

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

MARINE INVESTIGATION REPORT

M12W0054



CAPSIZING AND GROUNDING

**SMALL FISHING VESSEL *JESSIE G*
OFF CAPE BEALE, VANCOUVER ISLAND,
BRITISH COLUMBIA
04 MAY 2012**

Canada

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

Marine Investigation Report

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British Columbia
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Summary

On 04 May 2012 at approximately 1730 Pacific Daylight Time, the small fishing vessel *Jessie G*, loaded with prawn gear, rolled to starboard while rounding Cape Beale, British Columbia and was unable to recover. All 6 crew members on board were rescued by the Canadian Coast Guard fast rescue craft *Bamfield 1*. The *Jessie G* subsequently grounded and was later salvaged and towed to Port Alberni, where it was declared a constructive total loss.

Ce rapport est également disponible en français.

Factual Information

Particulars of the Vessel

Name of Vessel	<i>Jessie G</i>
Official/Licence Number	194220/VRN 29826
Port of Registry	Vancouver, British Columbia
Flag	Canada
Type	Small fishing vessel, trap and longline
Gross Tonnage	14.66
Length ¹	11.7 m
Draught	1.16 m
Built	1951, Quatsino, BC
Propulsion	6-71 Detroit diesel engine (130 kW) driving a single fixed-pitch propeller
Cargo	Approximately 180 kg of prawns and a combined 4300 kg of gear, equipment, and bait.
Crew	6
Registered Owners	Private owners (Errington and Qualicum Beach, BC)

Description of the Vessel

The *Jessie G* was a small fishing vessel of closed wooden construction (Photo 1) built in 1951 as a West Coast salmon troller/seiner. Its original configuration had been modified several times to meet various operational needs. The original hull had been covered over with fibreglass, and the original main deck had been covered with aluminum plating. The helm station, galley, and dinette were located forward of amidships in the aluminum deckhouse on the main deck. The bridge deck, located above the deckhouse, contained 4 crew bunks. The bunks were also accessible from inside the deckhouse.



Photo 1. *Jessie G* dry docked in Steveston, BC.

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

Below the main deck, 2 transverse bulkheads subdivided the engine room, the insulated and refrigerated fish hold, and the lazarette. The lazarette was accessible through a watertight flush-fitting manhole on the main deck. The vessel had 3 fuel tanks, 1 on either side of the main engine and the third on the bridge deck. The fresh water tank and lube oil tanks were located forward of the engine.

A stern platform extended the main deck by 1.83 m. The main deck was surrounded by solid aluminum bulwark and the aft main deck was encompassed by an aluminum cage. The port-forward half of the cage consisted of a solid weather guard. Approximately three-quarters of the cage roof was covered by a tarp reinforced with wooden planks (Photo 2).



Photo 2. Stern platform, aluminum cage, and weather guard.

A freezer that contained refrigeration plates was mounted inside the hatch coaming behind the deckhouse on the main deck. Power to the refrigeration compressor was provided by a diesel generator stowed on the bridge deck.

The vessel was rigged with paravane stabilizers and carried a 6 m aluminum skiff that was secured to the roof of the aluminum cage. At the time of the occurrence, the vessel also carried prawn fishing gear, bait, and crew provisions.

History of the Voyage

On 03 May 2012 the *Jessie G* departed Port Alberni at 0630, ² travelling out Alberni Inlet and heading south and seaward towards Trevor Channel (Appendix A). Upon arrival at Trevor Channel, the master and crew waited until 1200 ³ to set the prawn gear. They then left the gear in the water and docked for the evening in Bamfield at 1730.

The following morning, at 0630, the *Jessie G* departed Bamfield for Trevor Channel. At 0700, the crew began to haul in the prawn gear. The prawn catch was poor, so the gear was retained on board in preparation for departure to other fishing grounds that were anticipated to be more productive. The catch, weighing approximately 180 kg, was placed on the refrigeration plates inside the freezer. By 1630, all prawn gear was stowed in, on, and around the aluminum cage. The vessel departed Trevor Channel with an ebbing (outgoing) tide in calm sea conditions, intending to travel close to Cape Beale.

At approximately 1700, as the vessel neared Cape Beale, it became exposed to the southwest swell and opposing tide. The vessel began to roll, yaw, and pitch in the heavy sea conditions. The master adjusted the vessel's speed several times in reaction to the vessel's slow roll,

² All times are in Pacific Daylight Time (Coordinated Universal Time minus 7 hours) unless otherwise noted.

³ The prawn fishery opened at 1200 on 03 May 2012.

attempting to reduce the effects of the sea. Water shipped over the starboard bulwark, causing the *Jessie G* to begin to roll to starboard.

One of the crew members noticed that the freeing ports were submerged and that water was being retained on deck. The crew member advised the master, who increased the vessel's speed and made a port course alteration in an attempt to clear the water. When the *Jessie G* did not return to an upright position, the master ordered the crew to don their personal flotation devices (PFDs) and exit the deckhouse.

