alex B. 1* have sustained substantial water ingress while fishing on the St. Lawrence. Two of these vessels sank quickly: the *Brier Mist* (with the loss of five lives) and the *Geronimo 1*. Although the cause of water ingress on these two fishing vessels could not be confirmed because they were never found¹¹, examination of the hull of the *Alex B. 1* revealed that it had no hull protection and, consequently, it was not adequately outfitted for the scallop fishery. All three fishing vessels were being operated by new owners who had only recently converted them for scallop dragging.

¹¹ The *Brier Mist* was identified on the sea bottom in November 2002 but a subsequent underwater video showed that the hull was not visible due to sedimentation and, therefore, there was no indication of possible hull damage.

2.2 *Major Alterations not Reported to Authorities*

Not all major alterations of small fishing vessels are reported to Transport Canada, although the owners of such vessels not exceeding 15 tons, gross tonnage, are encouraged to request a courtesy inspection of their craft. Owners of vessels exceeding 15 tons, gross tonnage, are required to have their craft inspected, irrespective of when their four-year inspection is due.

Failure to report major alterations is still a widespread problem which is detrimental to the safety of fishers. Since the parties involved report that they acted in good faith in this respect, the safety issue must be attributable to such factors as:

- knowledge of regulatory requirements may be inadequate as training is voluntary;
- safety promotion programs targeting fishers may be ineffective; and
- the system of inspections and other risk-reduction measures may not be successful.

2.2.1 *Training of Fishers*

Although Transport Canada issues certificates for fishing vessel masters, the certificate does not apply to the majority of persons whose principal employment is commercial fishing. Of all the registered fishing vessels, about 94% have a gross tonnage of 60 tons or less. The only training that these uncertificated fishers are required to have is one course on marine emergency duties, and that minimum requirement will not be mandatory until 2007. These fishers are not subject to any other training requirements. There appears to be a disparity between the regulatory requirements applicable to pleasure boaters and those applicable to professional fishers. The onus is on fishers at various levels within their trade to take the training they require according to their assigned tasks which, in reality, require far greater skill owing to the inherent hazards of their work.

Since 1999, the Government of Quebec has put in place legislation to remedy that deficiency, but training will not be mandatory until 2007. A similar effort is underway in Newfoundland and Labrador, under the direction of the Professional Fish Harvesters Certification Board (PFHCB). These two provinces are at the forefront at the national and international levels.

In its investigations into the sinking of the *Nadine* in December 1990¹² and the scallop dragger *Cape Aspy* in January 1993¹³, the Board noted deficiencies in training, specifically with respect to stability. In 1993, the TSB recommended that Transport Canada develop and implement measures to ensure that the owners, operators, and masters of fishing vessels under its jurisdiction receive the training required and that they take measures to close all exterior and interior openings on their vessels in order to maintain hull watertightness in all the

¹² TSB Report M90L3034.

¹³ TSB Report M93M4004.

ambient conditions that they may encounter.¹⁴ Despite the good intentions of Transport Canada to strengthen examination requirements for this aspect of the trade, many fishers are not subject to the Department's examinations because they are not required to hold a certificate for commercial fishing. Such was the case in the subject occurrence.

The mechanisms for fisher training put in place by the provinces of Quebec and Newfoundland and Labrador are appropriate and commendable. However, their training programs do not include a component on the importance of complying with the *Small Fishing Vessel Inspection Regulations* (SFVIR) or the basic principles of stability, specifically with respect to subdivision. In Quebec, this training program does not cover these important aspects of the trade, while in Newfoundland and Labrador, the flexibility offered in the choice of mandatory courses results in the omission of some aspects of the trade. The efforts of the Comité sectoriel de main-d'oeuvre des pêches maritimes to promote a culture of training in commercial fishing and aquaculture are commendable and amply warranted, but deficiencies in the training are still present.

The subject occurrence demonstrates that the crew's knowledge of vessel manning was limited. For reasons of safety, the maximum number of crew members for which a commercial fishing vessel inspection certificate is issued is dictated by the capacity of the lifesaving apparatus carried on the vessel. In this occurrence, there were five crew members on board but the certificate was issued for only four. If commercial fishers are to operate their vessels safely, they must understand the *Canada Shipping Act* regulations that apply.

