



National Transportation Safety Board

Marine Accident Brief

Sinking of Commercial Fishing Vessel *Orin C*

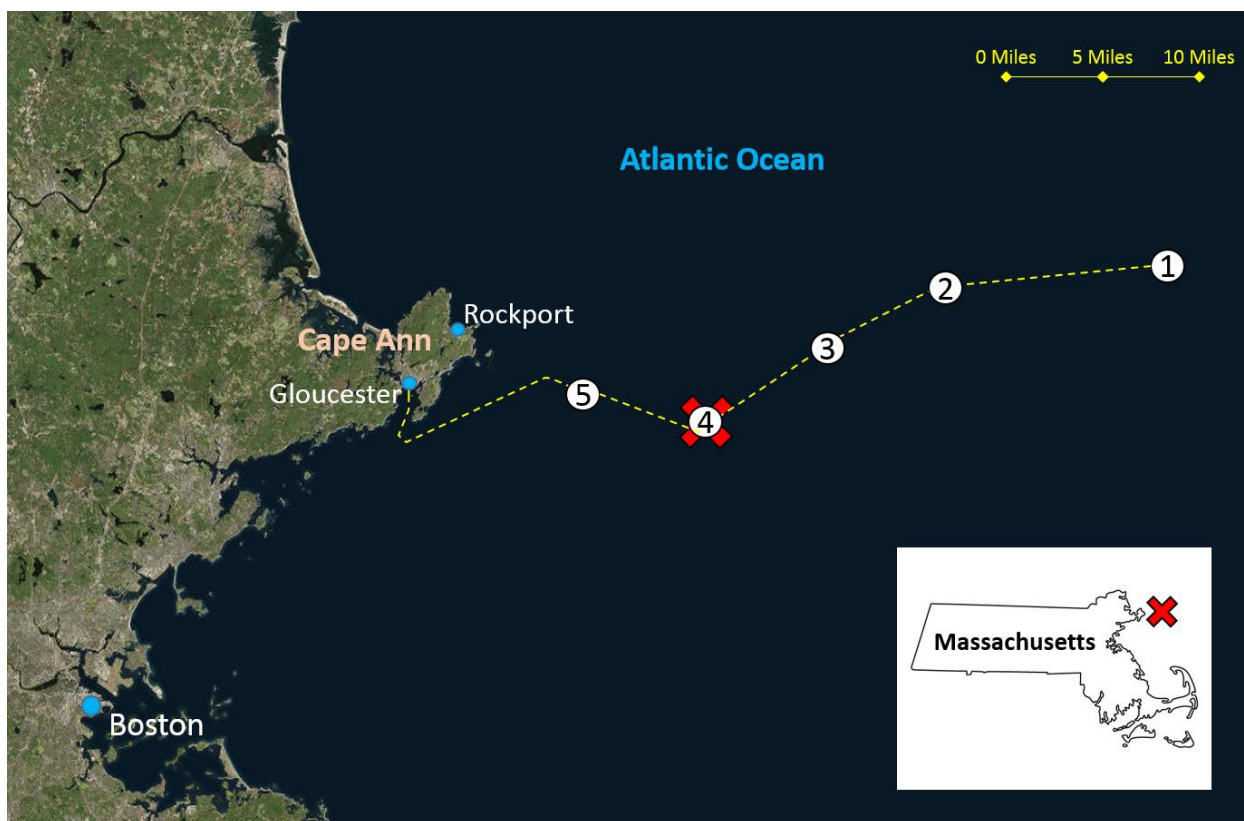
Accident no.	DCA16PM008
Vessel name	<i>Orin C</i>
Accident type	Sinking
Location	Atlantic Ocean, 13 miles* east of Cape Ann, Massachusetts 42°34.39' N, 70°21.91' W
Date	December 3, 2015
Time	2018 eastern standard time (coordinated universal time – 5 hours)
Injuries	1 fatality
Property damage	Total loss
Environmental damage	None reported
Weather	Overcast, winds west at 30 knots gusting to 35 knots, seas 8–10 feet, air temperature 45–48°F
Waterway information	Open waters of the Atlantic Ocean

On December 3, 2015, at 2018 local time, the commercial fishing vessel *Orin C* sank in the Atlantic Ocean about 13 miles east of Cape Ann, Massachusetts. All three crewmembers abandoned the vessel just prior to the sinking and were recovered by US Coast Guard motor lifeboat 47259. However, the captain of the *Orin C* became unconscious in the water before being pulled to the motor lifeboat by a Coast Guard crewman. When examined aboard the motor lifeboat, the captain had no pulse. In response, Coast Guard crewmembers performed CPR, but he could not be revived. There were no other injuries and no reports of pollution. The *Orin C* sank in about 300 feet of water and was not salvaged.



***Orin C* on the day the vessel departed Gloucester, Massachusetts, December 1, 2015. (Photo by M. Ring)**

*All miles in this report are nautical miles (1.15 statute miles).



