



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



MARINE TRANSPORTATION SAFETY INVESTIGATION REPORT M22A0312

LOSS OF STEERAGE AND GROUNDING

Roll-on/roll-off ferry *Confederation*
Caribou, Nova Scotia
04 September 2022

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Description of the vessel

The *Confederation* is a double-ended roll-on/roll-off ferry of steel construction (Figure 1) built in 1993, with a passenger capacity of 599 and a vehicle capacity of 210. The bridge is enclosed and is equipped with navigational equipment including radars, very high frequency (VHF) radios, an electronic chart system, and a simplified voyage data recorder. The vessel is powered by 2 keel-cooled diesel engines with a total of 6000 brake horsepower. Each engine is connected by a gearbox to a controllable pitch propeller, and a Becker rudder is fitted on each end of the vessel. The vessel has a gross tonnage of 8060.8 and a cruising speed of 18 knots.

Figure 1. The Confederation (Source: Northumberland Ferries Limited)



The vessel is registered to the Minister of Transport of the Government of Canada, which is also the authorized representative (AR), and operated by Northumberland Ferries Limited (NFL). The classification society Lloyd's Register is the recognized organization (RO) for the *Confederation*.

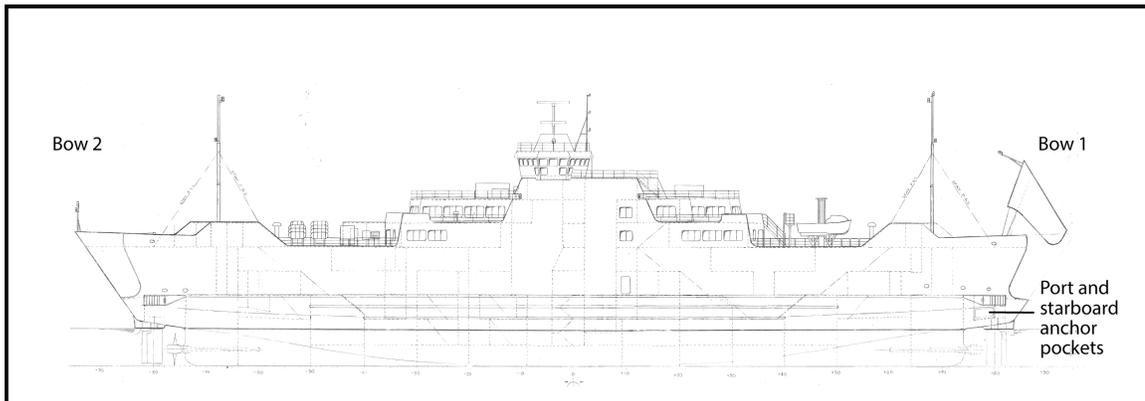
The *Confederation* can be steered from the following locations:

- the main steering and propulsion control console in the centre of the bridge;
- from 1 of the 2 identical steering positions located at the centre of the bridge, one facing Bow 1 and the other facing Bow 2 (Figure 2); whichever one is forward-facing is used when the vessel is underway; and
- from the bridge wing consoles, which are used primarily for docking and undocking the vessel.

When the vessel is underway,¹ the main propulsion is from the stern, the main rudder is the aft rudder, the forward propeller is declutched, and the forward rudder is locked in the midship position. When the vessel is docking and undocking, the rudders and propellers on both ends are used.

¹ Both ends of a double-ended ferry can function as the bow and stern depending on the direction of travel, but only one end is equipped with anchors. On both directions of the voyages between Caribou, Nova Scotia, and Wood Islands, Prince Edward Island, the end with the anchors is normally facing toward Caribou.

Figure 2. General arrangement of the double-ended ferry *Confederation* (Source: Northumberland Ferries Limited, with TSB annotations)



The vessel operates on a 75-minute route that crosses the Northumberland Strait between Caribou, Nova Scotia, and Wood Islands, Prince Edward Island, running 3 to 8 times per day, depending on the season.