For all practical purposes, the *Alex B. I* was left with no watertight bulkheads after the major alteration; water ingress could proceed unhindered from the lazarette forward - all the way to the accommodation. Without training, fishers do not understand the basic principles of stability. It is contradictory to hold fishing vessel owners and operators responsible for their vessels if they are not required to follow mandatory training on the basic principles of stability, among others. Unless they are familiar with the SFVIR or understand the principles of subdivision and weight transfer on board a vessel, shipowners and fishers will continue to operate and modify their vessels as they see fit.

¹⁴ Recommendation M93-0001.

2.2.2 *Communication with and Information for Fishers*

While the additional clauses stamped on the inspection certificate set operational limitations for the fishing vessel, they also serve as a reference. As such, the owner and operator can refer to the certificate to refresh their memory. However, the certificate does not mention the obligation to inspect the vessel after a major alteration. If it did, it could yield some benefits in terms of safety.

The many *Ship Safety Bulletins* issued over the years on various aspects of safety in the fishing industry, specifically regarding major alterations to fishing vessels, have been less effective than anticipated. Many fishers forthrightly acknowledge not knowing this regulation. Since the home port of many fishing vessels is located at some distance from the nearest Transport Canada Marine Safety (TCMS) regional office, the fishers are not able to profit from the expert knowledge that inspectors could provide on major alterations. Moreover, the scattered geographical distribution and remote locations of fishers contribute to their isolation and make it more difficult to contact them and thus to establish a rapport with inspectors.

Despite the merits of promoting safety through *Ship Safety Bulletins*, communicating with fishers via this mode seems less effective than had been anticipated. Even though the addition of clauses on commercial fishing vessel inspection certificates is effective for conveying specific information, there is no indication on the certificate that fishers are required to report major alterations.

2.2.3 *Inspection Frequency and Other Risk Management Initiatives*

Fishers select their vessel based on the terms and conditions of the fishing licence issued to them by Fisheries and Oceans Canada. The licence specifies the species and catch quota. It happens that fishers sometimes apply for a different licence and/or buy a different fishing vessel. As a result, the fisher's vessel may no longer be suitable for the species they seek. Since each fishery generally requires a specific type of gear, operators are then compelled to convert their vessels depending on the type of licence they hold, with the result that a vessel may well need a major alteration in the days and weeks following the purchase of the craft.

The new owner of the *Alex B. 1* purchased his vessel in similar circumstances. The existing gear had to be modified for dragging scallops in accordance with the new owner's licence. Under the SFVIR, had the vessel not been modified, the regular inspection would have been required in 2002. However, since the vessel underwent major alterations in 2001, it should have undergone a regular inspection following the modifications. Given that the inspectors at the regional TCMS office at Sept-Îles had not been notified of the modifications, they did not schedule an inspection of the vessel in 2001.

Not having received notification from the new owner, Transport Canada Inspection Services was unable to:

- do a safety inspection subsequent to the major alteration;
- assess the effect of the major alteration on the vessel's seaworthiness; and
- confirm that the vessel was suitable for dragging scallops.

The SFVIR require inspectors and fishing vessel operators to adhere to a stringent inspection regime, but the Regulations make no provision for changes that may increase the risk. Change of ownership should be a risk indicator for TC; as well, a link between the Registrar of ships and the inspectors at the regional offices could constitute a risk management mechanism that would contribute to a more proactive enforcement of the Regulations.

2.3 Safety Culture among Fishers

In this occurrence, the vessel was not seaworthy when it put to sea; the transverse bulkheads were no longer watertight, the hull protection was inadequate given the fishing gear used, and the major alteration had not been inspected by an approved authority. Moreover, there were too many persons on board.

