Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Canada

TSB Recommendation M17-01

Risk management of passenger vessel operations on the west coast of Vancouver Island

The Transportation Safety Board of Canada recommends that the Department of Transport ensure that commercial passenger vessel operators on the west coast of Vancouver Island identify areas and conditions conducive to the formation of hazardous waves and adopt practical risk mitigation strategies to reduce the likelihood that a passenger vessel will encounter such conditions.

Marine transportation safety investigation report	M15P0347
Date the recommendation was issued	14 June 2017
Date of the latest response	December 2023
Date of the latest assessment	July 2024
Rating of the latest response	Fully Satisfactory
File status	Closed

Summary of the occurrence

On 25 October 2015, at approximately 1500 Pacific Daylight Time, the passenger vessel *Leviathan II* was on a whale-watching excursion with 27 people on board when it capsized off Plover Reefs in Clayoquot Sound, British Columbia. The subsequent rescue operation recovered 21 survivors, which included 18 passengers and 3 crew members. There were 6 fatalities. As a result of the capsizing, approximately 2000 litres of fuel leaked into the water.

The Board concluded its investigation and released report M15P0347 on 14 June 2017.

Rationale for the recommendation

Although the predominant swell direction at Plover Reefs during the tourist season is from the west, effectively sheltering the area south of the reefs, there can be no certainty that this will be the case on any given day. Given the tidal effects and water depths of the area around Plover Reefs, when exposed to offshore swell, there is the potential for steep, breaking waves to form. The consequences of exposure to this type of wave could be catastrophic for small

shallow-draft vessels, as they were in this occurrence as well as the occurrence involving the *Ocean Thunder* in 1998.

The nature of the sea and the processes that combine to form breaking waves in shallow areas are so unpredictable that it is not feasible to precisely forecast the height and steepness of waves coming from offshore at Plover Reefs. It is also not feasible to predict the response of a vessel to a breaking wave.

While vessels may encounter such hazardous waves only occasionally, the consequences could be catastrophic. Therefore, the level of risk associated with this hazard was determined to be high for the *Leviathan II* as well as for its passengers and crew. Accordingly, it is necessary to implement operational measures to mitigate this risk, such as by

- approaching the reefs from the sheltered side or, if the conditions are not favourable, avoiding the area altogether;
- keeping a vigilant lookout and ensuring the vessel maintains a safe angle of encounter with oncoming swell to minimize its effect on the vessel's stability; and
- ensure that the vessel has a safe route away from the hazardous area.

In this occurrence, the measures taken by the company did not mitigate the risks associated with the hazard posed by sea conditions in the area of operation.

There are approximately 9 whale-watching companies operating out of Tofino and Ucluelet, all of which operate in the same area as the *Leviathan II* and may be exposed to similar hazards. Two other passenger vessels, in addition to the *Leviathan II,* have been overcome by hazardous waves in the area of Clayoquot Sound and Barkley Sound since 1992, resulting in 10 fatalities. Beyond that, passenger vessels operating along the west coast of Vancouver Island may also be in areas that pose similar hazards.

The first vessel, a 5.8 m open recreational boat rented by a group of 4 people on a whale-watching trip, was overturned by a very high, breaking wave while off Mara Rock, Barkley Sound, British Columbia. All 4 occupants were thrown into the water, and there were 2 fatalities. The TSB investigation determined that the vessel had capsized when overwhelmed by a high, breaking wave.

The second vessel, *Ocean Thunder,* departed Tofino, British Columbia, with 3 passengers and an operator (coxswain) on board for a 3-hour trip to watch marine life in the vicinity of Plover Reefs. While in that area, a large swell swamped and broached the vessel, throwing all of the occupants into the turbulent water and resulting in 2 fatalities. The TSB investigation determined that one factor contributing to the occurrence was that the operator did not fully appreciate the dangerous conditions the vessel would meet at the time and location of the accident.

The formation of these hazardous waves depends on the combination of sea conditions and other factors, so the safety of operations in these areas must be managed systematically by the authorized representative in conjunction with the vessel's master. This management is

achieved by continuously monitoring the conditions before and during the voyage, and by clarifying actions to mitigate the hazards of breaking waves in conditions favourable to the formation of these waves.

However, any encounter with such a hazardous wave has the potential for catastrophic outcome. Although measures to improve survivability must still be considered and implemented, the risk would be most effectively mitigated by reducing the likelihood of encountering the wave entirely.

Voyage planning is one such mitigation process; it consists of taking into account elements such as weather, tides, and navigation dangers, and making a contingency plan and sail plan before setting off on a voyage. The degree of voyage planning necessary for small vessels depends on the size of the vessel, its crew, and the length of the voyage.

