

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

**MARINE INVESTIGATION REPORT
M15P0035**



FOUNDERING AND ABANDONMENT

**SELF-PROPELLED BARGE *LASQUETI DAUGHTERS*
SUTIL POINT, BRITISH COLUMBIA
14 MARCH 2015**

Canada

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Marine Investigation Report M15P0035

Cat. No. TU3-7/15-0035E-PDF
ISBN 978-0-660-04331-9

This document is available on the website of the Transportation
Safety Board of Canada at www.tsb.gc.ca

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 M15P0035

Foundering and abandonment

Self-propelled barge *Lasqueti Daughters*

Sutil Point, British Columbia

14 March 2015

Summary

On 14 March 2015, at approximately 1100 Pacific Daylight Time, the self-propelled barge *Lasqueti Daughters*, with 17 people on board, departed Campbell River, British Columbia. Partway into the voyage, the sea conditions deteriorated. Water began shipping on board via the spaces between the bow ramp, the bulwarks, and the main deck, and then downflooded into the forward storage compartment. The *Lasqueti Daughters* flooded but remained afloat, was abandoned, and was eventually towed to shore and intentionally beached. There were no injuries. The vessel was declared a constructive total loss.

Le présent rapport est également disponible en français.

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1.0 Factual information

1.1 Particulars of the vessel

Table 1. Particulars of the vessel

Name of vessel	<i>Lasqueti Daughters</i>
Official number	836938
Port of registry	Victoria, British Columbia
Flag	Canada
Type	Self-propelled barge
Gross tonnage	106.54
Length	23.40 m
Draft	1.22 m
Propulsion	Two 4-stroke diesel engines (205 kW) driving 2 fixed-pitch propellers
Cargo	2 crew cab pickup trucks, 1 all-terrain vehicle, and 20 000 tree seedlings (approximately 8 000 kg)
Crew	2
Passengers	15 workers
Registered owner	Impact Reforestation Ltd.

1.2 Description of the vessel

The *Lasqueti Daughters* (Photo 1 and Photo 2) was a shallow-draft self-propelled barge/landing craft constructed of wood with a steel bow ramp. The main deck extended from the bow to approximately midships, where the deckhouse was located. There were 8 freeing ports¹ fitted on the aft portion of the main deck. The deckhouse contained the galley, accommodations for 20 people, and the wheelhouse (Appendix A).

The hull was subdivided by 3 transverse bulkheads into 4 compartments from forward: 2 storage compartments, the engine room, and a lazarette. The storage compartments were accessed through raised hatches on the main deck, and the engine room and lazarette compartments were accessed through hatches in the galley floor. The storage compartments and the engine room were each equipped with 2 automatic bilge pumps. Each of the 2 storage compartments contained a 75 mm suction pipe connected to an emergency pump located in the engine room. The vessel also carried 2 portable 25 mm pumps.

The vessel was equipped with a 20-person inflatable life raft that was secured to the main deck bulwark. At the time of the occurrence, the vessel was also carrying a 4 m aluminum skiff that was secured to the bow ramp, and an emergency position-indicating radio beacon (EPIRB) that belonged to the master's fishing vessel.

¹ Freeing ports are designed to shed water shipped on the main deck.

Photo 1. *Lasqueti Daughters*, Stuart Island, British Columbia, 2004



Photo 2. *Lasqueti Daughters* with bow ramp down, at Stuart Island, British Columbia, 2004



1.3 Vessel history

The *Lasqueti Daughters* was a homemade vessel, constructed in 2001 on Lasqueti Island, British Columbia. The vessel was not designed with the use of lines plan, nor was it constructed with the use of drawings. The vessel was never inspected during construction, assessed for stability, or registered with Transport Canada (TC) after construction.

Since the vessel was first built, it was primarily used to transport equipment and workers², and served as a live-aboard camp during silviculture³ operations. The current owner had purchased the vessel in 2010 after having leased it periodically over the previous 8 years.

In April 2012, the vessel lost its anchor in a windstorm and was intentionally beached onto a rock wall in Fife Sound, British Columbia.⁴ The master, the foreman, and 1 other person

² The *Canada Shipping Act, 2001* defines a passenger as “a person carried on a vessel by the owner or operator, other than [...] the master, a member of the crew or a person employed or engaged in any capacity on board the vessel on the business of that vessel.” In this occurrence, the workers would be considered passengers.

³ From the British Columbia Ministry of Forests, Lands, and Natural Resource Operations: “Silviculture is the art and science of controlling the establishment, growth, composition, and quality of forest vegetation for the full range of forest resource objectives.” (Source: <https://www.for.gov.bc.ca/hfd/pubs/ssintroworkbook/meansilv.htm> [Last accessed on 20 January 2016]).

remained on board, and 14 workers were removed and transferred to the Canadian Coast Guard search and rescue (SAR) lifeboat *Cape Sutil*. A detailed incident report was completed in accordance with the company's shore-side occupational health and safety program. The report indicated that the high water bilge alarms did not appear to be working.

Transport Canada's investigation of the occurrence revealed that the *Lasqueti Daughters* had been operating without being registered or holding an inspection certificate. It also revealed that the master was employed on board in a position for which a certificate of competency was required, but did not hold such a certificate. A Deficiency Notice was issued to the owner, followed by a Notice of Violation. The owner's authorized representative (AR)⁵ subsequently registered the vessel with TC.

Since October 2010, the vessel had undergone several upgrades and modifications, including

- replacing the 2 propulsion engines and the generator engine;
- upgrading the electrical systems;⁶
- installing an automatic engine room fire suppression system;
- installing additional fire extinguishers throughout the vessel; and
- replacing a section of the main deck from the bow to the deckhouse.

1.4 *History of the voyage*

On 13 March 2015, the master, the AR, and a couple of workers loaded the *Lasqueti Daughters* in preparation for the upcoming silviculture operation,⁷ which included the transportation and housing of silviculture workers. All necessary equipment was stowed on the main deck, including a skiff, 2 pickup trucks, an all-terrain vehicle, and 20 000 tree seedlings, lowering the vessel's bow to an even keel. In addition, the vessel was towing a 12-passenger workboat.