Fishing is a high-risk occupation. In the United States, the statistics for 1996 indicate that the mortality rate among fishers was over 40 times higher than the national average.¹⁵ Further,

Lack of awareness of certain risks may also be an important concern for some groups of fishermen. Most fishermen are well aware that fishing is a hazardous profession, but they may not be receiving timely and clear information on the link between certain acts or omissions and resultant deaths, injuries and illnesses. For some, a tendency to deny or downplay risks may also serve to filter out important safety messages and reduce the impact of safety initiatives.¹⁶

¹⁵ International Labour Organization (ILO), *Safety and Health in the Fishing Industry*, 1999.

¹⁶ Ibidem.

A safety culture consists of several elements, including compliance with standards and regulations, awareness of risks, and a fair balance between safety and commerce.¹⁷ Consistent with this definition, the lack of a safety culture among fishers has been noted in a number of TSB reports.¹⁸ An appropriate regulatory system, targeted training, and dissemination of safety information are means of managing and reducing risks. However, without a true safety culture pervading the entire commercial fishing industry, these mechanisms would undoubtedly be less effective.

2.4 Water Level Detectors

Small fishing vessels, like the *Alex B. 1*, are not required to have a water level detector in the fish hold or other compartments where the crew seldom goes. As a result, there was no alarm to warn the crew of water ingress. However, the operator realized the vessel was taking on water while making his rounds and he engaged all of the bilge pumps.

The dangers associated with not having water level detectors on fishing vessels were noted in other TSB occurrence reports.¹⁹ Moreover, this problem is a concern for several other countries, including the United States²⁰ and Great Britain²¹. The Workers' Compensation Board of British Columbia (WCBBC) requires all commercial fishers to install a water level detector in the engine compartment and the lazarette of their vessel and to connect the detectors to an alarm system.²² Through this safety initiative, the WCBBC increased the level of safety of fishers on Canada's West Coast, thereby reducing the risks.

Quebec's Commission de la santé et de la sécurité du travail (CSST) is working to increase its inspectors' knowledge of the maritime sector. A joint committee is working on evaluating and preparing memoranda of agreement to enable CSST inspectors to obtain specific parameters to evaluate and conduct targeted inspections based on specific criteria. In cooperation with federal authorities, industry representatives, and fishing vessel owners, CSST will develop policies with respect to safety on board fishing vessels that do not encroach on federal jurisdiction, which is the sole authority with respect to vessel inspection.

The lack of water level detectors on the *Alex B. 1* does not appear to have been a factor in this occurrence,

¹⁷ Heikki Valkonen, *IMO News No.4 2001*.

¹⁸ M00W0230 (*Star Queen*), M99C0048 (unnamed small fishing vessel), M98M0003 (*Cape Chidley*), M96M0144 (*SS Brothers*), M93M0007 (*The Pamela & Jenelle L.*)

¹⁹ M98L0149 (*Brier Mist*), M97M0005 (*Scotia Gold*), M93W1097 (*Menzies Bay*), M92M4007 (*Miss Holly No. 2*) M90L3034 (*Nadine*), M90M4020 (*Northern Osprey*)

²⁰ *Fishing Vessel Safety - Blueprint for a National Program*, National Academy Press, 1991.

²¹ *Safety Digest 2/2001; Safety Digest 3/2001*, Marine Accident Investigation Branch, United Kingdom.

²² Regulation 24.93(2).

although the lack of detectors may have contributed to the loss of the *Brier Mist* and the *Geronimo 1*. From all indications, the use of water level detectors helps to improve safety aboard fishing vessels. Despite the publication of *Ship Safety Bulletin* 04/2000 (Flooding Detection on Fishing Vessels), and the recommendations of the Small Fishing Vessel Safety Working Group - Atlantic Region, the Board is very concerned about the lack of progress with respect to the installation of such systems in compartments located below the waterline on decked fishing vessels (except British Columbia).

3.0 *Conclusions*

3.1 *Findings as to Causes and Contributing Factors*

1. Examination of the vessel revealed severe wear on the hull in way of the lazarette, including a through hole on the port side.
2. The *Alex B. I* was not adequately rigged for dragging scallops, since the hull did not have additional protection from repeated contact with the fishing gear.
3. The watertight bulkheads on the *Alex B. I* were compromised after the vessel's major alteration.
4. The owner did not know the basic principles of stability nor the regulations applicable to major alterations, particularly his obligation to notify the regional office of Transport Canada Marine Safety of any alterations affecting the vessel's seaworthiness.

