National Transportation Safety Board

Marine Accident Brief

Flooding and Sinking of Fishing Vessel *Ben & Casey*

Accident type	Flooding	**No.**	DCA18FM004
Vessel name	*Ben & Casey*		
Location	Gulf of Mexico, about 6 miles* east of South Padre Island, Texas 26°6.79' N, 97°3.45' W		
Date	October 30, 2017		
Time	About 2215 central daylight time (coordinated universal time – 5 hours)		
Injuries	None reported		
Property damage	$191,000 est.		
Environmental damage	None reported; 7,400 gallons of diesel, 50 gallons of hydraulic oil and lube oil on board; some floating debris noted near site of sinking		
Weather	Clear visibility, winds south at 5 knots, air temperature 77°F, water temperature 80°F		
Waterway information	Open waters of the Gulf of Mexico; water depth about 62 feet at accident site.		

About 2215 on October 30, 2017, the shrimp trawler *Ben & Casey* sank in the Gulf of Mexico about 6 miles off South Padre Island, Texas. The vessel was outbound to fishing grounds when it lost propulsion and seawater flooded into its freezer hold. The crew broadcast a distress call, and responding Coast Guard personnel assisted the crew in dewatering the vessel. They were unable to control the flooding, so the crew boarded a Coast Guard vessel. A Good Samaritan vessel then attempted to tow the *Ben & Casey*, but water ingress increased. The towline was cut, and the trawler sank soon after. No one was injured during the accident; no pollution was reported. The *Ben & Casey*, valued at $191,000, was lost.

***Ben & Casey* with Coast Guard response vessel on the accident date. (Photo by Coast Guard)**

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

Background

The uninspected fishing vessel *Ben & Casey* was built in 1978 by Marine Mart, Inc. in Port Isabel, Texas. The 68-foot-long trawler had a steel hull with a single-level wheelhouse and accommodation area forward on the main deck. Trawling gear, a deck work area, and accesses to a freezer hold and the lazarette were aft of the deckhouse.

Shaftway of *Jake M*, vessel with identical shafting to *Ben & Casey*, as viewed from freezer hold, facing aft.

In the engine room below the main deck, the *Ben & Casey* had a single 402-horsepower diesel engine for propulsion and two diesel generators for electrical power. A 4-inch diameter propeller shaft was coupled to the main propulsion engine via a reduction gear. From the reduction gear, the shaft ran aft through a non-watertight bulkhead to a "shaftway" that was located beneath the freezer hold. The shaft ran the length of the shaftway then penetrated the hull through a watertight seal at the aft end of the shaftway. According to the owner and the captain of the vessel, the shaftway could be accessed from the freezer hold by removing floor panels at the bottom of the hold. The shaft terminated at the propeller, which was located just forward of the vessel's single rudder.

Three bilge pumps were installed in the *Ben & Casey*'s engine room. Two pumps were electrically driven pumps and had 2-inch suction and discharge piping located within the engine room. The third pump, which the owner stated was a back-up to the electric pumps, was driven from a power take-off on the main engine and likewise had suction piping in the engine room. To operate this pump, a drive belt had to be physically installed between the power take-off and the pump.