In this occurrence, the company had not established guidelines to address the potential formation of breaking waves. Instead, it relied on individual masters' experience and judgment to mitigate this inherent risk. If companies that operate passenger vessels off the west coast of Vancouver Island do not implement risk management processes to identify and address environmental hazards in their area of operation, such as the potential formation of breaking waves, then there is a risk of a similar capsizing and loss of life.

Therefore, the Board recommended that

> the Department of Transport ensure that commercial passenger vessel operators on the west coast of Vancouver Island identify areas and conditions conducive to the formation of hazardous waves and adopt practical risk mitigation strategies to reduce the likelihood that a passenger vessel will encounter such conditions.
>
> **TSB Recommendation M17-01**

Previous responses and assessments

March 2018: response from Transport Canada

TC agrees with the recommendation. The CSA 2001, s. 106 requires the authorized representative of a Canadian vessel [to] develop procedures for the safe operation of the vessel. Marine Safety inspectors are providing specific warnings on vessel inspection certificates which include such directions as "the Master is to be mindful of the effects of tidal current, wind, swell and reflective waves in shoaling waters near the shore."

To ensure that authorized representatives are reminded of their obligations Transport Canada (TC) will issue a Ship Safety Bulletin (SSB) regarding the development of procedures for the safe operation of their vessels with topics such as weather, waves and dealing with the emergencies.

March 2018: TSB assessment of the response (Satisfactory in Part)

Transport Canada indicates that it agrees with this recommendation. While posting warnings on inspection certificates that masters need to be mindful of weather conditions is a step in the right direction, it is also important that TC ensures that commercial passenger vessel operators are aware of these warnings and take action to mitigate these hazards in their operations. A similar approach is required for commercial passenger vessels carrying 12 or less passengers that are not inspected and therefore do not have inspection certificates.

The proposed Ship Safety Bulletin (SSB) reminding authorized representatives (ARs) of their obligation under section 106 of the *Canada Shipping Act, 2001* would be helpful, but it also needs to be supplemented by a means to verify that ARs are fulfilling their responsibilities onboard passenger vessels operating off the west cost of Vancouver Island.

Until all commercial passenger vessel operators off the west coast of Vancouver Island identify and address environmental hazards in their area of operation, such as the potential formation of hazardous waves, there is a risk of similar capsizing and loss of life. Therefore, the response to the recommendation is considered to be **Satisfactory in Part**.

January 2019: response from Transport Canada

TC agrees with the recommendation. Ship Safety Bulletin (SSB) 09/2018 (*Safe operation of commercial passenger vessels*) was issued in June 2018 to remind vessel owners, authorized representatives and operators of commercial passenger vessels that they must develop procedures for the safe operations of the vessel and for dealing with emergencies. More specifically, authorized representatives were reminded to identify areas and conditions conducive to the formation of hazardous waves.

During inspection of passenger vessels, marine safety inspectors are required to complete a checklist in accordance with the instructions of the FlagStateNet 06-2018, issued in September 2018. One element on this checklist is the verification of safety procedures. Transport Canada will use the information collected during these inspections to assess the level of compliance with the requirements highlighted in Ship Safety Bulletin 09/2018 and determine if further action is needed.

March 2019: TSB assessment of the response (Satisfactory in Part)

The Board notes that TC has issued SSB (09/2018), which reminds vessel owners, authorized representatives, and operators of commercial passenger vessels of their obligation to develop procedures for the safe operations of the vessel and for dealing with emergencies, including identifying areas and conditions conducive to the formation of hazardous waves.

TC has indicated that it will use information gathered during inspections to assess compliance. TC states that, during inspections, inspectors are required to complete a checklist and that one of the items on the checklist is “verification of safety procedures.” However, it is not clear whether inspectors are simply verifying the presence of safety procedures or whether they are

verifying the contents of them (i.e. to determine if they identify areas and conditions conducive to the formation of hazardous waves and provide practical risk mitigation strategies). Further, TC has not indicated the number of inspections carried out since inspectors began using a new checklist in September 2018 requiring them to verify safety procedures, nor has TC indicated the level of compliance by authorized representatives. This information could assist the Board in assessing the actions taken to reduce the risk.

The Board considers the response to the recommendation to be **Satisfactory in Part**.