On 14 March 2015, at approximately 1100,⁸ after delaying departure to wait for favourable weather, the *Lasqueti Daughters* departed Campbell River, British Columbia. The master and the AR were in the wheelhouse, and 15 workers were on board. Normally workers would be transported separately in the workboat. However, given the length of the voyage, the capacity of the workboat, the number of trips that would have been required, the sea conditions, and the comfort aboard the *Lasqueti Daughters*, it was decided to carry the workers on board.

⁴ TSB marine occurrence number M12W0049.

⁵ The owner's authorized representative was the principal shareholder of the company that owned the vessel.

⁶ During the electrical systems upgrade, the high water bilge alarms were disconnected and never reconnected.

⁷ The vessel owner had been awarded a contract by a private landowner (licensee) to provide silviculture services.

⁸ All times are Pacific Daylight Time (Coordinated Universal Time minus 7 hours).

The weather conditions were favourable until the vessel passed Wilby Shoals, British Columbia, where the master altered course to 55° magnetic and began to transit Sutil Channel, British Columbia. At this point a squall approached and sea conditions deteriorated, with observed 3-m waves and northwest winds of 40 to 50 knots.

As the winds and waves increased, water began shipping on board via the spaces between the bow ramp, the bulwarks, and the main deck, and pooled near the base of the ramp (Photo 3), trimming the vessel by the bow. The master altered the vessel's speed and course to reduce the amount of water being shipped on board, while the AR went to the main deck to check the forward storage compartment and to determine why the vessel's trim had changed.

Photo 3. Water shipping on board the *Lasqueti Daughters* via the bow ramp



The AR noticed that there was water in the forward compartment and that the bilge pumps in the compartment were not keeping up with the ingress of water. The AR then informed the master and set up the 2 additional portable 25 mm pumps to de-water the compartment.

The pumps were still unable to keep up, and at approximately 1250, the AR contacted the foreman ashore and ordered extra pumps to be delivered by water taxi.

Shortly afterward, the master gave the helm to one of the workers and went to the engine room to open the emergency pump suction valves for the storage compartments. The master then returned to the wheelhouse to start the pump. The emergency pump started, but would not pump water. One of the portable pumps pumping out the forward storage compartment got swamped and stopped operating as more water pooled on the main deck. The water

continued to fill the storage compartment, further increasing the vessel's trim and causing the vessel to commence foundering.⁹

At this point, the AR instructed the workers to don life jackets¹⁰ and abandon the vessel into the workboat. The AR again contacted the foreman ashore and ordered another water taxi to transport the excess workers from the workboat. After helping the workers evacuate, the AR and the master remained on board to continue attempting to pump out the *Lasqueti Daughters*. The bilge pumps and the 1 working portable pump were still not able to cope with the ingress of water, which began to transfer through the bulkhead into the second storage compartment. The main deck was by then completely submerged, and the skiff began to float. The AR and the master got into the skiff, released it, and abandoned the *Lasqueti Daughters* at position 50°00.18' N, 124°59.44' W (Appendix B).

Shortly after the master and the AR had abandoned the vessel, one of the water taxis arrived. The sea conditions were not conducive to transferring the excess workers from the workboat onto the water taxi, so it escorted the workboat back to Campbell River. Soon afterward, the second water taxi arrived, escorted the master and the AR in the skiff to Mansons Landing, British Columbia, and took them back to the occurrence site to monitor the situation.

While the workers abandoned the vessel, a concerned citizen ashore called 9-1-1, which in turn called the joint rescue coordination centre (JRCC). The JRCC then dispatched the Canadian Coast Guard SAR lifeboat *Cape Caution*, which arrived at the occurrence site around 1400. While the *Cape Caution* was surveying the vessel and debris field, the EPIRB on board the *Lasqueti Daughters* activated.

Later that evening, a salvage tug secured a tow line to the *Lasqueti Daughters*, towed it to shore, and intentionally beached it. The water was pumped out of the vessel, which then refloated on the high tide and was towed back to Campbell River. The vessel was subsequently declared a constructive total loss.

1.5 Environmental conditions

For the morning and afternoon of 14 March 2015, Environment Canada forecasted diminishing southeast winds, switching to strong northwest winds in the afternoon. The local weather conditions reported at Savary Island, British Columbia, 5 nautical miles east of the occurrence location, were 40- to 50-knot northwest squalls. The intensity of these squalls was not indicated in the Environment Canada forecast.

⁹ A vessel founders when it is overwhelmed by the sea and sinks.

¹⁰ Standard life jackets, as required by Transport Canada for everyone on board, will turn individuals onto their backs in order to keep their faces out of the water and are intended to be worn when abandoning a vessel. In this occurrence, the vessel was equipped with enough personal flotation devices (PFDs) for everyone on board. PFDs have limited turning capability but are designed for constant wear.

Weather observations made by the *Cape Caution* approximately 1.5 hours after the occurrence were: winds from the northwest at 20 knots, wave height of 1.5 m, and rain showers.

The high water slack tide at Campbell River was predicted to occur at 1321. The tidal stream in Sutil Channel can reach speeds of 2 knots, meaning that northwest winds would oppose the southeast ebb tide.

1.6 *Personnel certification and experience*

The master had previously operated fishing vessels for 10 years. Since 2010, for approximately 7 months of the year, he had served as master of the *Lasqueti Daughters*. The master held an expired Fishing Master Class 4 certificate issued in April 2001, a Restricted Operator's Certificate - Maritime Commercial issued in 2001, and Marine Emergency Duties A2, B, C, and D certificates issued in 2002.

The AR held a Pleasure Craft Operator Card issued in 2007, but had limited marine experience.

1.7 *Safety oversight in silviculture operations*

Most silviculture operations in British Columbia take place on publicly owned Crown lands. The Crown lands are managed by the province through the Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO). These lands would be considered a forestry workplace under the *Workers Compensation Act* (WCA) if forestry workers are deployed to these lands. The MFLNRO would be considered the "owner" of the workplace if it has knowledge and control of the operation. Under subsection 119(a) of the WCA, the owner of a workplace must "provide and maintain the owner's land and premises that are being used as a workplace in a manner that ensures the health and safety of persons at or near the workplace."

The MFLNRO grants timber harvesting and marketing rights through various types of licences, or tenures. The MFLNRO works closely with client sectors through the industry safety council and expects staff to communicate any identified safety concerns to the licensee and/or WorkSafeBC.