3.2 *Findings as to Risk*

5. Although Transport Canada issues fishing vessel master's certificates, these certificates do not apply to the majority of fishers whose principal employment is commercial fishing. Quebec, as well as Newfoundland and Labrador, require mandatory training, though this training does not touch upon the *Small Fishing Vessel Inspection Regulations* (SFVIR) or the basics of stability.
6. The *Ship Safety Bulletins* issued by Transport Canada to provide safety information to fishers do not seem to be yielding the anticipated results.
7. Adding clauses to commercial fishing vessel inspection certificates is effective, but the certificates do not indicate that fishers are required to report major alterations.
8. Indicators of increased risk, such as changes of ownership, are not taken into account in the enforcement of the SFVIR, specifically with respect to a more proactive and flexible inspection frequency.
9. With the exception of British Columbia, Canadian fishing vessels are not required to have water level detectors in the fish hold or other infrequently accessed compartments.
10. There are currently no coordinated measures at the federal/provincial level which seek to foster a safety culture in the fishing industry.
11. When a registered fishing vessel is sold, change of ownership information is not forwarded by the Registrar to inspectors at TCMS regional offices.

3.3 *Other Findings*

1. In just under three years on the St. Lawrence, three fishing vessels with new owners and recently refitted for dragging scallops have experienced major water ingress. Loss of hull watertightness is the most probable cause in all cases.

4.0 *Safety Action*

4.1 *Action Taken*

4.1.1 *Transportation Safety Board*

On 08 February 2002, the TSB sent a Marine Safety Information Letter (MSI 01/02) to Transport Canada (TC), advising that it had revealed deficiencies with regard to:

- communication with fishers via *Ship Safety Bulletins*;
- the inspection regime for small fishing vessels; and
- modifications to fishing vessels not reported to the authorities.

In acknowledging receipt of the letter in April 2002, TC indicated its intention to look into the issues raised.

4.1.2 *Transport Canada*

TC is conducting a review of the process, which has been established by the TC Marine Safety (TCMS) Quebec regional office, whereby changes in the ownership status of fishing vessels (as reported by the regional Registrar of Ships) are brought to the attention of inspection personnel. The outcome of the review will be presented to Headquarters TCMS senior management for consideration in adopting a similar process nationally. Consideration is being given to include, in documentation provided by the Registrar to the new owner, information on notifying the regional TCMS office when modifications to a vessel are to be made. The TSB will be informed on the decision that is taken.

TC, in collaboration with industry groups such as the Canadian Council of Professional Fish Harvesters, has developed new requirements for mandatory safety training for operators and crew of fishing vessels and other small commercial vessels. These courses, entitled MED (Marine Emergency Duties) A3 and MED A4, have been designed specifically for fish harvesters and operators of small commercial vessels previously exempt from mandatory training. The training of fish harvesters began in the spring of 2002. Details of the courses, their syllabuses, application and implementation policy will be described in a new technical standard to be formally approved at the national meeting of the Canadian Marine Advisory Council (CMAC), in May 2003.

In addition to the requirement for basic safety training, the *Crewing Regulations* (section 21) were amended effective 11 April 2002, to provide the following:

- (1) The owner of a ship shall provide to the master (operator) written instructions that set out the policies and procedures to be followed to ensure that the complement of the ship:
 - (a) is familiarized with the ship and their duties; and
 - (b) can effectively co-ordinate their activities when performing duties vital to safety or the prevention or mitigation of pollution.

- (2) The master (operator) shall ensure that the ship's complement is trained in and carries out the policies and procedures.

This amendment applies to all commercial vessels. This combination of basic safety training (at an approved institution) and on-board familiarization and training in vessel-specific procedures is intended to help create a safety culture on board Canadian commercial fishing vessels.

