Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

MARINE INVESTIGATION REPORT

M04M0002

SINKING AND LOSS OF LIFE

SMALL FISHING VESSEL *LO-DA-KASH*

SAND COVE, NEW BRUNSWICK

23 JANUARY 2004

Canada

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

Sinking and Loss of Life

Small Fishing Vessel *Lo-Da-Kash*
Sand Cove, New Brunswick
23 January 2004

Report Number M04M0002

Summary

On the morning of 23 January 2004, the small fishing vessel *Lo-Da-Kash* departed Maces Bay, New Brunswick, on a trip of 21 nautical miles to Campobello Island, New Brunswick, to pick up fishing gear. When the vessel was about halfway back to Maces Bay on the return trip, it sank with four persons on board (two crew members and two guests). One person swam a short distance to shore, but subsequently succumbed to hypothermia. Two people drowned, and one person remains missing and is presumed drowned.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessel

Name	*Lo-Da-Kash*
Official Number	818949
Port of Registry	Yarmouth, Nova Scotia
Flag	Canada
Type	Small fishing vessel
Gross Tonnage[1]	13.0
Length	9.7 m
Built	1996, Barrington Passage, Nova Scotia
Propulsion	One 168 kW John Deere diesel engine
Crew	2
Guests	2
Owner	Kingsclear First Nation, New Brunswick

Description of the Vessel

The *Lo-Da-Kash* was a small fishing vessel of the Cape Island design, constructed of moulded, glass-reinforced plastic, with the wheelhouse and accommodation forward, the engine room beneath the wheelhouse, and the work deck aft. Access to the wheelhouse was through a hinged door on the starboard side. Access to the engine room was through a large hatch cover located in the wheelhouse. No watertight bulkhead was fitted below deck (see Figure 1).

The vessel had recently been converted from a sea urchin dive boat to a sea urchin dragger. This modification included the installation of an A-frame near the stern and a cable winch at the forward end of the work deck to enable the vessel to tow a drag along the ocean floor.

The 720 kg A-frame was installed a week before the occurrence, and was built with two 6.4 m vertical galvanized steel sections and a 1.5 m section across the top. The deck winch had approximately 366 m of 11 mm steel towing cable that was rigged from the deck winch, through a steel block on the top section of the A-frame, and out to an urchin drag. Two urchin drags were aboard the vessel, weighing about 635 kg each. They measured 3.05 m wide and were constructed of a steel frame with chain links forming the body.

The work deck had three flush hatches, capable of being secured watertight by four screws, located along the centreline and providing access to the below-deck space in way of the steering gear, the fuel oil tanks, and a bilge pump. Two freeing ports of about 150 mm by 50 mm each were located in the bulwark at the level of the deck on each side, and the vessel had a low freeboard.

As a vessel not exceeding 15 in gross tonnage, the *Lo-Da-Kash* was a small fishing vessel and subject to the requirements of the *Small Fishing Vessel Inspection Regulations* (SFVIR), Part II. It was not subject to periodic inspection by Transport Canada (TC) and was not required to submit stability data for approval, nor was such data available for this vessel.