Licensees have more direct control over high-level work and safety planning in most forestry workplaces and so are normally considered the "owner"¹¹ of the workplace for the purposes of section 26.1.1 of the *WorkSafeBC Occupational Health and Safety (OHS) Regulations, Part 26 - Forestry Operations and Similar Activities*, and section 119 of the WCA.

¹¹ Section 106 of the *Workers Compensation Act* expands the commonly understood meaning of "owner" to include a "licensee or occupier of any lands or premises used or to be used as a workplace" or "a person who acts for or on behalf of an owner as an agent or delegate." Accordingly, a number of parties may be referred to as "owners" of the same forestry workplace.

If a marine component is present in silviculture operations, specifically the transportation of workers and equipment by boat, safety oversight is distributed among several organizations. While vessel ARs and masters are responsible for the safety of their vessels, crew, and passengers, oversight from organizations such as WorkSafeBC and support from the British Columbia Forest Safety Council (BCFSC) help them meet these responsibilities. In addition, their vessels and crew are subject to regulatory oversight by TC.

1.7.1 *Authorized representatives and masters*

The responsibilities of vessel ARs and masters with regard to safety are set out in sections 106 to 112 of the *Canada Shipping Act, 2001* (CSA 2001). These include ensuring compliance with all applicable regulations for the vessel's type and use, and that procedures are developed for the safe operation of the vessel and for dealing with emergencies.

With regard to regulatory compliance, it is the AR's responsibility to identify the vessel's intended use and register the vessel's type with TC. As part of this process, TC recommends that new owners and masters make use of a marine consultant to better understand their regulatory and operational obligations to safely operate a vessel.

In order to operate in a safe and diligent manner, ARs must establish the key roles, responsibilities, and procedures for managing safety, emphasizing the role of management, and defining the responsibility and authority of the master.

On the *Lasqueti Daughters*, the roles and responsibilities for managing the vessel were divided between the master, the AR, and a foreman, but were not clearly defined. The master oversaw vessel operations, day-to-day maintenance, and operational vessel safety, such as ensuring that the vessel was equipped with additional fire extinguishers and an engine room fire suppression system. The AR was responsible for vessel administration, such as having the vessel registered and ensuring that it was inspected in accordance with regulations, while the foreman was given more defined tasks, such as managing the partial replacement of the vessel's main deck.

After the April 2012 occurrence involving the *Lasqueti Daughters*, consultations took place between the AR and the TC Vessel Registration Office, during which the AR received assistance and guidance on the registration process, identification of the vessel type, and inspection requirements. TC had informed the AR of the requirements to operate as a passenger vessel. TC was informed that the vessel would carry silviculture employees as crew from time to time, to and from work sites; however, this information was not included in the application form.

In October 2012, the *Lasqueti Daughters* was registered as a barge which was self-propelled. This type of vessel is subject to periodic inspections under the *Hull Inspection Regulations*.¹² It is the AR's responsibility¹³ to contact TC and arrange for the vessel to be inspected.

The AR of the *Lasqueti Daughters* was familiar with safety oversight through the shore-side aspect of the company's silviculture operations. The shore-side operations conducted regular safety meetings, had safe work practices in place, and used a formal incident reporting process to identify risks and introduce procedures to address those risks. The marine transportation side of the operation did not have a formal hazard identification or risk mitigation procedure in place, but hazards were identified on an informal basis. For example, the master identified the need for crew members to be certified when transporting passengers. Instead, silviculture workers who were not certified were used as additional crew members when needed.

1.7.2 WorkSafeBC

WorkSafeBC, an independent agency created by the WCA, provides guidance, support, and a regulatory framework for forestry operations¹⁴ in the province. According to WorkSafeBC, safety oversight begins with the owners of a workplace.

The aspects of the regulatory framework that are most relevant to this occurrence include the following provisions from Part 17 – Transportation of Workers (Marine Craft) of the *OHS Regulations*:

If the operator of a vessel transporting workers is not required to hold a certification under the *Canada Shipping Act*, the operator must

- a) have successfully completed a course on navigation and ship safety acceptable to the Board, or
- b) have other combination of training and experience acceptable to the Board.¹⁵

[...]

Before transporting workers on a vessel, the operator of the vessel must ensure that the vessel is capable of safely making the passage, considering the [...] existing and forecast weather conditions,¹⁶ [among other things].

¹² Non-self-propelled barges on domestic voyages are not required to be inspected by Transport Canada. This information was indicated to the authorized representative during the registration process.

¹³ As per *Canada Shipping Act, 2001* (S.C. 2001, c. 26), subsections 106 (2), "The authorized representative of a Canadian vessel shall ensure that (a) the vessel and its machinery and equipment are inspected for the purpose of obtaining all of the Canadian maritime documents that are required under this Part."

¹⁴ WorkSafeBC defines "forestry operations" as a workplace where silviculture work is done.

¹⁵ *Ibid.*, Part 17, section 17.18.

¹⁶ *Occupational Health and Safety Regulations* (B.C. Reg. 296/97), Part 17, subsection 17.23(c).

WorkSafeBC's prevention officers provide safety oversight within this regulatory framework and are allocated to offices that are assigned to inspect workplaces within specific geographical areas. The oversight is either planned around identified risk-based work activities or in response to an accident or complaints. Officers provide an inspection report, issue compliance orders¹⁷ if safety issues are present, and ensure that the employer submits an investigation report. In this occurrence, WorkSafeBC issued compliance orders for violations under the above-stated *OHS Regulations* (section 17.18 and subsection 17.23(c)) and the WCA (paragraph 115(2)(c)).

WorkSafeBC also promotes safety awareness through Hazard Alerts, information booklets, and a voluntary financial incentive program called the Certificate of Recognition (COR). Employers such as the owner of the *Lasqueti Daughters* can earn a COR by successfully implementing and maintaining a health and safety management system that exceeds regulatory requirements and meets a set of audited standards.

Some of WorkSafeBC's responsibilities for safety oversight are deferred to TC (the federal department with regulatory authority for the vessel and crew) or shared with industry health and safety associations. Currently, WorkSafeBC funds 12 of these associations, including the BCFSC.