January 2020: response from Transport Canada

Transport Canada agrees with the recommendation. During inspection of passenger vessels, marine safety inspectors continue to complete a checklist while inspecting passenger vessels in accordance with the instructions of the FlagStateNet 06/2018, issued in September 2018. One element on this checklist is the verification of safety procedures. Transport Canada will use the information collected during these inspections to assess the level of compliance with the requirements highlighted in Ship Safety Bulletin 09/2018. The information is reviewed periodically (e.g. every quarter), and may subsequently be used in planning inspections, such as a Concentrated Inspection Campaign, in providing additional instructions to inspectors (e.g. FlagStateNet) or in providing education/awareness to industry (e.g. Ship Safety Bulletins). When a specific vessel is found non-compliant, immediate action is taken. The verification and assessment of the content of safety procedures remains the full responsibility of the owner/operator.

March 2020: TSB assessment of the response (Satisfactory in Part)

Transport Canada (TC) has indicated that marine safety inspectors will continue to inspect passenger vessels in accordance with the instructions of the FlagStateNet 06/2018. One of the elements on the checklist used during inspections is verification of safety procedures. TC will use the information collected during these inspections to assess the level of compliance with the requirements highlighted in Ship Safety Bulletin 09/2018.

The Board is encouraged that TC plans to review the information collected periodically, in accordance with the instructions of FlagStateNet 06/2018, and may subsequently use this in planning inspections, such as a Concentrated Inspection Campaign, in providing additional instructions to inspectors (e.g. FlagStateNet) or in providing education/awareness to industry (e.g. Ship Safety Bulletins).

However, TC has put the onus of verification and assessment of the content of safety procedures on the owner/operator. The Board is concerned that this means there will be no external oversight to determine if the safety procedures identify areas and conditions conducive to the formation of hazardous waves and provide practical risk mitigation strategies. Further, TC has not indicated the number of inspections carried out since inspectors began using the new checklist in September 2018 requiring them to verify safety procedures, nor has TC indicated the level of compliance by authorized representatives.

The Board considers the response to the recommendation to be **Satisfactory in Part**.

February 2021: response from Transport Canada

Transport Canada agrees with this recommendation. The Department continues to provide external oversight to owners and operators of vessels through education, outreach and awareness activities. During the inspection of passenger vessels, marine safety inspectors continue to complete a checklist while inspecting passenger vessels in accordance with the instructions of FlagStateNet 06/2018, issued in September 2018. One element on this checklist is the verification of safety procedures. In the two years following the FlagStateNet issuance there have been 665 inspections carried out by Transport Canada, or Recognized Organizations, and 247 checklists.

Transport Canada plans to review the information collected during these inspections to assess the level of compliance with Ship Safety Bulletin 09/2018 requirements. This information may subsequently be used in planning inspections, such as a Concentrated Inspection Campaign (CIC), in providing additional instructions to inspectors (e.g. FlagStateNet) or in providing education/awareness to industry (e.g. Ship Safety Bulletins). Data on compliance however will require a detailed analysis and longer timeframe to note any trends, however, when a specific vessel is found to be in non-compliance, immediate action is taken. The verification and assessment of the content of safety procedures remains the full responsibility of the owner/operator.

March 2021: TSB assessment of the response (unable to assess)

Transport Canada's (TC) response indicates that the department has maintained its external oversight of vessel owners and operators and that marine safety inspectors have continued inspecting passenger vessels in accordance with the instructions of the FlagStateNet 06/2018. TC notes that since its issuance, 665 inspections and 247 checklists have been completed across Canada by TC or Recognized Organizations. However, TC has not provided data on the level of compliance by authorized representatives.

While the Board is encouraged that TC is providing external oversight of passenger vessel operators in accordance with FlagStateNet 06/2018 and Ship Safety Bulletin 09/2018, the department has not provided the TSB with any information specific to the west coast of Vancouver Island. Until TC provides more information about the identification of areas and conditions conducive to the formation of hazardous waves on the west coast of Vancouver Island, and whether passenger vessel operators in that area have adopted practical risk mitigation strategies, the Board is unable to evaluate the residual risk.

Therefore, the Board is **unable to assess** the response to Recommendation M17-01.

December 2021: response from Transport Canada

TC issued a SSB [Ship Safety Bulletin] reminding vessel owners, authorized representatives and operators of commercial passenger vessels that they must "...develop procedures for the safe operation of the vessel and for dealing with emergencies."

The SSB also reminded them to:

- identify, among other safety and environmental factors, areas and conditions conducive to the formation of hazardous waves; and
- adopt practical risk mitigation strategies to reduce the chances that a passenger vessel will encounter such conditions.

Identification of areas and conditions conducive to the formation of hazardous waves are the responsibility of any master of a vessel in preparing his voyage plan to ensure that the relevant information for the intended voyage is identified including the prevailing weather conditions, wave height, current, etc.

Masters and officers of the deck watch are trained and certificated for this purpose and should be available as part of the training and education to identify these hazards.