At 1721, the master began to make a Mayday call on very high frequency (VHF) radiotelephone channel 16; however, due to downflooding, the master was forced to exit the deckhouse partway through the call. The call was received by Tofino Coast Guard radio. In response to the Mayday, the fast rescue craft (FRC) *Bamfield 1* departed Bamfield en route to the *Jessie G*'s location.

While the crew stood on the port side, the vessel continued its starboard roll onto her beam ends in position 48°47.18' N, 125°13.76' W (Appendix A). All of the crew members had donned PFDs except for the engineer, who had located and donned his immersion suit. The 6 m aluminum skiff remained lashed to the roof of the aluminum cage. While some crew tried to free the skiff, others attempted to make a raft by tying prawn bladders together in preparation to abandon the vessel.



Photo 3. *Jessie G* grounded off Cape Beale.

At 1747 the FRC arrived and rescued the master and all 5 crew members from the vessel. They were transported to Bamfield. During the evening, the vessel drifted and eventually grounded on a reef in position 48°46.60' N, 125°12.20' W (Photo 3). The next day the vessel was located, salvaged, and towed back to Port Alberni, where it was declared a total constructive loss.

Environmental Conditions

The Environment Canada forecast, for the time of the occurrence, was light-to-moderate northwest winds and a low-to-moderate southwest swell. Fisheries and Oceans Canada tide tables for Bamfield indicated a low tide at 1737. The current would then be ebbing out of Trevor Channel against the southwest swells.

Vessel Certification

As a small fishing vessel under 15 gross tonnage, the *Jessie G* was subject to Part II of the current *Small Fishing Vessel Inspection Regulations* (SFVIR). As such, the vessel was not required to undergo inspection by Transport Canada (TC), nor was it required to submit stability data.

Personnel Certification and Experience

The master had over 40 years of accident-free fishing experience, mostly on vessels over 24 m, and held a valid Fishing Master Third Class since 1987. In May 2007, the master had completed

the Fish Safe Stability Education Program, a 4-day interactive course designed for fishermen to increase their knowledge of fishing vessel stability.

In addition, the master had completed the required Marine Emergency Duties (MED) A2 training in 1992. This was the master's first trip on the *Jessie G* and his second season fishing prawns.

The engineer held a valid Fishing Master Fourth Class certificate and had approximately 20 years of fishing experience. Three crew members held Small Vessel Operators Proficiency certificates. All but 1 crew member held MED A3 certification, and all of the crew had some previous experience in fishing.

Before the start of each fishing season, crew members must be instructed on the operational characteristics of the vessel, as per WorkSafeBC regulations.⁴ The crew members must also be familiarized with the location and use of navigational, operational, and emergency equipment, as well as be informed of the vessel's safe work practices and emergency procedures.

Prior to commencing fishing operations on the *Jessie G*, the crew members were shown the location of the fire extinguishers and were instructed to wear a PFD at all times while working on deck. The crew wore PFDs while working on deck.

Vessel Stability

Modifications

At the time of the occurrence, the vessel was outfitted to fish and freeze prawns. Some of the modifications to the original design of the vessel included the installation of

- fibreglass over the wooden hull;
- aluminum plating over the wooden deck;
- an aluminum deckhouse and bulwark in place of the original wooden deckhouse and bulwark;
- an aluminum cage, weather guard, tarp and wooden plank supports;
- a freezer and refrigerated fish hold in place of a dry pack fish hold;
- a 1.83 m stern extension;
- a 150 gallon fuel tank on the bridge deck; and
- additional rigging to house the paravane stabilizer system.

All of these modifications were done prior to purchase by the new owner. None of them were documented, and the extent of the modifications was largely unknown to the master. The vessel's original lightweight weight was increased by the modifications.

⁴ WorkSafeBC, *Occupational Safety and Health Regulations*, Part 24.73.

Load Distribution

When small fishing vessels are not assessed for stability, fishermen have minimal knowledge of a vessel's limitations. In these situations, a good practice of basic seamanship is to keep weight low on the vessel, thereby keeping the vessel's centre of gravity low as well. It is important that masters understand how load distribution impacts a vessel's stability and recognize that increasing a vessel's topside weight generally reduces stability.

Prior to departure on the day of the occurrence, the *Jessie G* had been prepared for a 6-week trip. A 6-week supply of provisions had been loaded and all consumable tanks were topped up. In addition, a number of items (weights approximate) were loaded on board, including

- 3680 kg of fishing gear and bait,⁵ which included 500 traps, 13.7 km of ground line, cement anchors, bladders and flag poles, and spare gear;
- a 650 kg diesel generator located on the bridge deck; and
- 480 kg of diesel fuel on the bridge deck.

Due to the size of the vessel, most of these items were stowed above the vessel's centre of gravity, increasing the vessel's topside weight and reducing its freeboard.

Freeboard

Freeboard is a measure of the vertical distance from the waterline to the lowest point on the main deck. Adequate freeboard is important in maintaining vessel buoyancy. An overloaded vessel will have reduced freeboard, which causes its freeing ports to submerge at smaller angles of heel. Submerged freeing ports change the vessel's centre of buoyancy and reduce its righting ability.