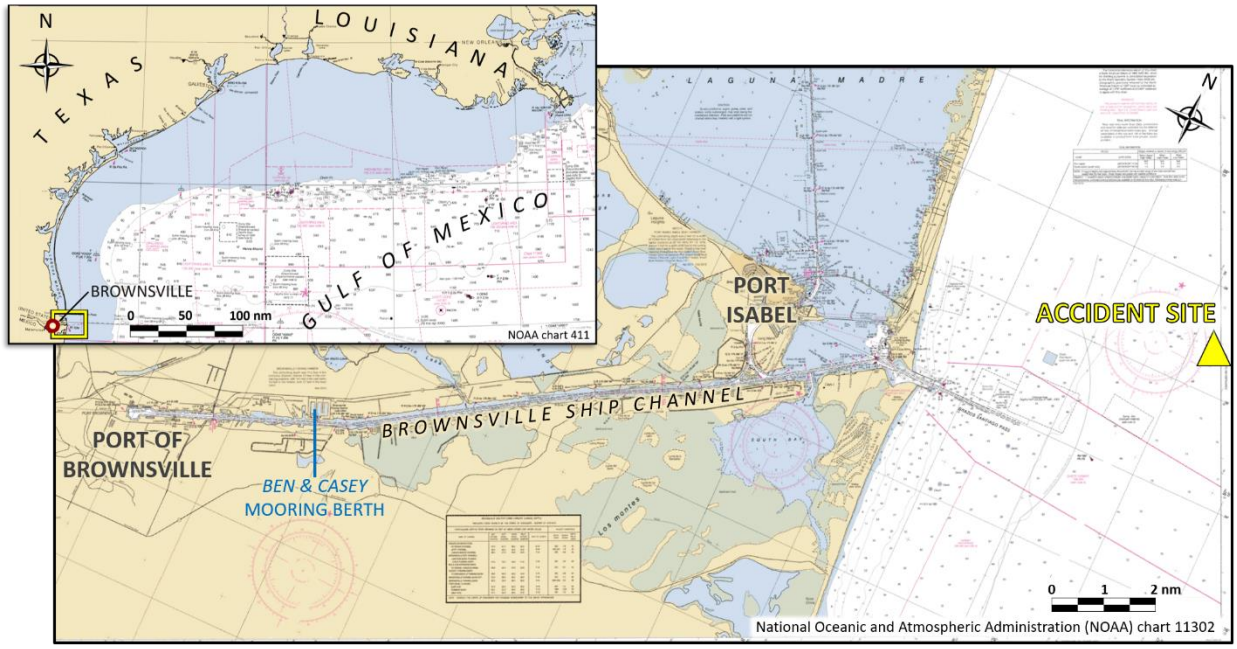
Accident Events

On October 30, 2017, the *Ben & Casey* departed its homeport of Brownsville, Texas, with four crew on board—a captain, a rigman, and two deckhands—to trawl for shrimp off the coast of Texas. The vessel's freezer hold was empty, except for food provisions for the crew, and the fuel tank had about 7,500 gallons of diesel. The captain, who was at the helm in the wheelhouse, intended to take the vessel about 25 miles offshore to begin trawling.

While the *Ben & Casey* was still outbound toward the fishing ground, the crew heard an unusual noise from below deck, but they did not investigate the noise because they thought it was the freezer compressor. Then, when the vessel was about 6 miles offshore, the crew heard a loud noise from below. The captain told investigators that at the same time, about 1805, the main engine rpm quickly rose from 1400 to 1800, the vessel lost propulsion thrust, and a bilge high-water alarm

sounded on the bridge. According to the owner and the captain, there were bilge alarms in both the engine room and the shaftway, but investigators could not determine which alarm sounded during the accident. The captain and the rigman went to the engine room and freezer hold to investigate. In the freezer hold, they found about 6 inches of water above the deck. Lifting the shaftway access floor panels, they found water entering the hold at the aft end of the shaftway, near the shaft packing seal. However, they could not visually see the shaft through the rising water. In the engine room, the captain and rigman found all equipment operating normally, but water was entering the engine room from the shaftway via the non-watertight bulkhead penetration for the propeller shaft.

The captain turned on both electric bilge pumps. The pumps could be aligned to take suction from the engine room and the shaftway, but it was unclear how the pumps were aligned. Although the bilge pumps appeared to be working, when he returned to the freezer hold the captain found that the water level was now more than a foot above the deck. Realizing that the flooding could not be controlled, he returned to the wheelhouse to make a distress call over VHF radio.