History of the voyage

On 04 September 2022 at 0807,² the *Confederation* arrived at Caribou from Wood Islands. Passengers and vehicles were disembarked, and the vessel began loading passengers and a number of vehicles for the return trip. The bridge team consisted of the master, the second officer, and the quartermaster.

At 0829, with the tide ebbing and a light breeze, the vessel departed the Caribou ferry terminal and then made the first turn to starboard to proceed out of the channel on a course of 035 degrees, increasing to a speed of 11 knots.³ The quartermaster was steering the ship from the main steering position facing Bow 2. The master was controlling the propellers and engines from the starboard (east) bridge wing console.

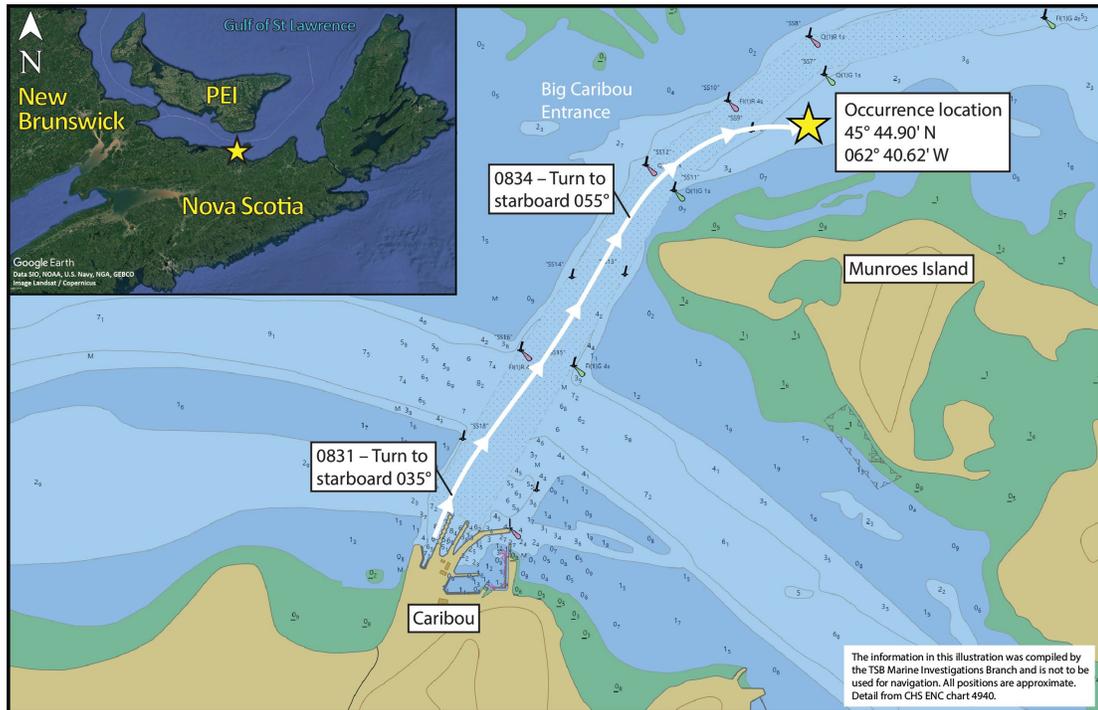
At 0834, the master declutched the forward propeller (Bow 2), transferred control of the propellers and engines to the centre bridge console, where the second officer took control, and then moved from the bridge wing to the centre bridge console.

At the same time, the quartermaster began a turn to starboard (Figure 3). Once the vessel reached the desired heading, he applied the rudder to port to straighten the vessel course on a heading of 055 degrees.

² All times are Atlantic Daylight Time (Coordinated Universal Time minus 3 hours).

³ The speed of 11 knots is speed over ground (SOG). Speed over ground accounts for the speed of the vessel through the water, the current, and wind speed.

Figure 3. Map of the occurrence, showing where the vessel left the channel (Source of main image: Canadian Hydrographic Service chart 4940, with TSB annotations. Source of inset map: Google Earth, with TSB annotations)



At 0835, the quartermaster told the master that the vessel was continuing to turn rapidly to starboard and was not responding to the hard-to-port rudder command.