Satellite image showing the approximate locations of critical events during the accident: (1) *Orin C* taken under tow by fishing vessel *Foxy Lady*; (2) wave strike damages *Orin C* and parts tow line; (3) motor lifeboat 47259 arrives on scene; (4) *Orin C* sinks and crew recovered; (5) attempted deployment of rescue swimmer from Coast Guard helicopter. (Background by National Geographic MapMaker Interactive)

Accident Events

On December 3, 2015, the 51-foot-long commercial fishing vessel *Orin C* was fishing about 34 miles east of Cape Ann, Massachusetts. About 0800 local time, the captain received a high oil temperature alarm on the vessel's main engine. The temperature was about 60 degrees Fahrenheit higher than normal, so he shut down the engine to investigate the problem. The crew discovered water in the lubricating oil, which the captain determined would damage the engine if restarted. The *Orin C* did not have enough oil on board to replace the contaminated oil, thus the captain radioed another fishing vessel in the area, the *Foxy Lady*, for assistance. The *Foxy Lady*, about 16 miles away, responded and started heading toward the *Orin C*.

The shortest route to the *Orin C* was through a closed and regulated fishing ground. Consequently, the *Foxy Lady* captain radioed Coast Guard Sector Boston at 0917 to request permission to pass through the area. He informed the Coast Guard that he was heading to a disabled vessel to render assistance. The Coast Guard authorized the passage and monitored VHF radio traffic between the *Foxy Lady* and the *Orin C*.

The *Foxy Lady* arrived at the *Orin C*'s location about 1100. By then, winds had increased to about 20–25 knots and wave heights had risen to 4–5 feet. The crew of the *Foxy Lady* made ready a tow line and sent it over to the *Orin C*, where a crewmember secured the line to the forward bow post. The length of the tow was estimated by an *Orin C* crewmember to be about 200 feet. According to radio communications between the Coast Guard and the *Foxy Lady*, the

tow commenced about 1125 at a speed of about 4–4.5 knots. The tow headed in a westerly direction toward Gloucester, Massachusetts, head on into the seas. Radio communications between both vessels indicate that, about 1240, the tow line parted and had to be reconnected. The line parted three to four more times throughout the day, with mooring lines supplementing the broken pieces of rope.

With the *Orin C* on battery power, the vessel could communicate by VHF radio in low power only. Therefore, the *Foxy Lady* was tasked with relaying situation updates to the Coast Guard. As directed by Coast Guard Sector Boston, the *Foxy Lady* checked in every hour with a report on the status of the tow and the vessels' positions.



Photo of the *Orin C* taken at 1324 from the aft deck of the *Foxy Lady*.
(Photo by *Foxy Lady* captain)

Weather conditions continued to deteriorate after noon, with winds increasing to 25–30 knots and wave heights increasing to 8–10 feet. At 1447, when the vessels were about 20 miles east of Rockport, Massachusetts, the *Orin C* was hit by a large wave that parted the tow line, damaged the overhead and visor of the wheelhouse, and broke out two forward windows. Sea water reached the back of the wheelhouse and flowed down to the deck below. A crewmember, who estimated the wave to be about 15 feet high, recalled hearing a “loud snap” and “creak” that sounded like the wood hull of the boat was “coming unglued.”

The *Foxy Lady* captain informed the Coast Guard of the damage to the *Orin C*, noting that the hole in the overhead and visor was about 2 feet by 8 feet.

At 1459, the *Orin C* captain radioed to tell the *Foxy Lady* captain that he thought he was taking on water. This information was relayed to Coast Guard Sector Boston, and 3 minutes later Sector Boston informed the *Foxy Lady* that a Coast Guard response boat would be dispatched to assist them.

In Gloucester Harbor, 47-foot motor lifeboat 47259 was diverted from a training exercise to assist the *Orin C*. It had a crew of nine consisting of a coxswain, four regular-duty crewmembers, and four break-in crewmembers.¹ Watchstanders at Sector Boston informed the *Foxy Lady*'s captain that the motor lifeboat would arrive at their location in 1–1.5 hours.

¹ (a) A *coxswain* is the Coast Guard person-in-charge of a motor lifeboat; (b) A *break-in crew* is a Coast Guard boat crew that has not yet completed all training tasks for the boat force qualification.

Just after 1500, the two fishing vessels connected the tow again using remaining line they had on board. The *Foxy Lady* captain informed the *Orin C* captain that he would try to keep the tow light and would do the best he could to keep the stricken vessel from drifting out to sea in the westerly winds.

On board the *Orin C*, the crew used items such as cabinet doors and a seat bench to cover the broken windows and prevent any further ingress of water and sea spray. At 1517, they reported that they had the windows secured. According to a crewmember, they were able to prevent sea spray from coming in through the broken windows but they could do nothing for the overhead. Once the temporary repairs were done, the crew changed into the remaining dry clothing they had available.

According to nearby ocean weather buoys, the outside air temperature that day ranged from 45 to 48 degrees Fahrenheit, with a wind chill of about 35 degrees Fahrenheit. One crewmember stated that everything was wet and there was no dry place except for the living space at the forward part of the boat. He said that there was only one dry blanket, which they gave to the captain who remained in the wheelhouse.

At 1615, the *Orin C* captain informed the *Foxy Lady* captain that he had a “good amount of water in the engine room” and that his pumps were not working. The *Foxy Lady* captain relayed this information to the Coast Guard and said that he was holding the *Orin C* into the wind and waves awaiting arrival of the motor lifeboat. The *Foxy Lady* captain told the *Orin C* captain to have his lifejackets and immersion suits ready as a precaution. At 1637, the *Orin C* captain informed the *Foxy Lady* captain that the water was coming into the engine room quickly, the starboard bilge pump had failed, and the aft bilge pump was “on and off.”