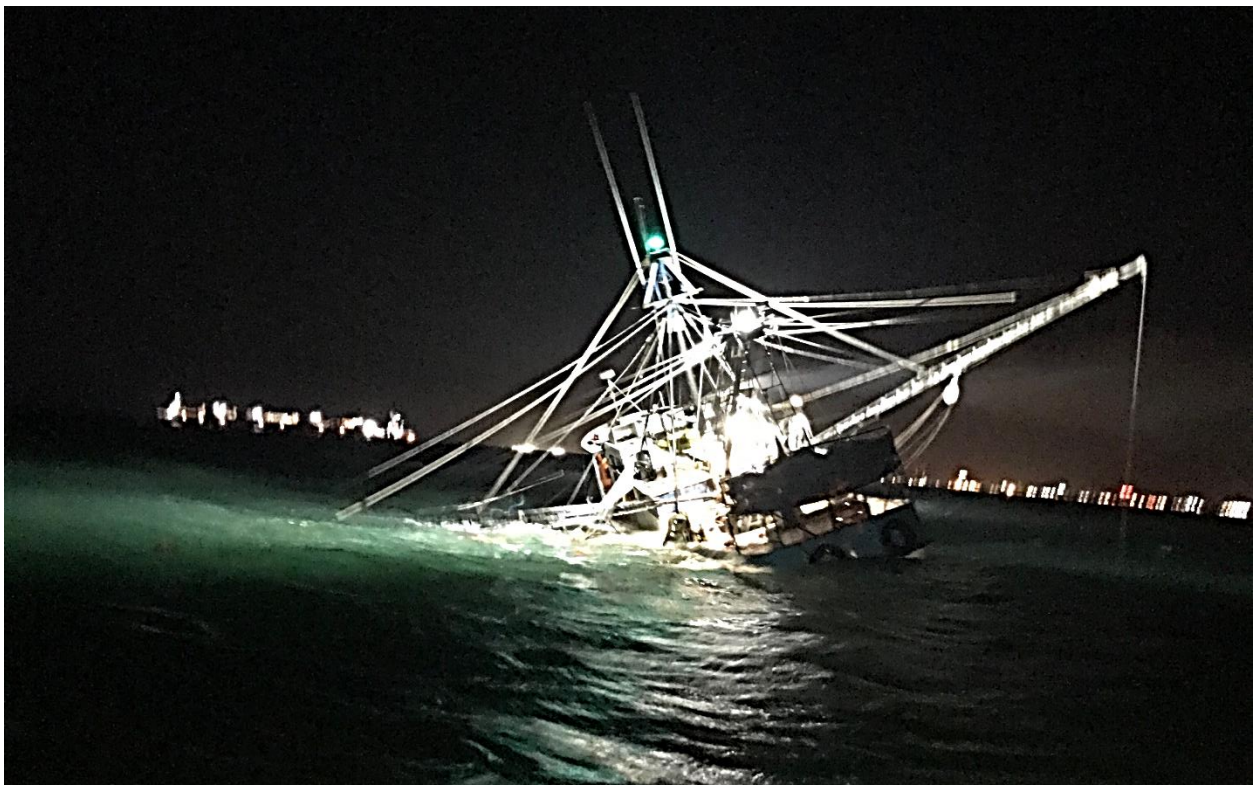


The accident site. (Adapted from National Oceanic and Atmospheric Administration [NOAA] charts 411 and 11302).

The Coast Guard received the distress call at 1820 local time, and the Coast Guard cutter *Alligator* responded along with a small boat from Coast Guard Station South Padre Island, arriving on scene at the *Ben & Casey*'s location at 1850. Upon arrival, Coast Guard crewmembers from the small boat transferred two dewatering pumps to the trawler. The pumps were set up on the main deck, suction hoses were rigged to the freezer hold, and the pumps were started. However, the captain told investigators that they could not get the pumps to take suction. Three Coast Guard crewmembers eventually boarded the trawler to assist with the pumps, but the pumps had become clogged with debris from the hold, and further efforts to gain suction were unsuccessful. With water rising in the vessel, the *Ben & Casey* and Coast Guard crewmembers evacuated to the Coast Guard small boat for safety.

At 2015, crewmembers from the *Alligator* boarded the *Ben & Casey* with a peri-jet eductor to make a second attempt at dewatering the vessel.[1] Shortly thereafter, a Good Samaritan vessel, the trawler *Blood and Guts*, arrived on scene and passed a tow line to the *Ben & Casey*. Once the line was secured between the stern of the *Blood and Guts* and the bow of the *Ben & Casey*, the *Blood and Guts* began to tow the stricken vessel toward port. However, once the tow commenced, flooding increased in the *Ben & Casey*. Ten to fifteen minutes later, the towline was cut, and the *Alligator* crewmembers disembarked the vessel.