Photo 4. *Jessie G* moored, April 2012.

When the new owners launched the *Jessie G* in Steveston in March 2012, it had an estimated 18 cm of freeboard (Photo 4). Before departure to the fishing grounds on the morning of the occurrence, the vessel's freeboard was reduced to an estimated 7.5 cm. Just prior to the occurrence, the freeboard was further reduced by the prawn catch, the water retained in the gear, as well as the water that had shipped on deck.

Fisheries Resource Management

The owners were permitted to stack 2 prawn licences on the *Jessie G*, as had been done in the past. Stacking licences increases the allocated number of traps from 300 to 500. Before designating a prawn licence to a vessel, the Department of Fisheries and Oceans (DFO) requires the vessel's buoyant hull to comply with licence length restrictions. However, the measurement of the buoyant hull does not include the stern extension, which, on the *Jessie G*, accommodated

⁵ Most of fishing gear and bait was trucked to Port Alberni for loading.

the increased number of traps and raised the vessel's centre of gravity. The length of the vessel's buoyant hull met the DFO's licence requirements.

Pacific Integrated Commercial Fisheries Initiative

In 2007, the DFO embarked on the Pacific Integrated Commercial Fisheries Initiative (PICFI), a 5-year federally funded program.⁶ The key elements of the program are capacity building, co-management, accountability, and First Nations' participation in commercial fisheries.

PICFI is intended to provide economic opportunities to First Nations who would like increased involvement in commercial fishing. The program accepts applications from First Nations commercial fishing enterprises (CFE). Applications must include, among other requirements, a business plan, training plan, and mentoring component.⁷

Once the business plan is approved, PICFI provides financial assistance with the implementation of the training and mentoring plans. The objective is to qualify masters and crew to fish safely and effectively. When the business, training, and mentoring plans are completed, the DFO may provide commercial licences, quota, vessels, and gear.

PICFI selects which CFEs are to receive licences. The DFO reclassifies the commercial licences as commercial communal licences⁸ and assigns them to the CFEs selected by PICFI. The DFO retains ownership of the commercial communal licences, while the First Nations CFEs distribute them. The DFO has spent \$107 million to purchase commercial licences and quota through the PICFI program. This represents approximately 15.8% of the value of BC's commercial fisheries licences.

Under the PICFI program, the DFO purchased and assigned 2 commercial communal prawn licences to the First Nations CFEs involved in this occurrence. The CFEs distributed these licences to the owners of the *Jessie G* through a lease bidding process. The licences were leased with an understanding that the master would provide fishing employment opportunities for 2 First Nations crew members. The 2 First Nations crew members had taken training to acquire the mandatory certifications but did not participate in the recommended safety training, which included basic first aid, vessel stability training, vessel familiarization, and cold water survival training. As well, these 2 crew members did not participate in PICFI's mentoring process.

Lifesaving Appliances

There was no life raft or Emergency Position Indicating Radio Beacon (EPIRB) on board the *Jessie G* at the time of the occurrence; neither was required by regulation. The vessel was equipped with 5 PFDs and 2 immersion suits; however, there were no lifejackets on board. WorkSafeBC regulations require that every crew member on board have an immersion suit, and TC regulations require that every crew member on board have a lifejacket.

⁶ PICFI has been extended to 2012-13 with an additional \$22.5 million provided for the program.

⁷ The mentoring process is intended to accelerate the transfer of classroom knowledge to applied fishing operations.

⁸ A commercial communal licence is assigned to a First Nations CFE. A commercial licence is assigned to a person or a vessel.

The *Jessie G* carried a 6 m aluminum skiff that was lashed to the roof of the aluminum cage. The skiff did not have a float-free mechanism and was unable to float free when the vessel rolled onto its beam ends. Neither the skiff nor the float-free mechanism was required by regulation.

Cost of Safety

Over the years, Transportation Safety Board (TSB) investigations into fishing vessel safety have shown that actions that maximize profit at the expense of safety are common and have contributed to accidents and loss of life.⁹ A profitable prawn fishing operation allows a fisherman to recover start-up and operational costs, as well as make a living. Costs may include, but are not limited to, any necessary refits, upgrades, or repairs; a vessel survey; insurance; the lease of licences or quota; and the purchase of gear, safety equipment, and provisions. As well, in many cases, the profit from a prawn fishing season represents a significant percentage of a fisherman's annual income. A fisherman's ability to operate a profitable prawn fishery is often dependent on minimizing start-up costs and maximizing fishing time to the extent possible given the fisheries resource management (FRM) measures on the BC prawn fishery.

Operation of the BC Prawn Fishery

In the BC prawn fishery, there is no limit on the prawn catch for each licence. Without such limits, fishermen compete against each other for the resource until the area spawner index reference point¹⁰ is reached, at which time the fishery is closed for that area. Some of the factors that affect profit include the number of days fished and the speed at which fishermen can harvest and process their catch. The fishery is restricted to 0700 and 1900 hours daily, and fishermen are permitted to haul their traps once per day.