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

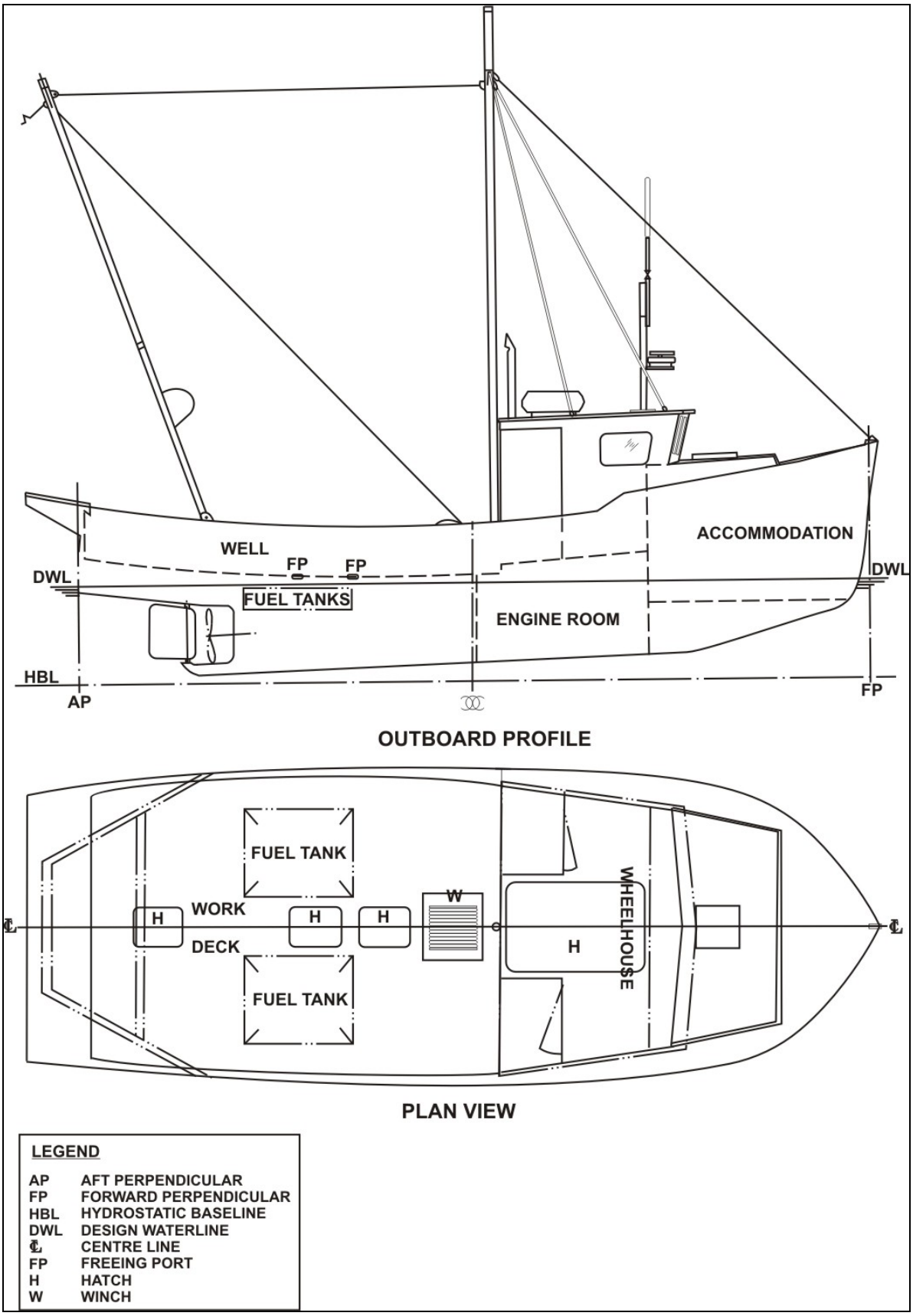

Figure 1. Outline arrangement

History of the Voyage

On the morning of 23 January 2004, the small fishing vessel *Lo-Da-Kash*, with four persons on board, departed Maces Bay, New Brunswick, for a short transit to Campobello Island in the Bay of Fundy, New Brunswick (see Appendix A). The intent of the trip of 21 nautical miles was to pick up two sea urchin drags in Campobello and return to Maces Bay the same day. Environment Canada had forecast temperatures of -10°C with west-northwest winds of 20 to 25 knots, accompanied by freezing spray. The water temperature was about 4°C. During transit to Campobello, the *Lo-Da-Kash* headed west-southwest and the vessel experienced ice accretion.

The *Lo-Da-Kash* picked up the sea urchin drags in Campobello and departed mid-afternoon for the return voyage. When the vessel was about halfway to Maces Bay, one of the drags was deployed over the stern and the cable run out on the winch. The fishing gear became caught on the seabed and the vessel sank in position 45°04.07′ N, 066°40.42′ W. The two guests were trapped in the wheelhouse and drowned. One of the crew members made his way from the vessel to a rocky beach and up a two-metre cliff into the tree line, a distance of about 480 m, where his flotation vest was found. About 230 m from the flotation vest, his jacket was found along with a lighter and what appeared to be an attempt to build a fire. The deceased crew member was found 15 m further down the shore. The operator is still missing and presumed drowned.

Although the *Lo-Da-Kash* was equipped with a very high frequency (VHF) radio and a cellular phone, no distress call was received. The VHF was not fitted with a digital selective calling (DSC) capability, nor was one required by regulations. The *Lo-Da-Kash* was not reported missing until the afternoon of Sunday, January 25, about two days after the estimated time of the occurrence.

Search and Rescue Operations

The Joint Rescue Coordination Centre (JRCC) Halifax received the initial report of the overdue *Lo-Da-Kash* on January 25 at 1315 Atlantic standard time.[2] The Canadian Coast Guard cutter (CCGC) *Westport*, CCGC *Courtney Bay* and CCGS *Sir William Alexander* were tasked the afternoon of January 25, as well as Aurora, Hercules and Cormorant aircraft. Upwards of 20 local fishing boats and ferries also assisted in the search. The search was hampered on January 26 by winds of 40 to 50 knots, extreme cold, and diminished visibility to near zero with sea smoke.

Nothing was found and the search was called off on January 29 after covering an estimated area of 42 000 square nautical miles. On February 4, the body of the deceased crew member who had made it to shore was discovered. Also found a little further down the shore was the hatch cover for the engine space. With this information, searches were resumed both on shore and at sea, concentrating around the area where the deceased was found.

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[2] All times are Atlantic standard time (coordinated universal time minus four hours).