Fourteen minutes later, just as it was getting dark, the motor lifeboat arrived on scene while the *Orin C* was still under tow by the *Foxy Lady*. The motor lifeboat coxswain reported that the seas at the time were 8–10 feet with winds above 30 knots. Given the poor sea conditions, the coxswain determined that it was too risky to come alongside the *Orin C* and attempt to put people or equipment on board. Instead, the coxswain ordered his crew to prepare to send the motor lifeboat’s P6 emergency dewatering pump to the *Orin C* to address the flooding.² At 1655, he maneuvered the motor lifeboat into position off the *Orin C*’s starboard side so that his crew could throw a heaving line to the stricken vessel. Due to the winds, seas, and cold temperatures, it took about 18 minutes before the coxswain reported that the *Orin C* had received the line and pulled aboard the watertight steel drum that housed the pump.

The *Orin C* crew set up the pump on the main deck and lowered the 15-foot-long suction hose into the approximately 5-foot-high engine room space. At 1720, the water in the engine room was reported to be at the bottom of the oil pan located near the base of the engine. Seven minutes later, the *Orin C* radioed that the pump was started and suction had been established.

² The CG-P6 gasoline motor-driven dewatering pump is used primarily for emergency dewatering of vessels. It has a rated output of 250 gallons per minute at a 12-foot suction lift. Under load, this pump will dewater for approximately 4–5 hours on the gasoline supplied with the kit.



Motor lifeboat 47259 in Gloucester Harbor.

The *Foxy Lady* continued to keep the *Orin C* under tow while the motor lifeboat stood by providing instructions for operating the dewatering pump. However, because the *Orin C* was getting heavier with flooding water and the tow line rigged between the fishing vessels was ineffective, the motor lifeboat made preparations to take over the tow. The *Foxy Lady* tow line was disconnected from the *Orin C*, and the Coast Guard vessel moved in to pass a tow line to the stricken fishing boat. At 1810, Coast Guard Sector Boston was informed that the motor lifeboat had the *Orin C* under tow in 10-foot seas and south-southwesterly winds above 30 knots. Once freed from towing, the *Foxy Lady* was cleared to depart and headed back to Gloucester.

According to the crews of both the *Orin C* and the motor lifeboat, the tow proceeded well with a longer 800-foot Coast Guard tow line. As soon as the vessels were under way, the coxswain instructed the *Orin C* captain on how to hail the motor lifeboat if they had any further trouble or any medical emergencies on board. The *Orin C* captain told the coxswain they were all well but cold.

At 1843, the *Orin C* captain informed the motor lifeboat coxswain that he was having trouble with the P6 pump. He said the pump's engine was running, but it was not maintaining suction. The crew of the motor lifeboat communicated with the *Orin C* crew about possible methods to get the dewatering pump to work, which included checking the pump hose for clogs in the line. The captain reported there was "some stuff" on the strainer that they removed. The Coast Guard crew asked him to check all of the hose fittings to make sure they were connected properly, and he reported back that they were. He was next advised to continue using the priming plunger on the pump, pumping as hard and as much as possible. The captain radioed that his crew was following the instructions but without success. The coxswain communicated to the

Orin C captain that, with the wind and wave conditions, it was not safe to put a Coast Guard crewmember on board to assist with troubleshooting the pump.

Personnel at Coast Guard Station Gloucester were also involved in the effort to help the *Orin C* crew regain suction on the pump. Using a P6 pump at the station, they troubleshot and relayed instructions to the motor lifeboat. According to an *Orin C* crewmember, who stated he had previous experience with the P6 pump, the crew complied with all troubleshooting instructions provided by the Coast Guard. However, all further efforts to get the pump to take suction were reported to be unsuccessful. The captain told the coxswain that he had to let the crew warm up before they tried again.

One of the crewmembers of the *Orin C* went to his bunk to warm up. After a few minutes, he got out of his bunk and stepped into water that was about half way up to his knee. He went to the wheelhouse and informed the captain of the water level, telling him, “[We] gotta get out of here.”

At 1949, the captain informed the motor lifeboat over the radio that he had about a foot of water in the galley and expressed his concern about the situation. The coxswain asked the captain if he felt things were unsafe, to which he responded that if he was able to pump the water down he would be fine. The coxswain told him that if things got worse, the Coast Guard crew needed time to break the tow and head back to the *Orin C*. The coxswain did not want the *Orin C* crew hanging on until the last second, he told the captain, as his overall goal was the safety of the crew.

Ten minutes later, the *Orin C* captain radioed the coxswain to tell him that he was getting nervous. Upon receiving this message, the coxswain directed the captain to have his crew don their immersion suits and report when they had them on. He then ordered the tow line cut and headed back to the *Orin C*. Shortly thereafter, the *Orin C* captain informed the coxswain that the engine room was full of water and they wanted to abandon the vessel.

As the motor lifeboat transited back to the *Orin C*, the coxswain radioed to ask if the crew had their immersion suits on yet. The captain replied that they were putting them on one at a time.