Start-up Costs

The *Jessie G*'s owners incurred costs for the start-up of the 2012 fishing operation. These included costs for the purchase of the vessel; a marine survey; a refit and upgrade; repairs to address vessel deficiencies; insurance; the lease of licences, gear and equipment; and provisions.

The *Jessie G*'s owners purchased a 61-year-old vessel near the end of its life span with the intention of it being a short-term asset. The owners also stacked 2 prawn licences on the vessel to maximize the number of allocated traps being carried and fished.

Work Practices

Towards the end of April 2012, the 5 crew members met and prepared the *Jessie G* to fish and freeze prawns. The master and crew were unfamiliar with the vessel's limitations, and most crew had just met for the first time prior to sailing. The investigation determined that the master was not familiar with TC's Ship Safety Bulletins or WorkSafeBC's safety information regarding

⁹ TSB investigations M07M0088 (*Big Sister*), M02W0102 (*Fritzi-Ann*), M95W0013 (*Hili-Kum*), M98L0149 (*Brier Mist*)

¹⁰ A spawner index is a biological reference point that measures the number of female prawns remaining for spawning. When the specified reference point is reached, the fishery is closed.

risks associated with reduced vessel stability and prawn fishing operations. There were no documented safe work practices or procedures for the *Jessie G* as required by WorkSafeBC.

Survey for Vessel Insurance

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 principal function of this survey is to determine the condition of the vessel, as well as its current value and replacement value. Some insurers have staff surveyors that are dispatched to conduct surveys; other insurers allow the owners to choose an independent marine surveyor to conduct the survey.

While marine surveyors may belong to one of several professional associations, there is no mandatory accreditation. The scope of vessel surveys varies between surveyors and companies, as do the criteria for obtaining insurance. As a result, critical areas of a vessel may go uninspected. Vessel stability characteristics and modifications may not be assessed and latent defects may not be identified.

In contrast to insurance underwriters that do not share a common standard for the scope of vessel surveys, in BC there is a fishing vessel insurer that encourages safety in the fishing industry by working as a co-operative. The co-operative is run by a board of directors comprised of fishermen. A vessel insured by this co-operative pays insurance premiums that are directly related to the number of accident claims. Fewer accidents mean lower premiums for fishermen, thereby encouraging safe fishing. The co-operative has surveyors on staff, and they use specific criteria for surveys and insurance approval. Vessels that have hull planking covered in fibreglass, such as the *Jessie G*, are not eligible for insurance with this co-op insurer.

With the goal of obtaining insurance, the *Jessie G*'s owners had the vessel surveyed on 28 March 2012 while it was dry-docked in Steveston, BC. A third party surveyor accredited by the Society of Accredited Marine Surveyors completed the *Jessie G*'s survey and then submitted the report to the underwriter through a broker. The survey covered the vessel's hull condition, machinery, equipment, propeller, rudder, shafting, electronics, and safety equipment. The survey did not determine the internal condition of the engine and gear, the working capability of the electronics, or the condition of the hull planking beneath the fibreglass. The survey was not intended to evaluate the vessel's stability or inherent structural integrity.

The survey concluded that the *Jessie G*, which had been dry-docked since 2008, was approaching the end of its normal life cycle. It also identified some deficiencies that needed to be addressed. The insurance was granted on the condition that the deficiencies would be addressed within 30 days of the date of the survey, or prior to beginning fishing operations. The survey also indicated that the vessel, in its current state, was suitable for travelling from Steveston to Port Alberni in unspecified good weather conditions. The vessel then travelled to Port Alberni in good weather conditions with minimal gear on board. For most of April 2012, while the *Jessie G* was moored, the master and engineer completed the vessel refit and addressed most of the deficiencies specified in the survey by:

- repairing a cracked window on the bridge deck;
- acquiring safety equipment required by the CCG;
- installing a high water bilge alarm and heat sensor; and
- recharging all fire extinguishers.

The *Jessie G* was required to carry enough lifejackets and immersion suits for each crew member on board, as well as a fire bucket and extinguisher, rockets and flares, and a life buoy. At the time of the occurrence, the *Jessie G* was not carrying an adequate number of lifejackets and immersion suits, but was carrying the other required safety equipment.

Safety Issues Investigation into Fishing Safety in Canada

In August 2009, the TSB undertook an in-depth safety issues investigation into fishing vessel safety in Canada. The *Safety Issues Investigation into Fishing Safety in Canada* (SII) report was released in June 2012 and provides an overall, national view of safety issues in the fishing industry, revealing complex relationships and interdependencies among these issues. The Board identified the following significant safety issues requiring attention: stability, FRM, lifesaving appliances, training, safety information, the cost of safety, safe work practices, the regulatory approach to safety, fatigue, and fishing industry statistics.¹¹

Previous Occurrences

Past trap fishing occurrences¹² investigated by the TSB have shared similar contributing factors, including the cumulative effects of

- additional weight above the vessel's centre of gravity;
- reduced freeboard;
- vessel modifications;
- a lack of vessel stability assessments; and
- FRM measures that do not use a systematic risk-based approach.