1.7.3 British Columbia Forest Safety Council

The BCFSC was formed in 2005 to promote the development of a safety culture within the forestry industry. It offers training courses and programs to its members,¹⁸ such as the Safety Accord Forest Enterprise (SAFE) Companies training, which is designed to help companies improve their safety performance and to evaluate company safety programs using industry-recognized audit protocols. The program explains the foundation of a good safety system, including important policies and procedures that companies should have in place to protect workers.

SAFE certification is maintained by passing an annual audit or a periodic verification audit by BCFSC safety advisors. The majority of forest tenure holders in British Columbia and the provincial government support the SAFE Companies program and require SAFE certification as a prerequisite for companies bidding on forestry contracts.

The BCFSC is one of WorkSafeBC's COR certifying partners, meaning that companies that meet the requirements for SAFE Companies certification are entitled to an automatic review to determine whether they meet the requirements of the COR. The owner of the *Lasqueti Daughters* was SAFE certified and met the requirements of the COR.

¹⁷ Compliance orders are WorkSafeBC's primary tools to address non-compliance with the occupational health and safety provisions of the *Workers Compensation Act* and the *Occupational Health and Safety Regulations*.

¹⁸ British Columbia Forest Safety Council (BCFSC) members can include any firm, corporation, agency, government authority, or society whose primary purpose involves participating in, regulating, or providing services to the British Columbia forestry industry. This includes licensees of forest tenures.

In addition to training and programs, the BCFSC issues 3 types of safety alerts:

- monthly safety alerts to demonstrate how companies can successfully manage high-risk situations;
- fatality alerts to inform the industry of incidents in which there is a death; and
- industry safety alerts (voluntarily provided by companies) to share information about recent incidents or close calls they have experienced.

No alert was issued in relation to this occurrence.

The BCFSC supports and facilitates industry initiatives as well, including the voluntary Coast Harvesting Advisory Group, which was formed in 2012 and comprises approximately 80 percent of the licensees involved in the forestry industry in coastal areas of British Columbia. Its focus is on the reduction of fatalities and serious injuries associated with various operations in the forestry industry on the British Columbia coast. The group plans to develop and implement systems, policies, procedures, expectations, and mechanisms primarily focused on contractors and their operations. The group has a list of initiatives, none of which relate to marine operations, which it believes will have the potential to dramatically reduce serious injuries and fatalities.

1.7.4 *Transport Canada*

In its role of promoting efficient marine transportation and safe, secure, and sustainable marine practices, TC provides a national regulatory system for owners and masters that governs the structural and operational safety of vessels. Owners of commercial vessels must register them with TC's Canadian Register of Vessels.¹⁹ The Register contains information such as tonnage, construction material, and type of propulsion and descriptors of type. Once a vessel is registered, TC is responsible for assessing its condition with regard to its intended use, and the competency of its master. Ensuring that a vessel is inspected and properly certificated for safety is verified through the appropriate TC certification, inspection, and enforcement systems. A TC inspection of the occurrence vessel was never conducted.

Transport Canada identifies unregistered vessels through inspectors' general surveillance, joint at-sea patrols, complaints from industry, and casualty and incident reports. When a new vessel is registered, it is standard procedure for TC to send an information letter to the vessel owner outlining some of the owner's responsibilities, such as complying with the provisions of the CSA 2001 and its regulations as applicable, ensuring that crew members meet the requirements of the *Marine Personnel Regulations*, and reporting to TC any alteration to any part of the vessel that affects its seaworthiness.

For the *Lasqueti Daughters* to be certified to carry workers/passengers, the *Hull Inspection Regulations* would require an annual inspection of its structural condition, as well as its firefighting, lifesaving, navigation, and communication equipment. The certificates of

¹⁹ *Canada Shipping Act, 2001* (S.C. 2001, c. 26), subsections 46(1) and 46(2).

competency of the crew and any licences required to be carried on board would also be verified, and the crew could be required to demonstrate emergency drills.

Transport Canada continues to promote the voluntary adoption of safety management systems (SMS)²⁰ by owners to manage risks associated with their vessels and to ensure that their vessels are compliant with all requirements.

In 2010, TC began formal consultations on a regulatory proposal to introduce safety management²¹ regulations for Canadian non-convention vessels, including those less than 15 in gross tonnage. However, industry expressed concerns, primarily concerning costs and feasibility, that the new regulations would be too onerous to implement for small companies that operate small vessels. In response to stakeholders concerns, TC amended its regulatory proposal in 2012 to include only vessels greater than 24 m in length and those carrying more than 50 passengers. Therefore, the proposed changes would not apply to the *Lasqueti Daughters*.

1.8 Vessel inspections

Most vessel owners choose to obtain insurance to protect against loss. In most cases, insurance underwriters require a vessel survey prior to providing the policy. The *Lasqueti Daughters* was surveyed for insurance purposes by a marine surveyor in 2007, and again in 2012. The primary function of an insurance survey is to determine the vessel's current value and replacement value, whether it is suitable for its intended purpose (on the survey, the purpose was recorded as "work barge / float camp in coastal waters"), and whether it can be assumed as an acceptable risk. The 2012 survey did not identify any deficiencies and

- was carried out with the vessel in dry dock;
- covered only visible or accessible components of the vessel;
- did not include an internal inspection of sea connections, sea valves, thru-hull fittings, piping and hoses; and
- did not include sea trials to test engines, marine gears, pumps or electronics.

The survey noted, among other things, that the following items were present: high water bilge alarms in all compartments, 3 watertight bulkheads, and all safety equipment meeting standards.

The master and the AR considered the survey to be very thorough; it led them to believe that the vessel was well built, in good condition, and suitable for its intended purpose.

²⁰ Transport Canada recently published a safety management system guidance website and material to build awareness and assist owners and masters in developing their own systems, available at: <http://www.tc.gc.ca/eng/marinesafety/dvro-4067.htm> (Last accessed on 20 January 2016).

²¹ The principal objective of a safety management system on board a vessel is to ensure safety at sea, prevent human injury or loss of life, and avoid damage to property and the environment.