The motor lifeboat maneuvered near the *Orin C* about 2006. With waves remaining between 8 and 10 feet high, in darkness, the coxswain determined that it was too dangerous to position his vessel alongside the *Orin C*'s wooden hull and instead chose to station the lifeboat off its starboard side.

The coxswain instructed the *Orin C* crew that he wanted each person to enter the water one at a time so that they could be recovered individually. At 2012, the captain reported that they all had their immersion suits on and acknowledged the instructions for entering the water.

The *Orin C* crew made their way to the stern of the boat where, according to one crewmember, the rails were starting to go under the water. The first crewmember entered the water with his immersion suit on and swam to the motor lifeboat, about 30 feet away. He was picked up and escorted to a warm survivors' compartment.

The second crewmember and the captain were on the stern of the *Orin C* waiting for their turn to enter the water when the vessel sank from under them, forcing both into the water at the same time. At 2018, the motor lifeboat reported to Station Gloucester that the remaining crewmembers were in the water and the *Orin C* was sinking bow up. The second crewmember swam toward the motor lifeboat and was recovered.

According to statements from both the Coast Guard crew and the second crewmember of the *Orin C*, the captain swam on his back away from the sinking vessel and the motor lifeboat. He made three distinct swimming strokes, and then his movements ceased. The captain could be seen floating on his back with his head submerged under the waves. Recognizing the captain was unconscious, a motor lifeboat crewmember, wearing a dry suit, donned swimming gear and entered the water with a lifeline. He swam to the captain and took hold of him. Both were pulled back to the motor lifeboat, which was maneuvering around debris from the sunken vessel.

Once at the pickup port of the motor lifeboat, Coast Guard crewmembers assisted in getting the captain on board. With the vessel rolling in the seas, the recovery of the captain was challenging. His 300-pound body weight combined with a wet survival suit, the motion of the vessel, and the restricted deck space required about seven crewmembers to pull him aboard. Once on board, the captain was transferred up several steps to the exposed aft deck where his vital signs were checked.

At 2023, the motor lifeboat reported to Coast Guard Station Gloucester that the last *Orin C* crewmember was on board but was not breathing and had no pulse. The crew unzipped his survival suit and began chest compressions and artificial respiration with a pocket mask. Once CPR started, the coxswain headed the motor lifeboat in the direction of Rockport, Massachusetts, the closest port with emergency medical services.

The coxswain also requested helicopter assistance. Coast Guard Sector Boston responded by diverting a Coast Guard helicopter, Rescue 6030, which had just completed a training mission about 30 minutes away, to the location of the motor lifeboat.

At 2038, the coxswain reported to Station Gloucester that the casualty was foaming at the mouth and that CPR was continuing.

A Coast Guard duty flight surgeon located at Coast Guard Air Station Cape Cod was called by personnel at Sector Boston to advise watchstanders involved in the rescue. At 2048, the flight surgeon recommended the motor lifeboat crew continue CPR on the *Orin C* captain for 10 more minutes. During that time, the crew performing CPR detected an intermittent pulse, which was communicated to Station Gloucester at 2057. One minute later, they reported that they lost the pulse. The crew continued with CPR.

At 2107, Rescue 6030 arrived over the motor lifeboat with a Coast Guard rescue swimmer trained as an emergency medical technician (EMT). The helicopter also had an automated external defibrillator (AED), a tool that was not standard equipment on the motor lifeboat. The flight crew asked the motor lifeboat coxswain if they had any EMT-trained crew on board, to which the coxswain replied they did not. The helicopter and motor lifeboat then conducted a risk assessment briefing based on the wind, waves, vessel movement, and visibility conditions, after which the decision was made to lower the rescue swimmer to the motor lifeboat with the AED and an EMT kit. The flight surgeon had recommended against hoisting the *Orin C* captain to the helicopter given the conditions and the interruption to CPR during the hoist operation.

Two attempts were made to lower the rescue swimmer to the deck of the motor lifeboat, but due to the vessel's pitching and rolling in the heavy seas and the wet decks, the helicopter flight commander determined that there was too much risk to continue. The swimmer and gear were hoisted back to the helicopter.

After the rescue swimmer was back in the helicopter, Rescue 6030 followed the motor lifeboat awaiting further instructions from Sector Boston. There was no discussion or attempt to lower the AED to the motor lifeboat.

The motor lifeboat continued on its course toward Rockport while the crew continued with CPR. At 2131, on the recommendation of the flight surgeon, Coast Guard Station Gloucester advised the motor lifeboat to discontinue CPR, which had been ongoing for over an hour. The station further advised the motor lifeboat to return to Gloucester. At 2141, with only 17 minutes of fuel available to remain on scene, Rescue 6030 was cleared by Sector Boston to return to Air Station Cape Cod.

The motor lifeboat arrived in Gloucester about 2230. The *Orin C* captain was transferred to county emergency medical services where he was pronounced dead. The two surviving crewmembers had no injuries.

Accident Analysis

Vessel History and Details

The *Orin C* was a wooden-hull fishing vessel built in 1976 and based out of Gloucester. There was very little information or documentation regarding the repair and maintenance history of the *Orin C*. According to the surviving crewmembers and other persons interviewed by investigators, there were no reported leaks and no known deficiencies with the hull, hatches, or fittings.