These same contributing factors were identified in another occurrence involving the fishing vessel *Love and Anarchy*.¹³ In that report, the Board found that owners and masters may come to rely on vessel surveys undertaken for insurance purposes as an indication of the condition and safety of their vessels.

Watchlist

In March 2010, and again in June 2012, the Board released its *Watchlist*, identifying critical safety issues investigated by the TSB that pose the greatest risks to Canadians. One of these critical safety issues is the loss of life on fishing vessels. With an average of nearly 13 fatalities per year between 1999 and 2011, the Board remains concerned about vessel modifications and their

¹¹ TSB Safety Issues Investigation Report Number M09Z0001, Safety Issues Investigation into Fishing Safety in Canada. The report can be accessed on the TSB website at www.tsb.gc.ca

¹² TSB investigations M02W0102 (*Fritzi-Ann*), M05W0110 (*Morning Sunrise*), M07M0088 (*Big Sisters*), M09L0074 (*Le Marsouin I*), M10M0014 (*Craig and Justin*)

¹³ TSB investigation M08W0189 (*Love and Anarchy*)

impact on stability; the use and availability of lifesaving appliances on board; regulatory oversight; the impact of FRM measures; and the lack of both a safety culture and a code of best practices in the fishing industry. The *Watchlist* highlights the need for the industry to adopt and promote safe operating procedures and practices to increase the safety knowledge of fishing vessel masters.

Analysis

Events Leading to the Capsizing and Grounding

In the afternoon of 04 May 2012, after the crew had hauled the prawn gear on board, the vessel immediately departed Trevor Channel for more productive fishing grounds. The catch and wet prawn gear were retained on board, increasing the vessel's topside weight. Coupled with the vessel's loaded condition, the catch and prawn gear reduced the freeboard, which was already limited due to the vessel's modifications. As the vessel exited Trevor Channel, travelling close to Cape Beale, it encountered heavier sea conditions due to the prevailing southwest swell against the ebbing tide. The master adjusted the vessel's speed several times in reaction to the vessel's slow roll, attempting to reduce the effects of the sea.

The vessel's exposure to the heavy sea conditions, combined with the reduced freeboard and increased load above the main deck, resulted in water being shipped on deck. The shipped water was retained due to the submerged freeing ports, resulting in a change in the vessel's centre of buoyancy. This combination of factors caused the *Jessie G* to roll to starboard, to the point where the vessel could not recover.

The vessel's deadweight and trim could not be determined, nor could the direct effect of modifications; moreover, an accurate assessment of the vessel's intact transverse stability could not be established. However, the investigation found that the freeboard was most likely insufficient in the vessel's loaded condition.

Safety Issues

Accidents like the one involving the *Jessie G* are the cumulative effect of unsafe practices, environmental factors, and operational conditions that align to form a window of opportunity for an accident to occur. The *Safety Issues Investigation into Fishing Safety in Canada* (SII) categorized actions impacting safety into 10 significant safety issues and found that there are complex relationships and interdependencies among them.¹⁴ Below is an explanation of how 7 of these 10 significant safety issues affected the *Jessie G*.

Stability

The *Jessie G* had undergone many modifications and was also loaded over its original intended capacity, reducing its freeboard. These factors reduced the vessel's stability and its ability to respond to external forces and were not fully understood or addressed by the crew.¹⁵

¹⁴ TSB Safety Issues Investigation Report Number M09Z0001, [Safety Issues Investigation into Fishing Safety in Canada](#). The report can be accessed on the TSB website at www.tsb.gc.ca

¹⁵ Fishing safety suffers when the principles of stability are not well understood, applied, or presented in a practical format. This safety significant issue is further analyzed in the SII.

Fisheries Resource Management

The *Jessie G* was fitted with a stern extension to accommodate the 200 additional traps allocated by a stacked prawn licence. The measurement of the *Jessie G*'s buoyant hull, which did not include the stern extension, met the Department of Fisheries and Oceans (DFO) licence length restrictions.¹⁶ The DFO did not require an overall assessment of the vessel's adequacy for prawn fishing prior to granting the stacked licence. Vessels that are not assessed to determine their adequacy for intended operations place the safety of the crew and the safe operation of the vessel at risk.

Pacific Integrated Commercial Fisheries Initiative

The DFO's Pacific Integrated Commercial Fisheries Initiative program (PICFI) is intended to increase First Nations' involvement in commercial fishing. One of PICFI's key elements is capacity building, which entails business planning, enterprise development, and most importantly, training and mentoring. The training plans are required to include the following:

- mandatory certifications;
- recommended safety training (including stability training, basic first aid, vessel familiarization, and cold water survival training); and
- operational training and involvement in the mentoring process.

These requirements are in place to help First Nations Commercial Fishing Enterprises (CFE) masters and crew fish safely and effectively. The CFE crew members on board the *Jessie G* did complete the mandatory certification training, but did not fully complete PICFI's training plan requirements. PICFI does not assess the level of compliance with training plan requirements.