In 2013, the vessel was inspected on behalf of BC Timber Sales,²² an owner of a previous operation to which the *Lasqueti Daughters* was under contract. The primary goal of this inspection was to ensure that workers were being housed adequately. The inspection included a review of FOODSAFE certification, accommodations, worker hygiene facilities, and the potable water filtration system.

The scope of vessel surveys and inspections varies between surveyors and companies as do the criteria for obtaining insurance. As a result, neither the 2012 survey nor the 2013 inspection covered safety-critical areas of the vessel with regard to its operation.

1.9 *Post-occurrence examination*

After the vessel was salvaged, the hull, wheelhouse, galley, and accommodations were found to be intact, and the machinery and equipment had sustained extensive water damage. A post-occurrence examination of the vessel conducted by the TSB determined the following:

- The bow ramp did not form a weathertight seal with the bulwarks and the main deck.
- The main deck did not form a watertight seal with the storage compartment bulkheads.
- None of the compartment bulkheads were watertight (as evidenced by the gap between the main deck and the top of the bulkhead and that none of the bulkhead penetrations were watertight).
- All of the high water bilge alarms were present but not operational.
- All of the automatic bilge pumps were tested and found to be in working order.
- Each compartment below the main deck contained 1 emergency pump suction pipe.
- There were not enough standard life jackets as required by TC on board for use when abandoning the vessel.

1.10 *Previous occurrences*

Previous investigations by the TSB have revealed issues related to passenger safety, and vessels being inadequately manned and equipped for their intended use.

In October 2008, the *Jumbo B*,²³ which was registered as a landing craft, was underway with a master and 6 workers on board when the bow ramp opened and water shipped through the opening, causing a starboard list. The master and 2 of the workers jumped overboard. Of the 3 people who entered the water, one re-boarded the vessel, the body of a second was recovered afterward, and the third was presumed drowned.

²² BC Timber Sales is a branch of the Ministry of Forests, Lands, and Natural Resource Operations under which timber harvesting, marketing, and silviculture operations are conducted.

²³ TSB Marine Investigation Report M08W0236 (*Jumbo B*).

Following that occurrence, the TSB issued Marine Safety Advisory (MSA) 11/08 to the silviculture company that had contracted the *Jumbo B*, regarding the safety of employees being transported. The MSA advised that vessels be appropriately registered, maintained, and equipped, and that masters and crew be adequately trained and certified.

In January 2010, TC informed the TSB that the list of descriptors of types of ships would be expanded to better reflect the technical characteristics of Canadian-registered vessels and ensure that they are properly and unambiguously identified in the Register.

The CSA 2001 requires that the Register provide the description of the vessel;²⁴ the intended use of the vessel is not recorded on the registration certificate because TC considers this to be a safety issue as opposed to a registration issue. The onus is therefore on the owner to ensure that the vessel is properly inspected and certified for its intended use.

Previous investigations by the TSB have also revealed issues related to lack of communication between organizations responsible for safety oversight. In October 2004, the sardine fishing vessel *Prospect Point*,²⁵ with 5 crew members on board, heeled to starboard and capsized while the crew was preparing to haul in the catch. The TSB investigation into this occurrence found that the lack of information exchange between TC and the Department of Fisheries and Oceans (DFO) can undermine TC's mandate to ensure that vessels proceeding to sea are in a seaworthy condition and interfere with DFO's concern for fishermen's safety at sea. Following that occurrence, DFO and TC agreed to exchange information and data to ensure that seine herring fishing vessels are in possession of appropriate stability data before a herring fishing licence is issued.

1.11 TSB Watchlist

1.11.1 Safety management and oversight is a 2014 Watchlist issue

The Watchlist is a list of issues posing the greatest risk to Canada's transportation system; the TSB publishes it to focus the attention of industry and regulators on the problems that need addressing today.

The TSB has identified safety management and oversight as a Watchlist issue. As this occurrence demonstrates, some marine operators are not effectively managing their safety risks. The solution will require all operators in the marine industry to have formal safety management processes with oversight by TC. When companies are unable to effectively manage safety, TC must not only intervene, but do so in a manner that succeeds in changing unsafe operating practices.

²⁴ *Canada Shipping Act, 2001*, subsection 43(2).

²⁵ TSB Marine Investigation Report M04W0225 (*Prospect Point*).

2.0 *Analysis*

The investigation into the foundering and abandonment of the *Lasqueti Daughters* determined that the vessel had not been inspected nor was it certified as required by the *Canada Shipping Act, 2001* (CSA 2001) and its regulations. This analysis will focus on vessel operation, inspection and safety oversight by responsible authorities.

2.1 *Events leading to the foundering and abandonment*

On 14 March 2015 at approximately 1100, the *Lasqueti Daughters* departed Campbell River, British Columbia, in favourable weather. The vessel encountered strong northwest winds after it passed Wilby Shoals, British Columbia, and began its transit through Sutil Channel, British Columbia. Water began shipping onto the main deck via the spaces between the bow ramp, the bulwarks, and the main deck due to deteriorating sea conditions. The main deck, which had recently been partially replaced, had not been inspected for watertightness. The water began to downflood into the forward storage compartment through the gaps between the main deck and the bulwarks. As the vessel's forward trim increased, and as the freeing ports were all located on the aft portion of the main deck, the water continued to pool at the base of the ramp.

Both storage compartments' emergency pump suction valves were opened up to pump out these spaces. However, because only the forward compartment contained water, the emergency pump likely got air locked and did not function as intended. Furthermore, one of the portable pumps became inoperable, leaving only the automatic bilge pumps and 1 portable pump available. Upon seeing that the pumps could not keep up with the ingress of water, the authorized representative (AR) instructed the workers to don life jackets and abandon the vessel. The AR and the master remained on board and further attempted to de-water the vessel, but the water began to transfer progressively through all the bulkheads until the vessel commenced foundering. Both the master and the AR abandoned into the skiff before the *Lasqueti Daughters* was completely submerged. The vessel remained afloat and was eventually towed to shore and intentionally beached.

2.2 *Safety oversight*

Effective safety oversight requires owners, regulators, and safety organizations to be aware of existing and potential risks involved in operations and to address those risks. For the majority of forestry operations, including most silviculture operations, these risks are known and managed through owners' health and safety practices and procedures, Safety Accord Forest Enterprise (SAFE) Companies requirements, and regulatory oversight. In British Columbia, vessel owners receive support, guidance, and oversight from WorkSafeBC, the British Columbia Forest Safety Council (BCFSC), and Transport Canada (TC). However, some gaps exist in safety oversight, as shown in this occurrence.