From the centre bridge console, the master confirmed that the rudder angle indicator was hard to port. At 0835:14, the master put the propellers astern and ordered the standby crew to drop both anchors. The vessel continued to starboard and started moving out of the channel at 0835:44.

At 0837, the vessel came to a stop with both anchors deployed (Bow 1 then became the forward bow). The master conducted a successful steering test from the wheelhouse, and the master and the engineers confirmed that the rudder was operable. A few minutes later, the public address system was used to inform passengers that the vessel was experiencing mechanical issues.

Between 0843 and 0852, the master made multiple attempts to raise the anchors, but they could not be raised because of the load on the anchor chains.

At about 0914, the master used the Bow 2 propeller to reduce the load on the anchor chains and attempted to raise the anchors again. From 0930 to 0932, the master added the Bow 1 propeller in an attempt to further reduce the load on the anchor chains.

At 0939, the aft engine shut down due to a high cooling water temperature and shortly afterward the forward engine PEI shut down for the same reason. Without the engines, the crew stopped their attempts to raise the anchors.

At 0942, the crew determined that the vessel was aground on a mud bank due to the falling tide.

At 0944, the master requested that the vessel's tanks be sounded.⁴

At 0945, the master and the shore staff began to discuss preparations to get passengers off the vessel. The master requested a passenger count from the bridge team, and at 0956 the master received an official passenger count of 217.

At 0955, as the tide continued to fall, the vessel began listing to port.

At 1002, the Joint Rescue Coordination Centre (JRCC) in Halifax, Nova Scotia, received a call about the incident from a concerned third party. JRCC personnel asked Sydney Marine Communications and Traffic Services (MCTS) to contact the *Confederation*.

At 1003, NFL shore staff informed the JRCC that the *Confederation* was carrying 130 passengers and 20 crew members.

At 1005, the master called a tug⁵ for assistance in freeing the vessel and asked a nearby fishing vessel to take soundings around the *Confederation*.

At 1007, MCTS hailed the *Confederation* on VHF radio to ask for information about the situation, including the number of passengers on board, and to offer assistance.

At 1026, the *Confederation* issued a safety call via VHF radio to notify other vessels that it was obstructing the channel. Shortly afterward, the passengers were updated and offered refreshments.

At 1115, the tide began to flood and the sea level rise.

At 1130, the Canadian Coast Guard (CCG) vessel *Cape Spry* was requested to stand by for environmental response and search and rescue (SAR) support, and a CCG helicopter was requested to fly over for an assessment.

At 1150, 2 passengers were transferred to a fishing vessel using a pilot ladder,⁶ so that they could catch their flight in Charlottetown, Prince Edward Island.

At 1159, the master received the official count of the number of crew members (26) on board, so that he could report the correct count to NFL shore staff.

At 1218, the *Cape Spry* left Souris, Prince Edward Island, arriving at 1433.

As soon as the *Cape Spry* arrived, the *Confederation* master requested that it connect a towline to see if it could move the *Confederation* enough to allow for engine cooling. This initial request was denied by the *Cape Spry* master. Because of its size (14.6 m), the *Cape Spry* normally tows smaller vessels.⁷

⁴ At approximately 1241, the master received the results of soundings of the vessel's tanks; there was no indication of water ingress.

⁵ The tug was sent from Superport Marine Services Ltd. in Canso, Nova Scotia, and was expected to arrive at around 1800, but was sent back at 1543 when the vessel was refloated and back in the channel.

⁶ The ladder had a manufacturer's certificate dated 29 October 2009 that was valid for 1 year.

⁷ Canadian Coast Guard (2013), *Towing Guide*, section 4: Canadian Coast Guard vessels that are 33 m or less.

At 1449, the *Confederation* master discussed the towing request with the JRCC, who confirmed that the *Cape Spry* could not tow the *Confederation*. The JRCC informed the *Confederation* master that connecting a towline to the vessel could only be done if there was immediate danger to the persons on board or to the vessel. The master of the *Confederation* then confirmed that the vessel was at risk of running further aground with the rising tide and the winds blowing toward shore.