The *Lo-Da-Kash* was located on February 11 after a helicopter spotted a steady stream of fuel coming from the ocean floor. Divers from the Royal Canadian Mounted Police (RCMP), assisted by local divers, searched the area and located the wreck. The *Lo-Da-Kash* was found resting upright and inclined to the port side in about 25 m of water, among rocky outcrops and ledges. The two deceased guests were recovered from the port side of the wheelhouse. The urchin drag, attached to 43 m of cable, was also discovered. The cable was found caught in a notch on an underwater ledge.

Injuries

Autopsies determined that the crew member who swam to shore had succumbed to hypothermia and the two guests recovered from the *Lo-Da-Kash* had drowned. The operator is still missing and presumed drowned.

Dive and Salvage

The TSB conducted a dive on the *Lo-Da-Kash* on 20 May 2004. The vessel was on the seabed right-side up. The visible portion of the hull and superstructure were inspected with only superficial damage observed on top of the wheelhouse on the port side. The port-side window of the wheelhouse was found broken, and the hinged wheelhouse door on the starboard side was found open. The engine throttle and gear levers in the wheelhouse were in the slow astern position, and the rudder was turned to port. The liferaft was discovered laying on the seabed near the vessel, still in its canister with 4.5 m of the 10 m painter paid out and attached to the cradle.

The urchin drag was found laying about 40 m from the *Lo-Da-Kash*. The towing cable had parted with about 43 m still attached to the drag. The other end of the cable led from underneath the vessel to the deck winch, where the last few wraps on the drum were found drawn into and deeply embedded in some of the inner wraps. The stern of the vessel was found partially covering the second drag.

On September 27, the *Lo-Da-Kash* was raised and towed to Beaver Harbour, New Brunswick. The vessel was beached and temporary patches were placed over three holes found in the hull. After the vessel was afloat, an inclining experiment was carried out to assess its stability.

After recovery, the following items were noted:

- the three holes on the port side were consistent with holes that would occur after prolonged contact and chaffing against rocks on the sea floor;
- the access covers for the hatches on the work deck were not in place;
- the last few wraps of the cable on the deck winch were deeply embedded in the remaining cable;
- when stretched out, the end of the cable from the deck winch reached the top block on the A-frame;

- the cable winch was found with the clutch engaged;
- the spare urchin drag was still made fast to the boat;
- both VHF radios were turned on;
- the vessel's anchor was hooked into the spare trawl with no anchor line attached;
- the engine controls were in the slow astern position, and the ignition key was set in the ON position; and
- a post-recovery disassembly of the engine and gearbox revealed no anomalies.

Photo 1. *Lo-Da-Kash* post-recovery

Stability-Related Data

A lines plan and an outline general arrangement (see Figure 1) of the *Lo-Da-Kash* were prepared. The inclining experiment report was produced. All facts and data pertaining to the stability of the vessel were gathered. Using the lines plan, a computerized model of the vessel was prepared, including two fuel oil tanks and the after well together with the freeing ports. Hydrostatic and cross curves were produced, together with the lightship characteristics of the vessel, using the data available from the inclining experiment report. Aspects of the *Lo-Da-Kash*'s stability were compared against the stability standards[3] for small fishing vessels. Although the vessel was not required to comply with the stability standards, these standards provide a yardstick against which a vessel's stability can be assessed.

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[3] Transport Publication TP 7301E, *Stability, Subdivision and Load Line Standards*, STAB 4, amended July 1986.

Fishing Operations

Operators of urchin dragging boats typically deploy the drag over the stern, with the cable running through the top block (see Figure 2 and Figure 3). Prior to the drag being towed along the bottom, the cable is brought down from the block to a level closer to the transom of the vessel to reduce the heeling moment. On the *Lo-Da-Kash,* this is achieved by attaching a chain to a strong point on the vessel's deck with a snatch block at the end. The snatch block is then attached to the towing cable while leading vertically down from the top block on the A-frame.

When the vessel begins to drag, the stress comes on the snatch block. In this instance, the chain arrangement had not been installed the evening before the *Lo-Da-Kash* departed for Campobello.