2.2.1 Authorized representative and master

When the vessel was purchased in 2010, the AR of the *Lasqueti Daughters* had limited marine experience, other than having been sporadically on board the vessel. Despite this lack of experience, the AR, who had not received an information letter from the Vessel Registration Office, did not obtain guidance from a marine consultant regarding his regulatory and operational responsibilities. It was not until the vessel was issued a Deficiency Notice and a Notice of Violation by TC in 2012 (as the result of an occurrence that occurred in April 2012²⁶) that the AR consulted with TC regarding the vessel registration process and inspection requirements. The vessel was subsequently registered as a barge which was self-propelled, making it subject to periodic inspections under the *Hull Inspection Regulations*. It was the responsibility of the AR to contact TC and arrange for the vessel to be inspected, but this was not done.

Because the *Lasqueti Daughters* was occasionally used to transport silviculture workers to and from work sites, it was subject to regulations governing passenger vessels, with respect to crewing, vessel requirements and lifesaving appliances. The AR did not indicate this use on the registration application nor initiate a vessel inspection. Therefore, no inspection was conducted and no inspection certificate was issued. As a result, no emergency drills were conducted, and no information was provided regarding safety procedures, muster stations, or duties in the event of an emergency.

There were no certified crew members available to assist the master, even though the master had previously requested that crew members be certified to help with transporting passengers. Only the AR was available, leading to the master giving the helm to a worker while he went to open the emergency pump suction valves.

Safety management responsibilities on board the vessel were shared on an ad hoc basis. The master, who ran on-board operations on behalf of the owner, was employed only part time, and the AR and the foreman divided the vessel management responsibilities among themselves. This meant that none of the 3 parties were fully engaged in the management or safety of the vessel. It also created opportunities for miscommunication among the parties, resulting in unsafe practices and conditions not being identified and resolved. For example, although the foreman was responsible for partially replacing the main deck, the AR, as the one responsible for the vessel's administration, was to ensure that TC was informed of the change to the vessel structure. Neither the foreman nor the AR followed up on this.

Although the procedures required by section 106 of the CSA 2001 could form a part of an effective process to manage safety in vessel operations, they are not equivalent to an effective safety management system. Most significantly, CSA 2001, section 106 does not address the need for processes to ensure ongoing hazard identification, as well as risk assessment and mitigation. Effective safety management requires companies to be aware of the risks involved in their operations, to manage those risks, and to be committed to operating safely. While the shore-side silviculture operations had regular safety meetings, safe work practices,

²⁶ TSB marine occurrence number M12W0049.

and an incident reporting system to identify risks, the AR did not consider the *Lasqueti Daughters'* operations to be part of the silviculture operations. As a result, hazard identification and risk assessment and mitigation were minimal, despite the AR's awareness that neither the vessel nor the master were certified to carry passengers. In this occurrence, the benefits of increased comfort for the silviculture workers and more efficient transportation of the workers and equipment were deemed to outweigh the risks associated with their being transported on a vessel that did not meet the regulatory requirements for passenger vessels.

2.2.2 WorkSafeBC

As the provincial occupational health and safety authority, WorkSafeBC provides a regulatory framework that governs the forestry and other industries. The framework consists of general and occupation-specific regulations that are adopted under the *Workers Compensation Act*.

The forestry industry and silviculture operations specifically are governed by Part 26 of the *Occupational Health and Safety Regulations (OHS Regulations)*. Part 26 does contain a section on water operations, but gaps are present as this part is mostly geared toward smaller vessels such as boom boats, workboats, and open boats, and not larger cargo/landing craft-type vessels such as the *Lasqueti Daughters* or the *Jumbo B*.

Part 17 of the *OHS Regulations* governs the transportation of workers. Sections 17.17 to 17.26 relate specifically to marine craft, but these sections address only general requirements and refer to other regulatory bodies. Examples include vessels meeting generally accepted standards²⁷ and being capable of making safe passage considering the existing and forecast weather conditions. Other requirements, which are more minor in nature, include adequate lighting, anti-skid covering, and a 2-way communication system.

In addition to regulations governing specific occupations and equipment, WorkSafeBC has numerous general provisions that apply to all workplaces. These include provisions on rights and responsibilities, personal protective clothing and equipment, and general conditions.²⁸ However, regulations alone do not cover every possible scenario in every workplace, leaving gaps in safety oversight. For example, Part 24 – Diving and Other Marine Operations of the *OHS Regulations* requires fishing vessels to be equipped with an immersion suit for every person on board, but Parts 17 and 26 do not require immersion suits to be carried in marine craft.

WorkSafeBC prevention officers conduct both planned work (planned around risk-based work activities and WorkSafeBC High Risk Strategies) and response work (responding to

²⁷ Transport Canada has extensive standards in place with regard to safety and passenger capacity.

²⁸ *Occupational Health and Safety Regulations*, Part 4 – General Conditions: these include such things as emergency preparedness and response, including risk assessments; impairment; workplace conduct; work area guards and handrails; and air quality.

complaints, incidents, serious injuries, and work-related deaths) with a tracked division of the work.

Safety issues are discussed annually within a province-wide marine group to identify trends and focus areas for improvement for the upcoming year.

2.2.3 *British Columbia Forest Safety Council*

The BCFSC includes the Coast Harvesting Advisory Group, which maintains a list of initiatives intended to reduce serious injuries and fatalities. However, the marine transportation of silviculture workers and equipment is not included on this list, despite the fact that this type of activity carries some risk, as demonstrated by the *Jumbo B* and this occurrence.

The risks involved in marine transportation of silviculture workers and equipment should also be identified when licensees develop their site plans, especially with regard to vessels that do not have an inspection certificate or are not adequately equipped or manned for their intended use. It is not known how many vessels are involved in marine transportation of silviculture workers and equipment, potentially leading to a gap in safety oversight.