At 1450, the JRCC called the regional supervisor for marine SAR to discuss the request. The supervisor instructed the JRCC that the *Cape Spry* could connect a towline to stabilize the situation but not to tow the vessel.⁸

At 1457, the *Cape Spry* crew connected the towline. The master of the *Confederation* asked the *Cape Spry* crew to take some load on the towline and at 1459, the vessel began to move. The master of the *Confederation* also transferred ballast to assist with the refloating. At 1501, the *Cape Spry* crew informed the JRCC that they were holding the *Confederation* off the shore.

At 1510, the master of the *Confederation* ordered the main engines started. Shortly afterward, the crew began to raise the port and then the starboard anchors.

At 1513, the CCG helicopter flew over and assessed the situation for the JRCC.

At 1518, the master clutched in the Bow 1 propeller and by 1519, both anchors were fully raised.

At 1519, with both anchors raised, the *Confederation* continued out through the channel to conduct sea trials of the steering system at the same end as Bow 1. The *Cape Spry* crew disconnected the towline and remained on standby.

At 1556, the *Confederation* headed back to the dock in Caribou, where it arrived at 1618 and offloaded passengers and vehicles. Later that evening, a dive inspection took place with the RO and Transport Canada (TC) representatives in attendance. No damage was found. The vessel maintenance staff checked the steering gear system and controls, and were unable to find a fault with the system. Some loose wires were secured.

On 05 September, after sea trials, the vessel was cleared by TC and the RO to return to service.

The investigation determined that, at the time of the occurrence, the steering controls, steering gear, and rudder blade were functioning as designed. The TSB was unable to determine why the vessel did not respond to hard-to-port rudder inputs by the quartermaster.

Reporting of the incident

Early reporting of a potential need for help gives SAR resources the time to assess the situation and make preliminary and contingency plans. The CCG recommends that mariners notify the CCG, via MCTS, of any situation that is at risk of developing into a more serious situation that might require SAR resources.⁹ In this occurrence, the vessel was operating in the Eastern Canada Vessel

⁸ The discussion about what the *Cape Spry* was permitted to do continued for some time after the towline was connected.

⁹ Canadian Coast Guard, *Notices to Mariners 1 to 46* (Annual Edition 2022), Section D: Search and Rescue, subsection 29A: Early Notification of Search and Rescue Authorities of Developing Situations.

Traffic Services (VTS) Zone and was also required to make a report about the steering system defect and the subsequent grounding.¹⁰

The NFL *Emergency Response Manual* states that in case of a steering failure,¹¹ a safety call or an urgency call should be transmitted as appropriate, and the incident should be reported to the nearest VTS location in a coverage area or otherwise to the CCG radio station. The same guidance was also to be used in the event of a grounding.¹² Steering failure drills, which included this reporting step, were conducted monthly on board the *Confederation*.

The TSB has reported on a number of recent occurrences in which a delay in reporting an incident affected the response.¹³

Passenger counts

In any incident, it is essential that the vessel master have an accurate count of all persons on board (passengers and crew members). This will assist the master and crew in ensuring everyone on board is accounted for when responding to the incident and will also assist outside agencies in their response if it is required. The *Fire and Boat Drills Regulations* require that, before a passenger vessel sails, the master is to be provided with the number of persons on board and with details of persons who have declared a need for special care or assistance during an emergency.¹⁴

The *Confederation's* operating manual¹⁵ describes a requirement for a vehicle count after the vessel departs, but does not specify that passenger counts and details are required and must be provided to the master before sailing.

In this occurrence, the total number of passengers on board was not recorded before the vessel sailed. The master received the official passenger count at 0956, 1 hour and 27 minutes after departure from the dock and 1 hour and 22 minutes after the occurrence began. The master received an accurate count of the number of crew members at 1159, nearly 4 hours after departure.

The TSB has reported on a number of recent occurrences in which accounting of passengers affected the response.¹⁶

¹⁰ Transport Canada, SOR/89-99, *Eastern Canada Vessel Traffic Services Zone Regulations* (as amended 01 July 2007), subsection 6 (b) and (c).