For vessels over 15 tons, gross tonnage, as part of TC's annual inspection, operators and crew members will have to provide their training certificate as part of the inspection process. During the implementation period, as a temporary measure if training has not taken place, a certificate of registry at an approved course must be produced, and they must demonstrate to the inspector their ability to use the lifesaving and firefighting equipment carried on board the vessel.

In order to foster communications and to invite the participation of stakeholders, TC has several initiatives underway, including a new national CMAC Standing Committee on Fishing Vessel Safety, as well as national and regional CMAC working groups addressing fishing vessel regulatory issues and operator certification and training. The main task of the Standing Committee is to update the fishing vessel regulations, starting with those vessels under 150 tons, gross tonnage.

The TC Atlantic region, in particular, has conducted extensive consultation with fishers, including town hall meetings. Recently, TC joined the Department of Fisheries and Oceans (DFO) and the Workers' Compensation Board of British Columbia (WCBBC) to devise additional measures that would improve the safety of fishing vessels operating on the west coast.

In partnership with DFO, TC is discussing with stakeholders more efficient means of communication between government and fish harvesters. The possibility of the mail-out of safety related material, such as *Ship Safety Bulletins* and other safety related documentation directly to fish harvesters, using the DFO database of fishing vessel license holders, is one avenue which is presently being explored.

TC is currently in the process of reprinting copies of the *Small Fishing Vessel Safety Manual* (TPI0038) for distribution to fish harvesters by spring 2003. This manual addresses, in a very easy-to-understand format, not only regulatory safety issues but also common everyday working hazards encountered in the operation of small fishing vessels.

TC is collaborating with DFO in the production and distribution of a booklet entitled "Alerting, Detection and Response" dealing with search and rescue and accidents at sea. The booklet is expected to be distributed by spring 2003.

As part of the regulatory reform process, TC will review the inspection requirements for fishing vessels not exceeding 150 tons, gross tonnage, and, in particular, the requirements for those vessels not exceeding 15 tons, gross tonnage. It is intended that all vessels will be subject to an appropriate inspection regime.

Proposed changes to the regulations, which would require some form of stability assessment for all fishing vessels, are being considered. To that end, a discussion paper on proposed "Draft Stability Requirements" was circulated for review at the national CMAC. Further to that, consideration will be given to more clearly delineate to masters (operators) and ship owners their responsibilities regarding the safety of the vessel and crew and, in particular, their obligation for reporting to TC any structural modifications or addition of weight items which may adversely affect stability.

Although TC is concerned with the lack of water level detectors in fishing vessels, no direct action or regulation is yet envisioned. Work at IMO is ongoing for water level detectors in bulk carriers, and TC will consider the performance standards that flow from this work as a possible starting point for any proposed regulatory action regarding fishing vessels in this respect.

4.2 *Action Required*

Safety Culture in the Canadian Fishing Industry

TC has introduced changes in the *Crewing Regulations* (section 21) that specify crew be familiarized with the ship and their duties, as well as effective co-ordination of their activities when performing duties vital to safety or the prevention or mitigation of pollution. It is with

these regulatory changes, together with the new mandatory MED A3 and MED A4 training for fishers, that TC has stated it hopes will help create a safety culture on board Canadian commercial fishing vessels.

While these actions undoubtedly are steps in the right direction, a safety culture does not evolve spontaneously from a regulatory framework. While training is one element in the foundation of a true safety culture, MED A3 and MED A4 can only be considered an absolute minimum for the survival of a fisher in a distress situation. This training, covering lifesaving, abandonment, survival, firefighting, emergency response, regulatory and environmental issues, seamanship, vessel operations, weather and rescue - all in eight hours - cannot be considered a viable base on which a safety culture can be inculcated or sustained.