In July 2015, the *Orin C* was taken out of the water for painting and maintenance. Investigators met with staff from the boatyard where the maintenance was performed and learned that the yard only provided a haul-out service and space to work on the vessel. All work on the vessel was conducted by the captain or those he had directly contracted. No one interviewed knew exactly what maintenance or repair work was carried out or the overall condition of the boat.

The condition of the engine was unknown. According to one crewmember who was familiar with the boat, it had an “old” 300-hp turbocharged Detroit Diesel. Surviving crewmembers stated that during the accident voyage the engine ran fine and was not shut down until the high temperature alarm was received. One crewmember stated they had changed the oil just before the voyage. The *Orin C* captain initially indicated to the *Foxy Lady* captain that he thought the engine had a leak in the oil cooler.

Surviving crewmembers estimated they had about 6,500–10,000 pounds of hagfish (slime eel) on board at the time the engine problems were discovered. About 5,000 pounds were located in the main fish hold below deck with the remainder evenly distributed in vats; two on each side of the boat. The crewmembers said that there was nothing unusual with the load distribution on the boat. They also noted that the deck was mostly clear, with any loose items secured in preparation for the oncoming weather. The vessel had a low freeboard and its deck scuppers were close to the water (see photo page 1). The aft deck was awash most of the time during the tow.

As he was proceeding to the *Orin C* to take it under tow, the *Foxy Lady* captain inquired about the stricken vessel’s stability, asking the *Orin C* captain if the fish hold and vats were drained of water. The captain responded that there was no water, only ice, in the vats, and the fish hold tank was shut off and drained, with only ice remaining.

Per the Coast Guard Authorization Act of 2010 and the Coast Guard and Maritime Transportation Act of 2012 (as codified at Title 49 *United States Code* section 4502[f]), commercial fishing vessels operating beyond the 3-nautical-mile territorial base limit were required to have a dockside Coast Guard safety examination of the vessel no later than October 15, 2015. There was no evidence in the Coast Guard's inspection database that the *Orin C* was in compliance with the new requirement. The last documented voluntary safety inspection was conducted by the Coast Guard on May 27, 2011, while the vessel was under different ownership. There were no observed deficiencies with the vessel during that inspection. The report noted that the *Orin C* had three bilge pumps. A previous owner recalled that the bilge pumps were connected to the battery power supply.

Although the *Orin C* sustained damage to its wheelhouse windows and overhead, surviving crewmembers did not believe that this was the main source of flooding that led to the sinking. Once temporary repairs were made, only sea spray was reported to be coming in through the overhead, which was not a large amount of water. Both crewmembers stated that the flooding came from an undetermined location in the forward part of the boat near their bunks; they concluded that the vessel must have "blown a plank" when they were impacted by the 15-foot wave. One crewmember described the water from the flooding as coming in from under the floor boards.

Given the time that it took for the vessel to sink after being hit by the wave, it is likely that the damage to the hull was near or above the water line. The flooding rate was initially slow but gradually increased as the *Orin C* sank deeper in the water.

Towing Operation

The good Samaritan vessel *Foxy Lady* responded to the call from the *Orin C* knowing that weather conditions were forecasted to get worse. The vessels used the only equipment and lines they had available, including the 200-foot tow line. *Orin C* crewmembers told investigators that the length of tow was a challenge because, as the *Foxy Lady* went up a wave, the *Orin C* was being pulled down a wave, and vice versa. One crewmember stated that he saw a speed of 5 knots over the ground on the *Orin C* GPS, and both surviving crewmembers believed that the speed was too fast for the length of the tow.

A crewmember said he told the *Orin C* captain to ask the *Foxy Lady* to slow down, but the captain did not make the request. When asked why his recommendation was ignored, the crewmember stated that the captain "was just happy to be in tow and did not want to 'rock the boat.'" At 1125, the *Foxy Lady* captain communicated to the Coast Guard that he was barely making 4 knots and that the *Orin C* was heavier than his boat. About 2 hours later, he reported that they were making 4–4.5 knots.

The tow was rigged with a bridle attached to both aft corners of the *Foxy Lady*, with the tow line extending to the *Orin C* from the middle of the bridle. The other end of the tow line was attached to the forward bow post of the *Orin C*. According to the *Foxy Lady* captain, the *Orin C* had no cleats on its forward deck, and the attachment using the forward bow post allowed the tow line to constantly move back and forth across the *Orin C*'s bow. The *Foxy Lady* captain expressed concern because the movement caused the line to chafe, lose strength, and eventually break. After the tow commenced, he communicated to the *Orin C* crewmembers that they needed to take measures to prevent the line from chafing. Each time the tow line parted, materials such as rubber hose, rain gear, and duct tape were added around the line to prevent it from chafing.