Prior to leasing the licences to the owners of the *Jessie G*, the CFE did not require an assessment of the adequacy of the vessel for its intended operation, thereby losing an opportunity to ensure the safety of the crew and the safe operation of the vessel.

Lifesaving Appliances

Fishermen may bypass safety expenditures in favour of those meant to increase income.¹⁷ In this occurrence, the purchase of lifejackets and an Emergency Position Indicating Radio Beacon (EPIRB) was deferred for financial reasons. Although the *Jessie G* had undergone a refit and upgrades, the vessel departed without this safety equipment. As well, at the time of the occurrence, the vessel was not carrying a life raft, or an adequate number of immersion suits.¹⁸ Lifesaving appliances are essential to increasing the chances of survival during an emergency at sea.

¹⁶ Fishermen are put at risk when fisheries resource management (FRM) measures do not consider safety at all levels, from policy through to practice. This safety significant issue is further analyzed in the SII.

¹⁷ The fishing community often sees safety as an obligatory cost, rather than a key cost of managing fishing operations. This safety significant issue is further analyzed in the SII.

¹⁸ Lifesaving appliances that are not properly designed, carried, fitted, used, or maintained for fishing operations put lives at risk. This safety significant issue is further analyzed in the SII.

Survival Craft and Float-free Mechanisms

Transport Canada (TC) and WorkSafeBC do not require a life raft on vessels that are less than 12.2 m or under 15 gross tonnage (GT). The *Jessie G* did carry a 6 m skiff lashed to the roof of the aluminum cage. However, the skiff was not secured with a float-free mechanism and remained attached as the vessel rolled onto its beam ends. The crew managed to free the skiff during the occurrence, but the FRC arrived before it was required. Survival craft secured to a vessel without a float-free mechanism may become inaccessible to crew in emergency situations. As well, small fishing vessels less than 12.2 m or under 15 GT that do not carry life rafts may put crew at increased risk in cases of emergency.

Training

The crew had completed Marine Emergency Duties training but did not carry out emergency drills prior to or during the fishing operations as required by TC and WorkSafeBC.¹⁹ The crew were shown the location of the personal flotation devices and fire extinguishers upon joining the vessel but did not receive formal vessel familiarization as required by regulation.

Safety Information

Over the years, the Transportation Safety Board (TSB), TC, and WorkSafeBC have published safety information on lifesaving appliances, the adverse effects of vessel modifications, improper loading procedures, unsafe work practices, and more. The master of the *Jessie G* had not received safety information related to fishing operations and did not find it was readily available.²⁰

The master did participate in the Fish Safe Stability Education Program in May 2007, which covers the basic principles of stability; however, these principles were not adhered to in this occurrence. For example, the risks of additional topside weight and limited freeboard were not addressed.

Cost of Safety

The economic reality of fishing is that most owners and masters try to minimize cost and maximize profit. As such, operational decisions can be influenced by start-up costs, the need to make a living, and the operation of the prawn fishery,²¹ resulting in the acceptance of risks to the detriment of safety.²²

¹⁹ Training is often not practical, and is not practised and evaluated regularly; such training is ineffective in reducing accidents. This safety significant issue is further analyzed in the SII.

²⁰ Safety information is not always practical or communicated in an easy-to-understand way, and does not always reach its target audience. This safety significant issue is further analyzed in the SII.

²¹ FRM measures limit the duration of the prawn fishery, the hours of fishing, and the number of hauls.

²² The fishing community often sees safety as an obligatory cost of time and money rather than a key part of managing fishing operations. This safety significant issue is further analyzed in the SII.

To reduce the start-up costs, the *Jessie G*'s owners purchased a 61-year-old vessel near the end of its life span with the intention of it being a short-term asset. The vessel had undergone extensive modifications over its life span, and the weight of these modifications had reduced the vessel's freeboard. However, the owners were not aware of the extent of these modifications and their effect on the vessel's stability. As well, the owners stacked 2 prawn licences on the vessel to maximize the number of allocated traps being fished and carried, which reduced operating costs but also increased the risk to vessel stability.

To maximize fishing time, the *Jessie G* departed Trevor Channel for more productive grounds immediately after the prawn gear had been hauled; however, departing immediately meant the vessel travelled on an ebb tide. This exposed the vessel to the risks of heavier sea conditions, which compromised the vessel's stability.

In this occurrence, there was a lack of knowledge of the vessel's limitations and the effects that the environmental conditions would have on the vessel. As a result, the operational decisions to maximize the fishing days precluded other options, such as waiting for more favourable sea conditions to transit the area, or trucking the traps to the new fishing grounds in order to reduce the vessel's topside weight. Operational decisions that are focused on maximizing fishing days may negatively impact the safety of a vessel and its crew.

Safe Work Practices

There were no documented work practices or procedures for the *Jessie G*, as required by WorkSafeBC,²³ and the master and crew were unaware of the vessel's limitations. Due to the vessel's size, stowage locations for fishing gear and equipment were limited. The generator and fuel were positioned on the bridge deck due to the limited stowage, raising the vessel's centre of gravity.