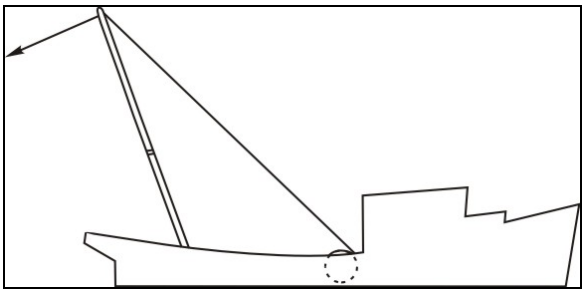

Figure 2. Vessel towing without chain

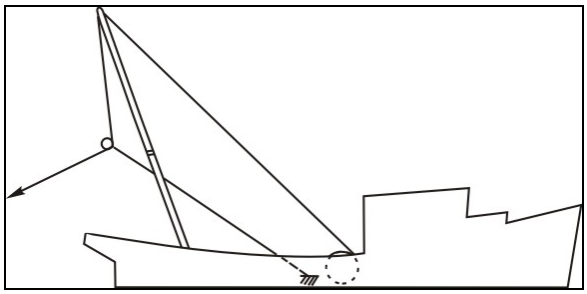

Figure 3. Vessel towing with chain

Personnel Certification, Training, and Experience

The operator had more than 25 years of experience at sea, most of which were spent on various types of fishing boats. He had sailed the *Lo-Da-Kash* in the Maces Bay area with the A-frame in place on at least two occasions before the accident, but had no experience dragging for sea urchins on this or any other boat. The other crew member had more than 10 years of experience fishing, but no experience stern dragging.

Because the *Lo-Da-Kash* had a gross tonnage of less than 15, no navigation training was required. However, the operator held a master, limited certificate, and had marine emergency duties (MED) training. Neither the two guests nor the crew member had any formal navigation or MED training. Consequent to changes in the *Crewing Regulations*, MED training for fishers is now mandatory and is being phased in with the completion date of July 2007.

Life-Saving Equipment

Although not required by regulation, the *Lo-Da-Kash* carried a liferaft (RFD Seasava Plus four-person liferaft) that was fitted on top of the wheelhouse and held in its cradle with a senhouse slip attached to nylon straps. This configuration required manual operation in order to deploy the liferaft.

A post-occurrence dive on the vessel revealed that, although the liferaft had cleared the chocks, the straps that had secured the liferaft on the cradle were still in place and connected by the senhouse slip. The liferaft was not fitted with an automatic release mechanism or other arrangement that would permit the liferaft to float free automatically in the event of sinking, nor was it required.

The *Lo-Da-Kash* was not required to carry an emergency position-indicating radio beacon (EPIRB), nor was it equipped with one.

One of the two bodies found on the vessel was wearing a flotation jacket and the other, a flotation suit. A life vest was found near the deceased crew member who made it to shore. It is unknown what type of flotation device the operator was wearing, if any.

Analysis

There was insufficient information available to establish the precise cause of the vessel sinking. It could not be determined with certainty whether the urchin drag was deployed over the stern to

- act as an anchor had the boat lost power;
- try a test tow; or
- tighten the lay of the cable on the drum.

The engine hatch cover was too large and unwieldy to exit the wheelhouse without assistance. However, the cover was found ashore. This suggests that it had been opened and stowed on deck to provide access to the main engine, perhaps following engine failure. As the vessel was close to shore while passing through Sand Cove, New Brunswick, the urchin drag may have been deployed over the stern to act as an anchor. It is not likely that the operator would have deployed the drag to try a tow because he was familiar with the area, having dived for urchins there, and knew the bottom to have many obstructions. In addition, the operator was likely aware that the cable was only wrapped hand-tight on the winch and would present the risk of becoming snarled once stress was placed on it. The cable had been rove onto the warping drum by hand, and thus was not as tight as would be desired for fishing. The cable must be guided onto the drum under tension to avoid having it tighten to such a degree that the outer wraps become drawn into the inner wraps.

The engine controls were found in the slow astern position, and the ignition key in the ON position. This suggests that the engine was restarted at some point after the drag was deployed. It is probable that the vessel was backing up to recover the drag, when the cable became snagged on an obstruction on the sea floor. When the cable became snarled on the winch drum, the vessel would have been tethered on a short scope and unable to pay out any more slack. With little room to manoeuvre, the *Lo-Da-Kash* would have been more susceptible to the effects of wind and waves.

The lack of any distress calls received suggests that the events leading up to the sinking transpired very quickly.

Stability at the Time of the Occurrence

Lightship and Departure Conditions

The TSB conducted a post-occurrence stability analysis, the details of which are contained in a separate stability report.[4] Various conditions were prepared to reflect the loading of the *Lo-Da-Kash* during its voyage and at the time of the occurrence, based on the number of crew and their effects, the estimated consumables and the fishing gear on board. The stability of the *Lo-Da-Kash* for these conditions of loading was assessed and compared with the criteria contained in the STAB 4 stability standards. The assessment took into consideration the effect created by the wind, the ice accretion, the towing cable acting at the block at the top of the A-frame, and a possible flooding of the well.

In the lightship condition, the metacentric height (GM) was determined to be 2.64 m, which is well above the minimum of 0.35 m required by STAB 4. The freeboard to the freeing ports and to the gunwale was 0.16 m and 0.86 m, respectively.