As knowledge and values evolve, so do standards by which acceptable risks are measured and what must be done to reduce that risk. In order to achieve a true safety culture in the Canadian fishing industry, several elements must converge, including;

- Training fishers, with particular attention to stability and seaworthiness
- Risk and hazard awareness sensitization of fishers
- Fatigue awareness training of fishers
- Effective safety communications
- Dissemination of lessons learned
- Just (blameless) culture
- Reporting culture
- Integration of fisheries management into the safety model
- Continuous improvement targets established and revised as necessary

Establishing a safety culture has made great strides in many industries over the past decade. The marine field is also engaged in this push, primarily through initiatives such as the International Safety Management Code. The fishing industry, however, does appear to have lagged behind other sectors.²³ In all fairness, the task cannot be solely attributed to TC. The Department of Fisheries and Oceans (through resource management and licencing criteria), training institutions, fisher associations, the fishers themselves and even their families must coordinate and cooperate in this effort. Once a safety culture has reached a mature stage, further payoffs can then be achieved using self-regulatory and voluntary regimes.

The Board is encouraged by the new and reinvigorated means of communicating with fishers through such initiatives as national and regional CMAC Standing Committees on Fishing Vessel Safety, town hall meetings, Federal/Provincial working groups as with the WCBBC, coordination with DFO in regard to harnessing the database of fishing vessel licence holders, reprinting and distributing copies of the *Small Fishing Vessel Safety Manual*, and the production and distribution (spring 2003) of a booklet entitled "Alerting, Detection and Response". The Board will continue to monitor the progress of these communication initiatives. The Board

²³ International Labour Organization (ILO), as published in *Safety and Health in the Fishing Industry*, 1999. Extract from unpublished report by R.D. Coton, *Fishing vessel safety - The insurer's perspective*, London Shipowners' P&I Club, 1999.

notes, however, that the training of fishers is a patchwork throughout the country. Although encouraged by new requirements for MED A3 and/or MED A4, this training is long overdue and is a minimum for survival, not for the foundation of a safety culture. Certain provinces have taken the lead in the training of fishers. Even in these cases, the Board is concerned that certain aspects of the trade that affect safety, such as stability and seaworthiness, hazard and fatigue awareness, are not covered. Only through a concerted and overarching effort to change the existing paradigm within the fishing community, and specifically establish a true safety culture within it, can the risks to fishers be reduced to acceptable levels. The Board therefore recommends that:

Transport Canada, in coordination with Fisheries and Oceans Canada, fisher associations and training institutions, develop a national strategy for establishing, maintaining and promoting a safety culture within the fishing industry.

(M03-02)

4.3 *Safety Concerns*

The Board notes that TC is aware of the problem concerning the lack of water level alarms in fishing vessels and that ongoing work at IMO may eventually lead to improvements in this regard. However, the Board is concerned that, in the interim, without a requirement for such equipment, such as is required in British Columbia, fishing vessels in the rest of Canada will continue to be unduly at risk for undetected flooding.

The Board is encouraged that TC is conducting a review of the process, which has been established by the TCMS Quebec regional office, whereby changes in the ownership status of fishing vessels (as reported by the regional Registrar of Ships) are brought to the attention of regional inspection personnel, with a view to adopting a similar process nationally. The TSB will continue to monitor the progress of this risk reduction measure.

The Board is encouraged by the ongoing regulatory reform process conducted by TC and by the upcoming review of the inspection requirements for fishing vessels, in particular, the requirements for those vessels not exceeding 15 tons, gross tonnage. The Board will continue to monitor the outcome of this reform and the review of the inspection requirements.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 06 May 2003.

Visit the Transportation Safety Board of Canada web site, www.tsb.gc.ca for information about the TSB and its products and services. There you will also find links to other safety organizations and related sites.

Appendix A—Glossary

BAPAP	<i>Bureau d'accréditation des pêcheurs et aides-pêcheurs (Quebec)</i>
BHP	brake horsepower
CSMOPM	<i>Comité sectoriel de main-d'oeuvre des pêches maritimes</i>
CSST	<i>Commission de la santé et de la sécurité du travail</i>
MAPAQ	<i>ministère de l'Agriculture, des Pêches et de l'Alimentation du Québec</i>
MED	Marine Emergency Duties
PFHCB	Professional Fish Harvesters Certification Board (Newfoundland and Labrador)
SFVIR	<i>Small Fishing Vessel Inspection Regulations</i>
TSB	Transportation Safety Board of Canada
TCMS	Transport Canada Marine Safety
WCBBC	Workers' Compensation Board of British Columbia