In this occurrence, the owner's safety program did not include the marine transportation of the workers and equipment required for silviculture operations. Nevertheless, the owner's company qualified for SAFE Companies certification, and therefore also qualified for WorkSafeBC's Certificate of Recognition program. The audit requirements to maintain SAFE Companies certification do not specifically include audit for policies and procedures involving marine transportation of workers and equipment.

If a company's health and safety program covers only some of its operations, and audits do not identify this situation, then there is a risk that hazards will not be identified or addressed.

2.2.4 *Transport Canada*

Transport Canada is responsible for making and enforcing regulations and standards with respect to vessel safety, as well as crewing for all commercial vessels to ensure a safe and secure marine transportation system.

Once the AR of a vessel has identified its intended use by initiating a vessel inspection, TC is responsible for assessing its condition and the competence of its master.

In April 2012, TC investigated an occurrence involving the *Lasqueti Daughters* and identified several deficiencies. One of the deficiencies was subsequently addressed when the vessel was registered with the Canadian Register of Vessels. However, the vessel continued to operate without an inspection certificate, even though this was required by the *Hull Inspection Regulations*. Furthermore, the master continued to be employed without holding the appropriate certificate of competency.

Transport Canada did not follow up with the AR to ensure that all of the previously identified deficiencies were addressed, leaving a gap in safety oversight; TC places the onus on the owner to ensure that the vessel's condition and the competency of its master are verified through proper TC certification, inspection and enforcement systems.

2.2.5 *Shared responsibilities*

Safety oversight of silviculture operations, including marine transportation associated with these operations, is a shared responsibility. In addition to collaborating with vessel owners, ARs and masters, the federal and provincial organizations involved in safety oversight – TC, the BCFSC, and WorkSafeBC – could collaborate more actively and effectively with each other. For example, sharing information about vessels involved in silviculture operations would improve data on the number of vessels involved in this type of operation. Improved data sharing on the number of vessels involved would enable organizations to provide more specific safety oversight and give them better insight into the scope of any potential safety issues.

If organizations with overlapping areas of responsibility do not share information and collaborate effectively among themselves as well as with vessel owners and masters, then there is a risk that gaps in safety oversight will occur.

2.3 *Vessel inspections*

Insurance underwriters do not have shared standards for the scope of vessel surveys, and so surveyors follow their own criteria when performing these surveys. The result is that surveys vary between surveyors and companies, as do the criteria for obtaining insurance.

The *Lasqueti Daughters* was surveyed for insurance purposes only, and this survey did not identify any safety deficiencies. It noted the presence of high water bilge alarms in all compartments and 3 watertight bulkheads, and that all safety equipment met standards. However, the report did not indicate if these items were tested or verified. The survey was accepted by the master and the AR as written confirmation that the vessel was operationally fit in all respects.

The post-occurrence examination of the vessel conducted by the TSB determined that the high water bilge alarms were present but not operational, none of the compartment bulkheads were watertight, and there were not enough standard life jackets as required by TC on board. Because there was no inspection or verification by TC of the vessel's condition, there was no other opportunity to identify and address safety deficiencies, such as the non-watertight main deck and bulkheads.

Masters and owners may be misled by insurance surveys and consider these to be written confirmation that their vessels are seaworthy, safe and in good operating condition. If comprehensive surveys or mandatory inspections are not conducted, critical areas of a vessel may go uninspected, and masters and owners will have incomplete information about the condition and safety of their vessels, increasing the risk of accidents.

3.0 Findings

3.1 Findings as to causes and contributing factors

1. The weather conditions encountered by the *Lasqueti Daughters* resulted in water being shipped onto the main deck via the spaces between the bow ramp, the bulwarks, and the main deck.
2. The main deck, which had recently been partially replaced, was not watertight and allowed water to downflood into the forward storage compartment.
3. As the vessel was trimmed by the bow, and as the freeing ports were located on the aft portion of the main deck, water began to pool at the base of the bow ramp.
4. The master and the authorized representative attempted to pump out the storage compartments using the on-board pumps; however, the emergency pump did not pump water, likely due to an air lock, and the remaining pumps could not keep up with the ingress of water.
5. Water continued to enter the forward storage compartment and transfer progressively through all the bulkheads causing the vessel to commence foundering.

3.2 Findings as to risk

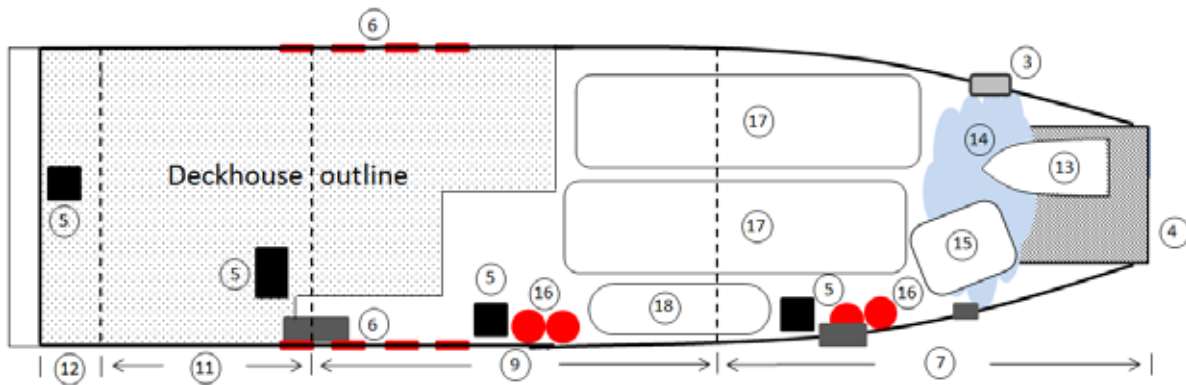
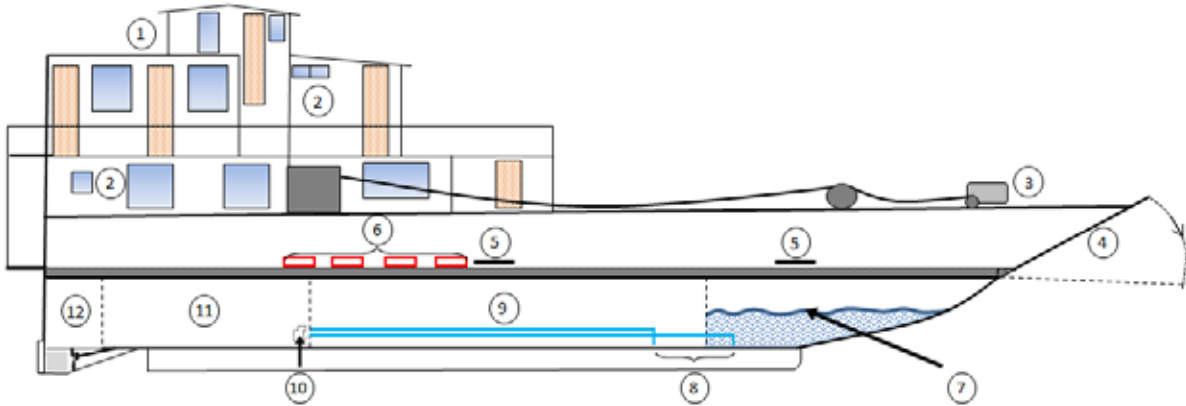
1. If a company's health and safety program covers only some of its operations, and audits do not identify this situation, then there is a risk that hazards will not be identified or addressed.
2. If organizations with overlapping areas of responsibility do not share information and collaborate effectively among themselves as well as with vessel owners and masters, then there is a risk that gaps in safety oversight will occur.
3. If comprehensive surveys or mandatory inspections are not conducted, critical areas of a vessel may go uninspected, and masters and owners will have incomplete information about the condition and safety of their vessels, increasing the risk of accidents.