In the departure condition from Maces Bay, the stability of the vessel was such that the area under the righting arm (GZ) curve at angle of heel between 0° and the angle of downflooding (20°) exceeded the criteria of STAB 4. However, the range of positive stability was limited to about 20°, due to the submergence of the gunwale at that angle, with the consequence of downflooding the after well. There is no explicit criterion for a minimum range of positive stability in STAB 4, but there is a criterion for the area under the GZ curve between 30° and 40°, which was not met. In the departure condition, the freeboard in still water in way of the freeing ports was 0.08 m.

In the lightship condition, the installation of the A-frame, the deck winch and the boom winch reduced the GM of the vessel from 2.94 to 2.64 m. In the departure condition, this installation reduced the range of positive stability from 23.6° to 20° and the freeboard from 0.13 to 0.08 m.

Wind and Icing Considerations

During the transit between Maces Bay and Campobello Island, the *Lo-Da-Kash* was exposed to winds six points on its starboard bow. The relative direction of the wind in conjunction with cold temperatures caused freezing spray and icing. Under such conditions, ice would accumulate on the windward side (starboard side) of the vessel. This is consistent with the vessel developing an angle of heel of under one degree to starboard—heel that would not significantly affect the vessel's stability. On the return trip, with the wind abaft of the beam, ice accretion was minimal due to the relative wind speed and seas, and the initial starboard list was maintained.

In the absence of precise information, the rate, quantity, and location of ice accretion aboard the *Lo-Da-Kash* was estimated using the prevailing meteorological and oceanographic conditions, during the voyage and at the time of occurrence. According to the Mertin's icing diagram,[5] with

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4 The TSB Stability Report—*Lo-Da-Kash*—21 December 2005 is available upon request.

5 H.O. Mertins, "Icing on Fishing Vessels due to Spray," *The Observer* (London, vol. 38, No. 221), p. 128-130)

wind force 6 (22 to 33 knots) on the Beaufort scale, air temperature of -10°C and seawater temperature of 4°C, the rate of ice accretion during the estimated six-hour voyage was considered to be moderate, generating an accumulation of 1 to 1.5 cm.

Icing allowances were included in the stability analysis using the estimated values mentioned above. In the case of the *Lo-Da-Kash*, the icing increased the weight of the vessel by a maximum of 1.05 tonnes (1.03 long tons), reducing the freeboard by less than 0.03 m and creating a maximum starboard list of less than one degree.

The stability was adversely affected by the rise of the centre of gravity of the vessel with accumulated ice, but the area under the GZ curve was within the criteria set forth in STAB 4 at an angle of heel of between 0° and 30°. The range of positive stability was limited to about 19°, again due to the submergence of the gunwale. The stability was less than the criteria set forth for the area under the GZ curve between 30° and 40°. The vessel was not equipped with the means to remove the ice.

Effect of Fishing Gear

In 1965, the International Maritime Organization (IMO) Sub-committee on Safety of Fishing Vessels discussed the problem of whether the forces induced by fishing gear were dangerous for the stability of fishing vessels.

The IMO has recognized that the pull from fishing gear may result in dangerous heel angles, but has not yet established any special stability criteria for fishing vessels subject to the action of fishing gear.[6] The maximum forces occur when its rigging gets caught on some underwater obstacle.

The assessment of the stability of the *Lo-Da-Kash* under the effect of fishing gear was therefore considered necessary. The following situations were considered:

- The fishing gear was deployed overboard, acting as an anchor, or the vessel was dragging at constant speed on a straight course with the cable running out on the winch via the top block on the A-frame.

- The vessel was towing the drag or was backing up to recover it and the cable became fouled on an underwater obstacle on the ocean floor.

- The vessel was trying to free the fouled cable from the ocean floor by the thrust of the propeller or the pull of the cable winch.

The force acting on the cable is greater when the vessel is dragging, due to the friction of the fishing gear on the ocean floor, compared to when the drag is simply deployed overboard acting as an anchor.

When the fishing gear is deployed, the axis of the cable may not be in the centre plane of the vessel, generating a heeling moment that will increase with the angle of heel.

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6 IMO, *Code of Intact Stability*, 2002 edition, Chapter 4, Section 4.2.2.8.

The pull in the towing cable was acting at the top block of the A-frame. In a dragging condition at a constant speed on a straight course, the resultant pull in the cable was estimated to be 9.96 kilonewtons (kN), or one long ton.

The results of the stability analysis show that the corresponding trimming moment would create a trim by the stern of 0.64 m. The area under the GZ curve is consistent with the stability criteria of STAB 4 only between 0° and 30°, and the range of positive stability would be limited to about 20°, corresponding to the submergence of the gunwale and flooding of the well.

It is likely that the vessel was not towing, because the short remaining length of cable found after recovery was insufficient for a proper tow. When the urchin drag of the *Lo-Da-Kash* was found, the remaining length of cable between the fouling point and the parted end was about equivalent to the height of the top block above the ocean floor. In this situation, any attempt to release the fouled cable from the ocean floor by the thrust of the propeller, by the cable winch, or by the use of the vessel's inertia would have been dangerous.