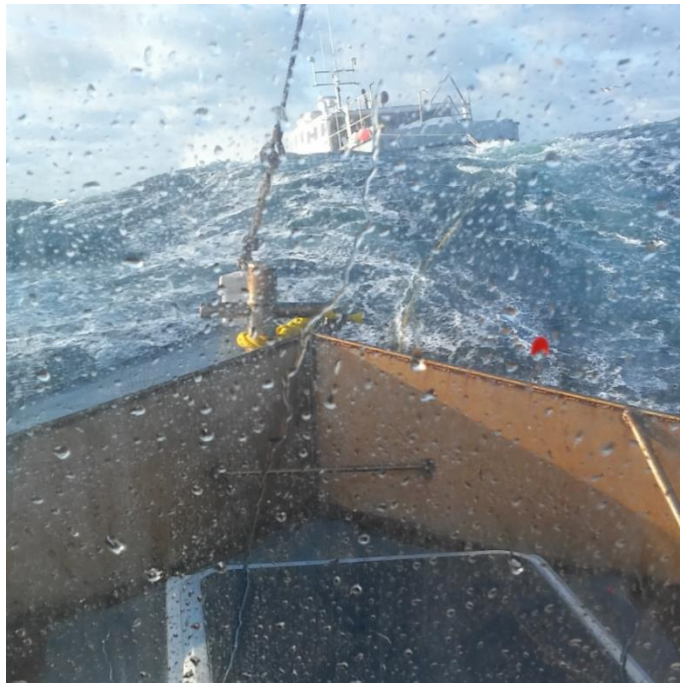


Photo taken from the *Orin C*, while being towed by the *Foxy Lady*, moments before the *Orin C* was hit by the wave that caused damage. Note the yellow tow line on the bow post, the bow stem with guy wire, and the lead of the tow line off the starboard bow into the water.

The *Foxy Lady* captain told investigators that they initially used a 4-inch nylon line that was on board for towing purposes. Although suitable for towing, the line was not an ideal length—too short—for the sea conditions and the vessel being towed. The *Foxy Lady* captain commented that the *Orin C* was heavier than his fiberglass boat and the type of line was all they had for the tow. He noted that the line would get shorter each time it parted and was repaired. Eventually, they were forced to use a 2-inch line because nothing else longer was available. The *Orin C* had only mooring lines on board and no lines for towing.

When a vessel and its tow do not climb, crest, or descend waves together, the vessels are out of step, and stress is placed on the tow line and rigging. Investigators reviewed a 23-second video of the *Orin C* tow, taken from the *Foxy Lady*, which showed the tow being out of step. Each time the *Orin C* descended into a wave trough, the rope went slack (see photo this page). As it ascended the next wave, the tow line went taut (see photo page 3). In the video, the line is seen to take up slack quickly and vibrate, which is indicative of shock loading.³ While the line is under tension, the *Orin C* is seen to plough through a wave rather than move over it. One crewmember from the *Orin C* stated that it was as if the line “exploded” each time it parted.

Concerns about the speed of the tow were not communicated to the *Foxy Lady*. The captain of the *Foxy Lady* believed that the line was parting due to chafing from the *Orin C* deck and not the speed. Certainly, the quickly deteriorating weather conditions weighed on both captains as they sought to get in the lee of land as soon as possible.

³ A *shock load* is the resistance force caused by intermittent and varying forces of waves or sea conditions encountered by a towing boat on its towing lines and equipment. Source: US Coast Guard, *Boat Crew Seamanship Manual: Train, Maintain, Operate* (Washington, DC: US Department of Homeland Security, 2003).

Dewatering Pump

The P6 dewatering pump that was supplied to the *Orin C* was lost with the vessel; thus, investigators were unable to determine why the crewmembers were unable to regain suction after they unclogged the suction hose. The maintenance history of the pump was provided by the Coast Guard and reviewed by investigators. Documentation indicated the pump entered service in May 2011 and was last inspected and accepted on November 20, 2015, with no discrepancies noted. It was subject to monthly and annual maintenance and inspections, which were all up to date.

Investigators examined P6 pumps at both Station Gloucester and Sector Boston and found that both pumps were similar in type. The instructions for use, which came attached with a flashlight, were in four languages with basic wording supporting pictorial guidance for the 13 operational steps. The investigators found the instructions clear and easy to use, and a pump was prepared and operated by investigators using the instructions, without any noticeable problems.

Survivability

The *Orin C* was fitted with survival equipment typical for a fishing vessel of its size. A four-person inflatable liferaft automatically deployed during the sinking, and the vessel's emergency position indicating radio beacon (EPIRB) activated.⁴ The vessel had three survival suits and life jackets. According to a surviving crewmember, the captain "had an XL suit, and it fit him well."

The three crewmembers of the *Orin C* were instructed to don their immersion suits by the coxswain of the motor lifeboat. This took an estimated 10–13 minutes, which was considerable time in an emergency situation. When asked why it was taking so long, the captain told the coxswain they were putting them on one by one. One of the surviving crewmembers explained this was because he and the other surviving crewmember had to help the captain get into his suit. Conditions at the time were dark, rough, windy, and cold, which presented a challenge in the limited space. After the captain was suited up, the next crewmember donned his suit with the assistance of the last crewmember, before the last crewmember suited himself up. The long period it took to don the suits was critical time lost, which ultimately led to the vessel sinking from beneath the captain and a crewmember and the need to simultaneously recover both in rough water and darkness.

Per Coast Guard regulations, commercial fishing vessels operating beyond the 3-nautical-mile territorial boundary are required to carry out crew drills at least once per month for events such as abandoning the vessel, launching survival craft, controlling flooding/damage, and donning immersion suits and other wearable personal flotation devices.⁵ The captain or individual-in-charge is required to be trained as a certified drill conductor and run the drills on the vessel. There was no evidence of any safety drills, instruction, or orientation being conducted on the *Orin C*. Furthermore, the Coast Guard had no record of any crewmember being certified as a drill conductor. Coast Guard inspectors would have verified the presence of a drill conductor during the mandatory dockside safety examination, had it been completed.