This report concludes the Transportation Safety Board's investigation into this occurrence. The Board authorized the release of this report on 16 December 2015. It was officially released on 01 February 2016.

Visit the Transportation Safety Board'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 transportation safety issues that pose the greatest risk to Canadians. 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.

Appendices

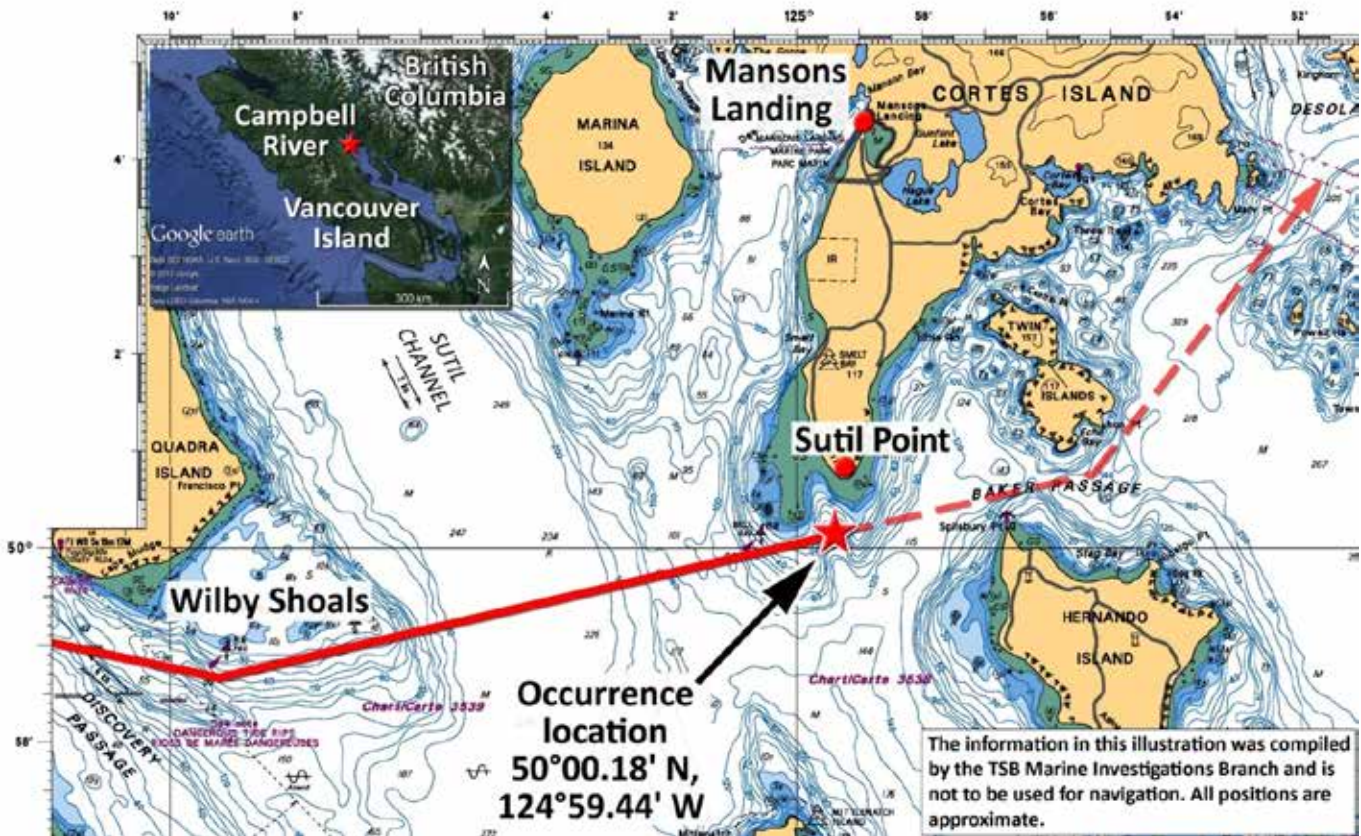
Appendix A – General arrangement of the Lasqueti Daughters



- | | | |
|------------------|--------------------------------|------------------------|
| 1 Wheelhouse | 7 Forward storage compartment | 13 Skiff |
| 2 Accommodations | 8 Emergency pump suction pipes | 14 Pooled water |
| 3 Life raft | 9 Aft storage compartment | 15 All-terrain vehicle |
| 4 Bow ramp | 10 Emergency pump | 16 Gas containers |
| 5 Hatches | 11 Engine room | 17 Pickup truck |
| 6 Freeing ports | 12 Lazarette | 18 Tree seedlings |

Dotted line (---): Transverse bulkheads

Appendix B – Area of the occurrence



Source: Canadian Hydrographic Service and Google Earth, with TSB annotations