The results of tensile tests carried out on the towing cable showed a breaking strength of approximately 88.74 kN (9.05 tonnes).[7] The heeling moment generated by a force of this magnitude, acting at the top block with a short cable, would be such that, at an initial angle of heel of about 6°, it would be greater than the maximum righting moment. At that point, the vessel would incline very rapidly and be prone to capsizing. In the case of an open-construction type vessel (Cape Islander), the gunwale would become submerged, leading to flooding of the well.

Loss of Reserve Buoyancy

In this instance, the vessel's range of stability was limited to 20°. At this angle, the vessel would be prone to shipping and retaining water on deck. The cumulative effect of this, together with the liquids in the slack tanks, generated free surface effect further exacerbating the situation. Downflooding ensued through the openings at the well deck until all reserve buoyancy was lost and the vessel sank.

Requirement for Stability Data

Currently, there is no requirement for small uninspected fishing vessels, such as the *Lo-Da-Kash*, to submit trim and stability data to TC for information, review, or approval.

The Board has repeatedly expressed the concern that the stability characteristics of most small fishing vessels are not formally assessed and, consequently, their safe operation is compromised. In November 2003, the Board issued two recommendations to TC (M03-05 and M03-06), calling for the assessment/verification of stability for new and existing small inspected fishing vessels. In 2005, following the loss of the *Ryan's Commander* and concerned that, in the absence of meaningful action to address past recommendations, fishers continued to be placed

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7 TSB Engineering Report LP 161/2004, Examination of Fractured Steel Cable from Sunken Fishing Vessel *Lo-Da-Kash, 23* October 2004.

at undue risk, the Board issued another recommendation (M05-04) calling on TC to immediately implement recommendations M03-05 and M03-06. (See *Safety Action Taken* section for subsequent actions.)

While these recommendations were made in relation to small inspected fishing vessels (with a gross tonnage of 15 to 150), the principles also apply to small uninspected fishing vessels (with a gross tonnage of under 15) given that the risk associated with their operation is similarly high.

Periodic Verification of Stability Data

Owners of commercial vessels are required to report modifications to TC. In addition, where there is change of ownership of a registered vessel, or modifications require that the vessel's registration information be changed, then TC is notified by the Registrar of Ships as a matter of course. However, in many cases, such as the *Lo-Da-Kash*, commercial vessel owners simply make structural modifications without notifying any authority.

Frequent changes to the management and operation of the fisheries mean that fishing vessel modifications are an ongoing reality. These modifications, which may adversely affect a vessel's transverse stability, are often carried out without any evaluation by a naval architect or assessment by a TC inspector. In the absence of such an assessment, operational decisions may be based on imprecise or incomplete information—to the detriment of safety.

Life-Saving Equipment

Liferafts and Hydrostatic Releases

The *Lo-Da-Kash* carried a four-person inflatable liferaft although it was not required to do so by regulation. Inspection of the liferaft container when retrieved revealed that it had no residual buoyancy. The loss of buoyancy may have been brought about by the accumulation of water inside the liferaft container through the drain holes in the canister while it was submerged. Subsequent testing demonstrated that the raft inflated as designed when the painter line was pulled out.

The liferaft may have worked its way out of the cradle because of local tidal currents and underwater pressure compressing the foam rubber cushion on the cradle. While there is no requirement for the carriage and stowage of the liferaft on uninspected fishing vessels, there is information[8] available to operators recommending the use of liferafts equipped with deep chocks or a hydrostatic release unit. In occurrences involving small vessels similar to the *Lo-Da-Kash*, capsizing or foundering typically transpires very quickly, leaving little time for the crew to manually deploy a liferaft. Instances are on record where lives have been lost and the involved liferafts did not provide life-saving support to persons in the water.[9]

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8 Transport Publication TP 10038E, *Small Fishing Vessel Safety Manual.*

9 TSB Report M00C0033, *True North II;* TSB Report M99M0142, *Joseph and Sisters; and* TSB Report M98L0149, *Brier Mist.*

Emergency Position-Indicating Radio Beacons (EPIRBs)

The *Lo-Da-Kash* did not carry an EPIRB, nor was it required to do so by regulation. The *Lo-Da-Kash* did not have enough time to send a distress message. However, the carriage of an EPIRB would have provided an opportunity to automatically initiate a transmission and to alert search and rescue (SAR) authorities at the onset of the distress, increasing the chances of survival.

As a result of its investigation into the sinking of the small fishing vessel *Brier Mist*, the Board recommended (M00-09) that small fishing vessels engaging in coastal voyages be required to carry an EPIRB or other appropriate equipment that floats free, automatically activates, alerts the SAR system, and provides position updates and homing-in capabilities.