⁴ An *emergency position indicating radio beacon* (EPIRB) alerts search and rescue services in an emergency by transmitting a coded message on the 406 MHz distress frequency via satellite and Earth stations to the nearest rescue coordination center. The device can be activated manually or automatically when submerged and deployed from the vessel.

⁵ Title 46 *Code of Federal Regulations* 28.270.

VHF audio recordings from the captain and statements by both surviving crewmembers indicate that they were cold and wet from the moment the *Orin C* was hit by the wave that damaged the vessel. It cannot be ruled out that these conditions over a period of about 6 hours affected the performance and wellness of the crew as they prepared to abandon the vessel. According to one of the crewmembers, the captain seemed “a little lethargic,” noting that it was probably because they were soaked all day.

Medical Issues and Toxicology

The *Orin C* captain, age 47, died in the accident. The autopsy report stated that the captain had a body mass index of 40.1, was 6 feet in height, and weighed 297 pounds.⁶ The medical examiner determined that the cause of death was drowning and the manner of death was accidental. Additionally, the medical examiner noted that the captain’s cardiac hypertrophy (enlarged heart) and atherosclerotic cardiovascular disease (narrowing of the heart’s arteries) contributed to his death. The captain had an enlarged heart with severe thickening of the left ventricle and some thickening of the right ventricle, as well as slight to moderate coronary artery disease. The enlargement may have been the result of obesity and/or hypertension. Both findings placed him at increased risk for an acute cardiac event such as a heart attack, arrhythmia, or sudden cardiac death. The strain of the prolonged exposure to the cold, wet environment; the shock of entering the water; and the physical exertion of swimming, along with stress of losing his vessel, increases the likelihood that the captain suffered an acute event. While these factors may have contributed to the captain’s loss of consciousness that led to his drowning, the exact cause could not be determined.

Toxicology testing of the captain’s heart blood identified 3.3 ng/ml of tetrahydrocannabinol (THC), the impairing compound in marijuana, and 9 ng/ml of carboxy-tetrahydrocannabinol, the inactive breakdown product of THC. Long term, regular users store THC in body tissues, and over time it leaks back into the bloodstream. Thus, THC may be present in blood at measurable concentrations even after 30 days of abstinence.⁷ In addition, THC and its metabolites undergo postmortem redistribution, moving back into the blood from storage sites in tissues after death. Both surviving crewmembers stated that they did not witness any use of marijuana for the duration of the accident trip, and no alcohol was on board. There is no evidence that the use of marijuana contributed to the captain’s death or the circumstances of the vessel’s eventual sinking.

One of the surviving crewmembers submitted a post-casualty drug sample, which tested negative. The other crewmember refused to submit a sample.

⁶ A *body mass index*, or BMI, is a person’s weight in kilograms divided by the square of height in meters. A high BMI can be an indicator of high body fat. BMI can be used to screen for weight categories that may lead to health problems, but it is not diagnostic of body fatness or the health of an individual. Source: “Body Mass Index (BMI),” Centers for Disease Control and Prevention, accessed December 6, 2016, <http://www.cdc.gov/healthyweight/assessing/bmi/index.html>.

⁷ Bergamaschi, Mateus, Erin Karschner, Robert Goodwin, Karl Scheidweiler, Jussi Hirvonen, Regina Queiroz, and Marilyn Huestis, “Impact of Prolonged Cannabinoid Excretion in Chronic Daily Cannabis Smokers’ Blood on Per Se Drugged Driving Laws,” *Clinical Chemistry* 59, no. 3 (2013): 519–526.

Coast Guard Crew, Equipment, and Training

The motor lifeboat was fully manned with five qualified and current crewmembers consisting of the coxswain, engineer, and three crewmembers. The coxswain was qualified and current for motor lifeboat operations in heavy weather.

An additional four Coast Guard crewmembers, referred to as “break-in crew,” were on board for training and qualification experience. The recovery of the *Orin C* captain onto the motor lifeboat was challenging due to his size and body weight. It might have proved more difficult had the break-in crew not been aboard the motor lifeboat to assist.

Training records were provided to the NTSB for the nine Coast Guard crewmembers. All training records were found to be current and in accordance with Coast Guard requirements. According to the records, all five regular crew were listed as being up to date with first-aid and CPR training, with refresher training being completed on August 8, 2015. The Coast Guard requirements for first-aid training for boat crews focused on basic level treatment of injuries such as burns, hypothermia, shock, bleeding, and CPR. CPR protocols were in accordance with the American Heart Association guidelines.

The records for the August 2015 training also noted that four of the permanently assigned boat crewmembers as well as a break-in crewmember had also covered a practical application of the automated external defibrillator (AED). It was not known by the helicopter crew, nor was it asked or communicated, that five of the crew on board the motor lifeboat had familiarization training in the use of an AED.