Transport Canada's proposed way forward for amendments to the *Marine Safety Management System Regulations* will expand both Safety Management System and oversight requirements to all domestic passenger vessels.

March 2022: TSB assessment of the response (Satisfactory Intent)

Transport Canada's (TC) response refers to its 2018 release of Ship Safety Bulletin (SSB) 09/2018 and its current work in amending the *Marine Safety Management System Regulations*. When published, the Board believes the proposed amendments to the *Marine Safety Management System Regulations* will expand the application of safety management systems (SMS) and, since risk management of operating environments forms an integral part of an SMS, it is expected that the expanded application of these regulations, in conjunction with SSB 09/2018, will substantially address this safety deficiency. TC intends to pre-publish the amendments in the *Canada Gazette*, Part I, in June 2022. In order to advance safety action prior to the final publication of the amended regulations, the Board encourages TC to undertake outreach with passenger vessel operators on the West Coast of Vancouver Island about the SSB.

Therefore, the Board considers the response to Recommendation M17-01 to be **Satisfactory Intent**.

December 2022: response from Transport Canada

Proposed *Marine Safety Management System Regulations* (MSMSR) were published in *Canada Gazette, Part I* in June 2022. Transport Canada is considering potential revisions based on comments received during commenting period, and anticipates publishing in *Canada Gazette, Part II* by fall 2023. With the implementation of these regulations, marine safety culture in day-

to-day operations will be enhanced through the expansion of formal Safety Management System (SMS) requirements to a greater portion of vessels operating in Canadian waters. The consistent and appropriate application of SMS in the marine sector will contribute to reduce the likelihood and severity of marine-related accidents and incidents onboard commercial vessels operating in Canadian waters, resulting in fewer fatalities, serious injuries, and pollution incidents.[1]

March 2023: TSB assessment of the response (Satisfactory Intent)

Transport Canada's (TC) response highlights the pre-publication of the new *Marine Safety Management System Regulations* (MSMSR) in the *Canada Gazette,* Part I in June 2022 and its upcoming publication in the *Canada Gazette,* Part II in fall 2023. The Board believes the proposed amendments to the MSMSR will expand the application of safety management systems (SMS). Since the risk management of operating environments forms an integral part of an SMS, it is expected that the expanded application of these regulations, in conjunction with SSB 09/2018, will substantially address this safety deficiency. The Board continues to encourage TC to undertake outreach with passenger vessel operators regarding the SSB, specifically on the West Coast of Vancouver Island.

The Board considers the response to Recommendation M17-01 to be **Satisfactory Intent**.

Latest response and assessment

December 2023: response from Transport Canada

The proposed *Marine Safety Management System Regulations* (MSMSR) will include requirements for vessels to develop and implement a safety management system that includes procedures for voyage planning, safe navigation and handling of the vessel; and ensuring safety at sea and preventing human injuries and loss of life. This will effectively require commercial passenger vessel operators to identify situations where hazardous waves may be present and implement risk mitigation measures. In turn, this should reduce the likelihood and severity of marine related accidents. These regulations are scheduled for publication in final form in early 2024.

TC also requires vessel masters to comply with the voyage planning provisions contained in the *Navigation Safety Regulations, 2020* (NSR 2020) especially Section 144, which requires the master of a vessel to plan a voyage before it starts. While doing so, the master is to identify and monitor the route, taking different factors into account such as all known navigational hazards and adverse weather conditions. Under the same NSR 2020 section, the master needs to abide

[1] Responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues in the material it reproduces without indication but uses brackets [ ] to show other changes or to show that part of the response was omitted because it was not pertinent.

by the IMO resolution A.893(21), *Guidelines for Voyage Planning*, when planning and executing the voyage where the meteorological condition is listed amongst other criteria.

July 2024: TSB assessment of the response (Fully Satisfactory)

The Board notes that the *Marine Safety Management System Regulations* (MSMSR) were published in the *Canada Gazette*, Part II on 03 July 2024. The MSMSR require vessels to develop and implement a safety management system, which includes the need for vessel operators to identify situations where hazardous waves may be present and implement risk mitigation measures. TC additionally highlights the requirement for masters to plan a voyage before it starts, and thus take into account navigational hazards and adverse weather conditions, in the *Navigation Safety Regulations 2020* (NSR 2020). These regulations also require masters to abide by the IMO resolution A.893(21), *Guidelines for Voyage Planning* when planning and executing a voyage.

The Board believes that the new MSMSR, in conjunction with the NSR 2020, will substantially mitigate the risk associated with the safety deficiency identified in this recommendation. Therefore, the Board considers the response to Recommendation M17-01 to be **Fully Satisfactory**.

File status

This deficiency file is **Closed**.