In response to the recommendation, TC indicated that it continues to support and encourage the voluntary carriage of EPIRBs on all vessels that are not required to carry this equipment. Furthermore, the risk assessment study by TC to evaluate the need for more effective distress-alerting capabilities on small commercial vessels, including fishing vessels that are not yet required to carry either an EPIRB or a VHF radio with DSC, is ongoing.

The need to alert authorities in a timely manner and to request assistance in the event of capsizing or foundering has been identified in previous TSB investigations in which delays in reporting distress situations have contributed to the loss of lives. Instances are on record where the carriage of an EPIRB has contributed to the saving of lives.[10]

TC is introducing new Fishing Vessel Safety Regulations under the *Canada Shipping Act*, 2001 Regulatory Reform initiative. Numerous consultation sessions have been conducted to discuss the proposed requirements that will apply to small fishing vessels (less than 24 m in length). The carriage of EPIRBs has been addressed, and in the latest draft regulations, a vessel like the *Lo-Da-Kash* would not be required to carry one unless

- it was considered a vessel of closed construction and it did not carry a coastal liferaft; or
- the hull of the vessel met the inherent buoyancy criteria as defined in the *Small Fishing Vessel Regulations.*

Findings as to Causes and Contributing Factors

1. The *Lo-Da-Kash*'s transverse stability was adversely affected and the vessel heeled due to the cumulative effect of

    - the added weights above the vessel's centre of gravity from modifications;
    - the ice accretion experienced during the voyage;
    - the free surface effects of liquids in tanks and water shipped and retained on deck; and
    - the fishing gear caught on an obstruction, generating a large heeling moment.

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10 TSB Report M93M0004, *Cape Aspy;* TSB Report M97W0236, *Pacific Charmer;* TSB Report M98N0064, *Atlantic Prize; and* TSB Report M98F0009, *Twin J.*

2. The inherent low freeboard along with the heel permitted water to be shipped and retained on deck, and downflooding ensued through the openings at well deck until all reserve buoyancy was lost and the vessel sank.

3. There is no requirement for a hydrostatic release unit or deep chocks to be fitted on small fishing vessels, and this precluded the liferaft from floating free and deprived the persons in the water of critical life-saving equipment and protection from the elements.

4. Because a distress message was not transmitted and no automatic means of raising an alert was carried, the search and rescue response was delayed, decreasing the possibility of survival.

Findings as to Risk

1. The recently modified vessel entered service without a reliable stability assessment, with no stability data on board for the guidance of the master, and no formal instructions for the safe operation of the fishing gear, nor was there a requirement to do so.

2. For small fishing vessels such as the *Lo-Da-Kash* not exceeding 15 in gross tonnage, there is no requirement for the vessel's stability to be assessed.

3. Following modifications, small fishing vessels are not required to undergo an assessment to ensure that they are safe to operate and that they are suitable for their intended purpose.

4. There are no requirements or criteria regarding the effect of fishing gear on the stability of fishing vessels.

5. The *Lo-Da-Kash*'s departure from Maces Bay, with winds of 25 to 30 knots and freezing spray warnings forecast, exposed the vessel to additional risks.

Safety Action Taken

Carriage of Emergency Position-Indicating Radio Beacons (EPIRBs)

In June 2004, the TSB issued a Marine Safety Information (MSI) letter (No. 03/04) addressed to Transport Canada (TC) regarding the alerting of vessels in distress and the carriage of emergency position-indicating radio beacons (EPIRBs) in particular. The MSI noted that, given that small fishing vessels are susceptible to sudden capsizing, consideration of this occurrence may benefit the risk assessment study ongoing at the time to evaluate the need for more effective distress-alerting capabilities on small fishing vessels.

In response, TC indicated that, in conjunction with its partners, it will continue to encourage and promote the voluntary carriage of equipment capable of sending rapid distress alerts, such as EPIRBs, personal locater beacons, and very high frequency (VHF) radiotelephones fitted with

a digital selective calling (DSC) capability. TC recommended that Industry Canada require that all fixed-type–approved VHF radiotelephones be capable of distress alerting using DSC. As well, TC has various publications in print to hand out to stakeholders at industry-related venues.

Float-Free Arrangements for Liferafts

In July 2004, the TSB issued Marine Safety Advisory (MSA) 02/04 addressed to TC regarding the carriage of float-free arrangements on uninspected small fishing vessels. The MSA noted the Board's concern that, although TC's impending Regulatory Reform will require that liferafts, when carried, float free, the risks remained in the interim.

In response, TC indicated that, in the new proposed Fishing Vessel Safety Regulations, there will be requirements for liferafts, when carried, to have float-free arrangements. In the interim, TC has used a number of methods to communicate the importance of these devices during consultations with the fishing industry as part of the Regulatory Reform project.