Interdependency of Safety Issues

The application of stability knowledge to fishing operations on the *Jessie G* had a complex relationship with

- access to and availability of practical training;
- work practices;
- access to and comprehension of safety information; and
- the cost of safety.

The safety of fishermen will be compromised until the complex relationship and interdependency among safety issues is recognized and addressed (Appendix B). Past attempts to address these safety issues on an issue-by-issue basis have not led to the intended result: a safer environment for fishermen. The SII emphasized that in order to obtain real and lasting improvement in fishing safety, change must address not just one of the safety issues involved in an accident, but all of them, recognizing that there is a complex relationship and

²³ Unsafe work practices continue to put fishermen and their vessels at risk. This safety significant issue is further analyzed in the SII.

interdependency among those issues. Removing a single unsafe condition may prevent an accident, but only slightly reduces the risk of others.

Marine Surveys

Insurance underwriters do not have shared standards for the scope of vessel surveys. Insurance approval depends on several factors, some of which include:

- the vessel survey;
- the operator's training, experience, and accident history;
- the intended fishery and voyage area;
- the insurance premiums; and
- the underwriter's financial situation.

Insurance coverage may also be restricted by factors such as weather conditions, the voyage area, or gear limitations.

Lacking a shared standard, surveyors follow their own individual criteria for vessel surveys. The result is that surveys vary between surveyors and companies, as do the criteria for obtaining insurance. These inconsistencies may mean that critical areas of a vessel go uninspected. Safety critical items such as stability, vessel modifications, and latent defects may not be identified by a survey. The lack of industry-wide underwriters' standards for surveys prior to granting insurance coverage leaves crew and vessels at risk.

Small fishing vessel owners and masters sometimes take the results of these surveys, address any reported deficiencies, and conclude that their vessel is now safe in all operational respects. However, these surveys are not reliable indicators of a vessel's condition, and it is unsafe for owners to believe this. As well, if the surveyor identifies deficiencies, the owner normally agrees to rectify these deficiencies within a specified period of time and insurance is granted. However, underwriters may not always follow up to ensure that the deficiencies are actually corrected.

In this occurrence, a third party surveyor completed the *Jessie G's* survey and then transmitted the report to the underwriter through a broker. The underwriter did not require an assessment of the internal condition of the hull, nor the structural integrity and stability of the vessel. Nevertheless, the vessel was found suitable for a voyage to Port Alberni under unspecified good weather conditions, and the survey required only repairs and updates to be completed prior to fishing. Following the survey, the broker recommended the vessel and master to an underwriter as an acceptable risk for insurance. This recommendation was largely based on the master's 40-year history of accident-free fishing experience, most of which was on larger fishing vessels.

In the absence of mandatory inspections for fishing vessels under 15 GT and detailed periodic surveys undertaken for insurance purposes that provide usable information, there is a risk that owners may not be aware of the condition and adequacy of the vessel for its intended purpose.

Findings

Findings as to Causes and Contributing Factors

1. The cumulative effects of environmental conditions and the *Jessie G*'s load distribution, hull characteristics, modifications, reduced freeboard caused the vessel to roll to starboard.
2. When the vessel encountered heavier sea conditions, water was shipped over the starboard bulwark and retained on deck.
3. The weight of the additional water shipped and retained on deck resulted in the *Jessie G* rolling on its beam ends and prevented the vessel's recovery.

Findings as to Risk

1. The safety of fishermen will be compromised until the complex relationship and interdependency among safety issues is recognized and addressed.
2. Survival craft secured to a vessel without a float-free mechanism may become inaccessible to crew in emergency situations.
3. Vessels of less than 12.2 m or under 15 GT that do not carry life rafts may put the crew at increased risk in case of emergency.
4. Vessels that are not assessed to determine their adequacy for intended operations place the safety of the crew and the safe operation of the vessel at risk.
5. In the absence of comprehensive surveys or mandatory inspections that provide usable information, there is a risk that owners may not be aware of the condition and adequacy of the vessel for its intended purpose.

Safety Action

Safety Action Taken

Following a Transportation Safety Board (TSB) presentation on the occurrence, the Fish Safe Advisory Committee recommended the immediate production of safety information for fishermen involved in the prawn fishery.