¹¹ Northumberland Ferries Limited, *Confederation/Holiday Island Emergency Response Manual* (March 2022), section 3.23: Steering failure.

¹² Northumberland Ferries Limited, *Confederation/Holiday Island Emergency Response Manual* (March 2022), section 3.15: Grounding.

¹³ TSB marine transportation safety investigation reports M20P0229, M17C0179, and M15A0009, as well as TSB marine occurrence M20A0048.

¹⁴ Transport Canada, SOR/2010-83, *Fire and Boat Drills Regulations* (as amended 23 June 2021), section 10.

¹⁵ Northumberland Ferries Limited, *Confederation/Holiday Island Ship Operating Manual* (2009), section 14.6: Traffic handling.

¹⁶ TSB marine transportation safety investigation reports M17C0179, M15A0009, M13M0287, M13L0067, and M12C0058.

In 2006, the ferry *Queen of the North* struck bottom and sank.¹⁷ Two passengers were unaccounted for and have since been declared dead. During and subsequent to the evacuation, difficulties were encountered in obtaining accurate passenger counts. Following this occurrence, the Board recommended that

the Department of Transport, in conjunction with the Canadian Ferry Operators Association and the Canadian Coast Guard, develop, through a risk-based approach, a framework that ferry operators can use to develop effective passenger accounting for each vessel and route.¹⁸

TSB Recommendation M08-01

The recommendation was closed as **Fully satisfactory** in 2010, when the *Fire and Boat Drills Regulations* were published.

Safety action taken

After the occurrence, the following safety actions were taken by Northumberland Ferries:

- The *Confederation's* steering system was examined while it was in dry dock.
- A procedure has been established and posted on the brige regarding clutching-in all propellers and the transfer of control from the bridge wing to the centre console.
- The company's safety management manual was revised to include an external accident reporting guide.
- The company established a Ship Emergency Communication Plan that requires the Canadian Coast Guard be notified of an emergency.
- The company implemented the Incident Command System (ICS),¹⁹ with training and a program of periodic drills and exercises, to manage potential incidents.
- The company has undertaken a gap analysis of its existing safety management policy and procedure with the Canadian Standards Association Z-1600 Standard for Emergency Management. At the time of the release of this report, the company was developing action plans to resolve any identified gaps.
- The company has developed an internal Safety Improvement Plan to improve its safety management system.

On 07 March 2023, the TSB issued a safety information letter²⁰ to the Regional Director, Programs-Atlantic at Transport Canada and the Chairman and Chief Executive Officer at Atlantic Ferries Holdings Limited, informing them of the importance of thorough and detailed inspections of all components of a steering system following an occurrence related to steering difficulty, to understand the cause of the failure and to prevent reoccurrence.

¹⁷ TSB Marine Investigation Report M06W0052.

¹⁸ TSB Recommendation M08-01: Accounting for passengers, at [tsb.gc.ca/eng/recommendations-recommendations/marine/2008/rec-m0801.html](https://www.tsb.gc.ca/eng/recommendations-recommendations/marine/2008/rec-m0801.html) (last accessed 17 July 2023).

¹⁹ ICS enables effective and efficient incident management by integrating various facilities, equipment, personnel, procedures, and communications into a standardized organizational structure.

²⁰ TSB Marine Safety Information letter MSI 02/23: Examination of aft rudder flap assembly on the ferry *Confederation*, at <https://www.tsb.gc.ca/eng/secure-safety/marine/2023/m22a0312/m22a0312-02-23.html> (last accessed 10 October 2023).

Safety messages

Early reporting and immediate communications with MCTS are essential for immediate tasking and deployment of air and marine SAR assets, particularly for vessels carrying passengers who are untrained in marine emergencies.

It is essential that the vessel crew have an accurate count of all persons on board (passengers and crew members) prior to departure. This will assist the master and crew in responding to an incident and will also help outside agencies with their response.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 13 September 2023. It was officially released on 10 October 2023.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

ABOUT THIS INVESTIGATION REPORT

This report is the result of an investigation into a class 4 occurrence. For more information, see the Policy on Occurrence Classification at www.tsb.gc.ca

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