Assessment of Stability Requirement for Small Fishing Vessels

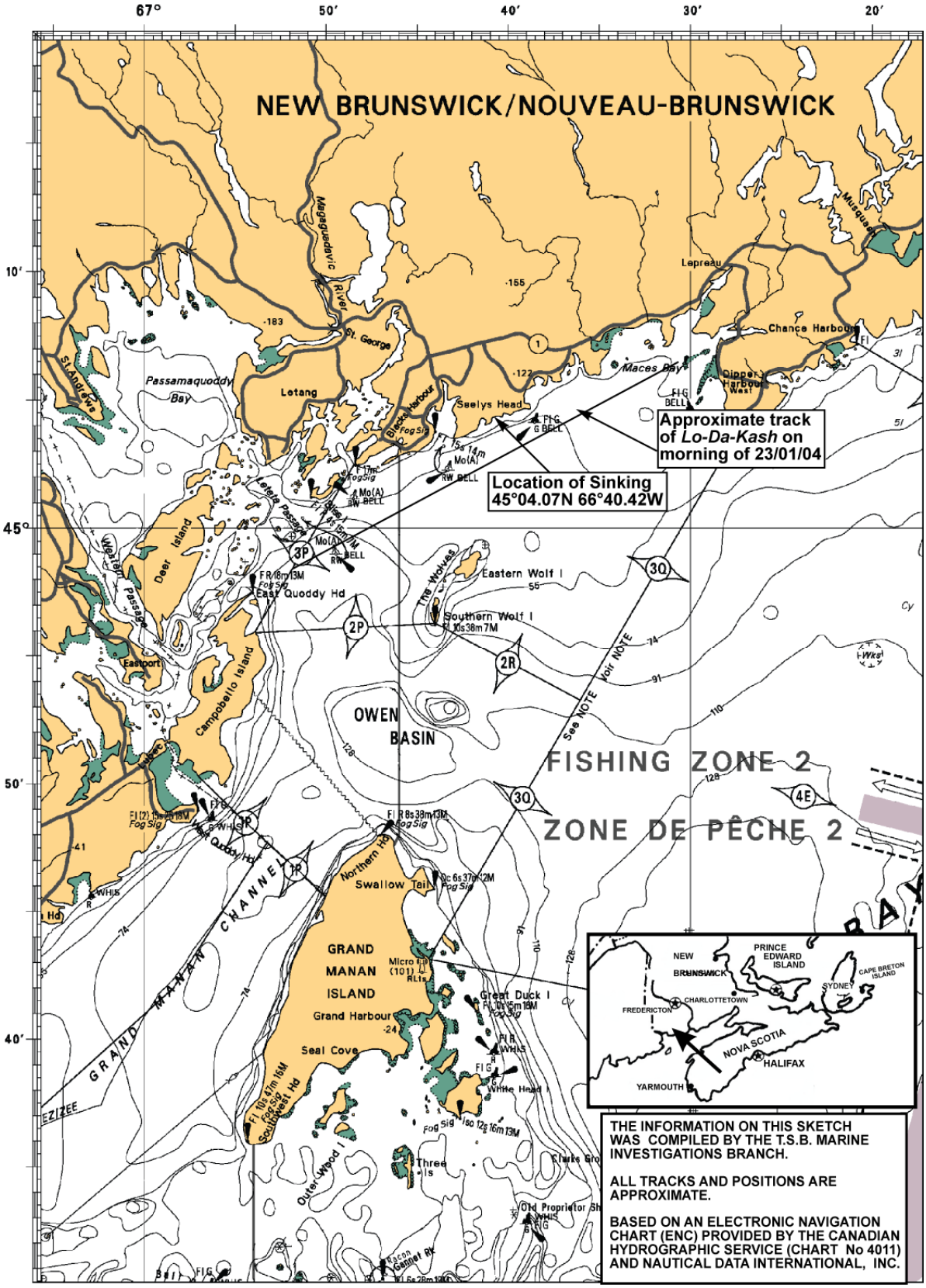
TC issued Ship Safety Bulletin (SSB) 04/06 entitled *Safety of Small Fishing Vessels: Information to Owners/Masters about Stability Booklets* as an interim measure in advance of the new Fishing Vessel Safety Regulations. The bulletin applies to all owners and operators of fishing vessels, new and existing, that are between 15 and 150 in gross tonnage and not more than 24.4 m in length. It sets out how to determine whether a vessel requires a stability assessment and stability booklet.

While this does not pertain to vessels with a gross tonnage of less than 15, owners and operators are being encouraged to review SSB 04/06 and determine whether a stability assessment and stability booklet could help them operate safely.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 20 July 2006.

*Visit the Transportation Safety Board's Web site (**www.tsb.gc.ca**) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.*

Appendix A – Occurrence Area



Appendix B — List of Supporting Reports

The following TSB reports were completed and are available upon request:

- Stability Report—*Lo-Da-Kash*—21 December 2005
- LP 161/2004—Examination of Fractured Steel Cable from Sunken Fishing Vessel *Lo-Da-Kash, 23* October 2004.