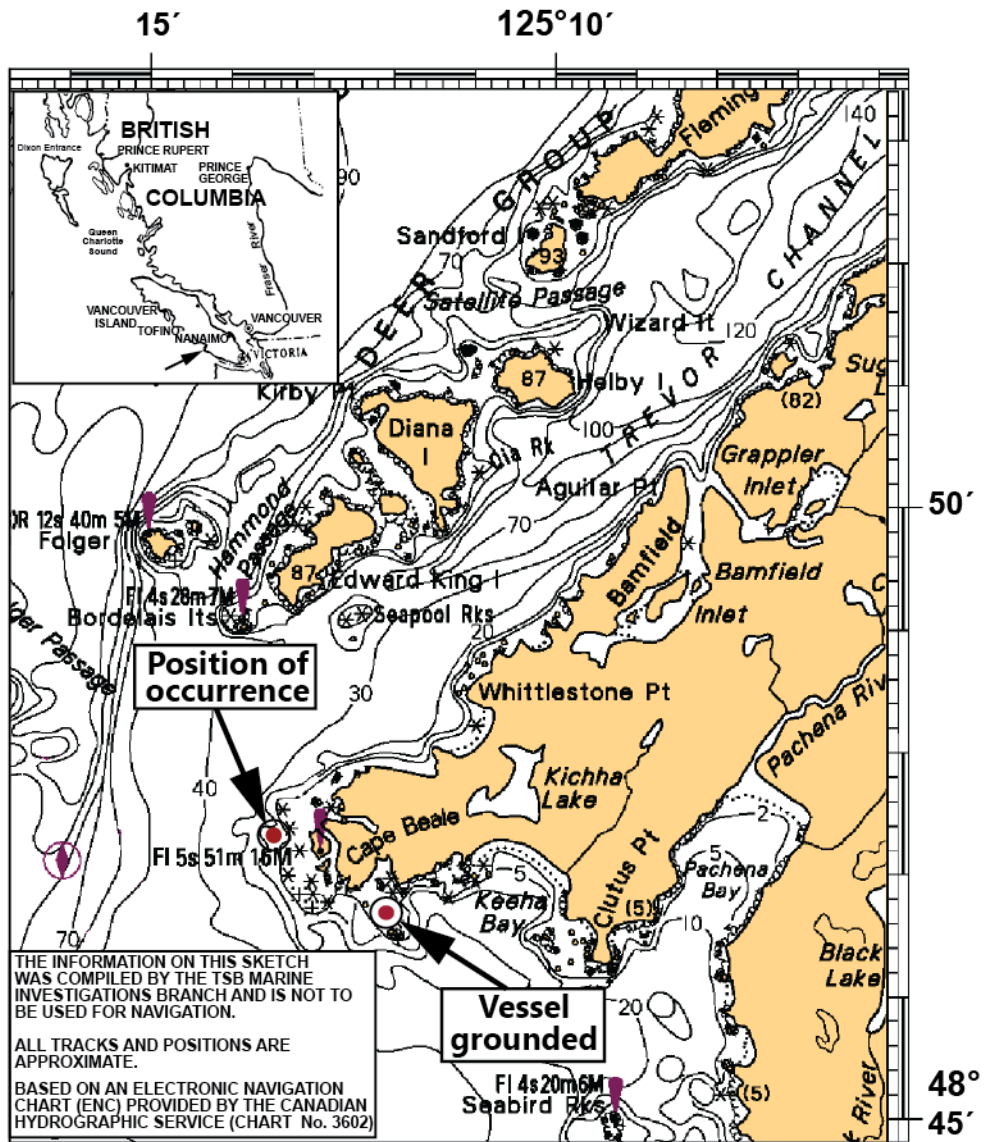
In light of this occurrence, the Pacific Prawn Fisherman's Association (PPFA) assembled a committee of prawn fishermen to work with Fish Safe to develop a code of best practices for the BC prawn fishery. Early in 2013, a code of best practices was developed and approved by the PPFA board of directors for publication and was distributed to fishermen. The code of best practices²⁴ is intended to address unsafe work practices that continue to put fishermen, their crew, and vessels at risk.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 29 May 2013. It was officially released on 10 June 2013.

Visit the Transportation Safety Board's website (www.bst-tsb.gc.ca) for information about the Transportation Safety Board 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.

²⁴ Fish Safe, *Prawn Fishery: Best Industry Recommended Practices*,
https://www.fishsafebc.com/_customelements/uploadedResources/PrawnBestPractices.pdf
last accessed on 3 June 2013

Appendix A – Area of the Occurrence



Appendix B – Unsafe Conditions and Associated Safety Issues

Unsafe conditions	Safety issues						
	Stability	FRM	LSA	Training	Info	Cost	Work practices
Vessel modified to accommodate operational needs and licence length restrictions	X	X		X	X	X	X
Vessel modifications never approved or recorded despite SSB 01/2008	X			X	X	X	X
Signs of marginal stability not fully recognized (i.e. reduced freeboard)	X			X	X	X	X
Participated in a fishery which the vessel was not suited for	X	X		X	X	X	X
Distress call incomplete, no life raft, EPIRB or lifejackets available			X	X	X	X	X
Vessel operated outside safe stability limits: no stability book available despite SSB 04/2006	X	X		X	X	X	X
Unsafe gear and equipment loading practices: excess traps, raised center of gravity	X	X		X	X	X	X
Skiff did not float free			X	X	X	X	X
No emergency drills or vessel familiarization were conducted despite SSB 06/1995			X	X	X	X	X
Inadequate number of life jackets and immersion suits on board			X	X	X	X	X
Travelled in increased sea conditions to save time	X	X		X	X	X	X