It is unlikely, however, that use of an AED would have changed the outcome in this case. An AED is used to treat the absence of a pulse from a fast and irregular heart rhythm known as ventricular tachycardia/fibrillation. In a study of drowning-related cardiac arrests, ventricular tachycardia/fibrillation was the initial heart rhythm in only 3 percent of the cases, and only a third of those with this initial rhythm survived.⁸

Investigators boarded motor lifeboat 47259 to examine the vessel after the accident. In the survivors’ compartment, a First-Aid and Trauma (FAT) kit containing advanced emergency first-aid equipment (including an oxygen tank with tubing and masks, airway suction, clearing, and supply materials) was secured to the bulkhead. In accordance with the *US Coast Guard Addendum to the United States National Search and Rescue Supplement*, a “search and rescue unit (SRU) crew shall be able to correctly operate all equipment provided on their vessels, aircraft, or land vehicles to aid a person or property in distress.”⁹ However, none of the crew on board had the training to use much of the equipment in the FAT kit.

Coast Guard officials, referencing the Coast Guard *Emergency Medical Services Manual*, stated that boat crews are supplemented with EMT-trained personnel when responding to designated medical emergencies.¹⁰ At the time the motor lifeboat was dispatched to aid the *Orin C*, the mission was to assist a stricken fishing vessel; there were no reports of injuries or specific medical requests. Coast Guard watchstanders at Sector Boston had asked if there were any injuries before dispatching the motor lifeboat to the area, to which they received a response

⁸ Dyson, Kylie, Ameer Morgans, Janet Bray, Bernadette Matthews, and Karen Smith, “Drowning related out-of-hospital cardiac arrests: Characteristics and outcomes,” *Resuscitation* 84, no. 8 (2013): 1114–8.

⁹ US Coast Guard, *US Coast Guard Addendum to the United States National Search and Rescue Supplement*, Commandant Instruction M16130.2F (Washington, DC: US Department of Homeland Security, 2013), page 40.

¹⁰ US Coast Guard, *Emergency Medical Services Manual*, Commandant Instruction M16135.4 (Washington, DC: US Department of Transportation, 1992).

that there were not. The need for medical treatment was not known until the time of the recovery of the crewmembers from the sinking vessel.

A Coast Guard response boat may be called on to provide medical assistance at any time, including during training missions. Conditions may preclude transferring medically trained personnel during a rescue, as was the case during this accident. It is unclear if the presence of a crewmember with advanced first-aid training on board the motor lifeboat would have changed the outcome of this accident; however, the NTSB concludes that having a crewmember with training adapted to the types of medical emergencies expected in a marine environment and the specific equipment on board response boats would enhance the Coast Guard's preparedness to respond to developing medical emergencies. Therefore, the NTSB recommends that the Coast Guard ensure that, at all times, at least one crewmember on board each type of response boat is adequately trained in the types of medical emergencies expected in a marine environment and qualified in the use of all first-aid and/or trauma equipment carried on board.

Coast Guard response boats vary in size and area of operation in relation to shore-based emergency medical services. Larger boats, like the 47-foot motor lifeboat in this case, can operate up to 50 miles offshore where life support activities may be required for an extended time. To ensure that FAT kits contain the equipment needed for expected medical emergencies and that crewmembers are adequately trained to use the equipment, kits should be standardized by the type and range of the response boat on which they are carried. However, when Coast Guard policies related to contents of the FAT kit were reviewed by NTSB investigators, they could not find any detail or standard for these kits on any type of response boat. The NTSB concludes that no standard exists for FAT kit contents on Coast Guard response boats. Therefore, the NTSB recommends that the Coast Guard develop a standard for the contents of FAT kits for each type of Coast Guard response vessel.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the sinking of the *Orin C* was the structural failure of the disabled vessel's wooden hull and subsequent flooding of the vessel while being towed in adverse conditions.

Recommendations

As a result of its investigation, the National Transportation Safety Board makes the following recommendations to the US Coast Guard:

1. Ensure that, at all times, at least one crewmember on board each type of response boat is adequately trained in the types of medical emergencies expected in a marine environment and qualified in the use of all first-aid and/or trauma equipment carried on board. (M-17-6)
2. Develop a standard for the contents of First-Aid and Trauma (FAT) kits for each type of Coast Guard response vessel. (M-17-7)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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EARL F. WEENER
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Adopted: February 15, 2017

Vessel Particulars

Vessels	<i>Orin C</i>	47259
Owner/operator	Orin C LLC	US Coast Guard
Port of registry	Gloucester, Massachusetts	Gloucester, Massachusetts
Flag	United States	United States
Type	Fishing vessel	Motor lifeboat
Year built	1976	1997
Official number (US)	573869	N/A
Construction	Wood	Aluminum
Length	51 ft 5 in (15.1 m)	47 ft 11 in (14.6 m) (without rub rails)
Draft	5 ft 1 in (1.6 m)	4 ft 6 in (1.4 m)
Beam/width	16 ft 1 in (4.9 m)	15 ft (4.6 m)
Gross and/or ITC tonnage	28 gross tons	20 gross tons
Engine power	300 SHP (221 kW)	435 BHP (324 kW) at 2,100 rpm
Propulsion	1 x Detroit Diesel	2 x Detroit Diesel
Persons on board	3	9

NTSB investigators worked closely with our counterparts from Coast Guard Sector Boston and Station Gloucester throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA16PM008.

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under 49 *United States Code* 1131. This report is based on factual information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, “[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” 49 *Code of Federal Regulations*, Section 831.4.

Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *United States Code*, Section 1154(b).