The vessel developed a severe list to port, then began to founder by the stern. At 2215, the vessel fully submerged. The crew of the *Ben & Casey* was returned to shore by the Coast Guard small boat.



***Ben & Casey* just prior to sinking. (Photo by Coast Guard)**

[1] Peri-jet eductors are dewatering devices that use pressurized water (usually supplied by a separate pump) and internal nozzles (jets) to create a venturi within the device. The venturi provides a suction head for dewatering a space. Due to their construction, eductors are less prone to clogging from debris.

Additional Information

The captain, who spoke to investigators through an interpreter, stated that he had been working on the *Ben & Casey* since at least 2005. It was unclear from the interview whether he had been captain of the vessel for the entire time. The rigman had been working on fishing vessels for 16 years as a rigman or deckhand. The deckhands on the trawler were not available for interview. The owner stated that crewmembers on his vessels received safety orientations, captains were trained as drill conductors, safety drills were regularly conducted, and "we refresh [safety equipment] every year."

Additionally, the owner told investigators that maintenance on the *Ben & Casey* was done on an as-needed basis. During each voyage, the captain was instructed to make a list of problems and other work that needed to be addressed when the vessel was in port. The owner provided investigators with samples of work lists generated during previous voyages. The rigman stated that he and the captain checked the list from the prior voyage before getting under way for the accident voyage, and all items had been addressed. According to the captain, the crew also checked the vessel's shaft seal for water leaks prior to getting under way and "one or two or three times" while the vessel was under way. He stated that they found no leakage during the accident voyage. The owner said that there were no issues with the vessel prior to the accident, nor were there any recent events such as groundings, collisions, noise, or vibrations during previous voyages.

The owner stated that each of his vessels was hauled out of the water every 3–4 years for major maintenance to the hull and machinery. The *Ben & Casey* was last hauled out in March 2014 and relaunched the next month, according to shipyard records. During the haul out, nineteen 5/16-inch steel doubler plates were welded to the hull as patches. The trawler's hull was scraped, wetblasted, pressure washed, primed, and painted. The rudder was removed, bearings were replaced, the rudder stuffing box was repacked, and the rudder was reinstalled. The propeller shaft was also removed and visually inspected. Areas on the ends of the shaft that were worn and grooved were built up and turned down to restore the shaft to its original 4-inch diameter.[2] The shaft was also straightened before being reinstalled, and the shaft seal was repacked. Finally, numerous zinc plates and bars were installed or replaced along the hull to prevent metal deterioration from electrolysis.

Investigators visited the marine facility where the *Ben & Casey* was hauled out in 2014. According to the facility's vice president and operations manager, during a typical vessel haul out, shafting would be visually inspected for wear and surface cracks, but no other testing would be performed to determine if the metal was fatigued. He also stated that when he had looked at propulsion shafts that had sheared on other fishing vessels, the sheared areas appeared to have been "cut with a butter knife;" that is, the breaks were smooth. This indicated to him that the failures were due to metal fatigue.

Analysis

The loss of propulsion and the immediate increase in engine rpm reported by the captain just after the crew heard the loud noise suggest that the propeller shaft on the *Ben & Casey* sheared.

[2] Building up and turning a metal shaft is a process in which metal filler is added to worn areas of the shaft and then the shaft is placed in a lathe which spins or "turns" the shaft to allow a cuttting bit to remove excess metal filler and provide the shaft with a uniform diameter.

(The unusual noise prior to the louder noise may have been the shaft turning out of balance as it began to shear.) Once the shaft completely sheered, it is likely that either the weight of the propeller caused the shaft to partially back out of stern tube or that excessive movement of the shaft in the stern tube seal allowed water to enter the hull.

Generally, mechanical shafts shear due to either an overload on the shaft or metal fatigue. An overload shear can happen nearly instantaneously as a result of the load increasing past the designed strength of the shaft. Fatigue shears, on the other hand, occur over time as the result of a high number of revolutions on the shaft. Scoring lines form due to rotational friction-related processes found near strut bearings and shaft seal journal surfaces and become potential sites for fatigue crack initiation. Corrosion of the shaft can also expedite the process leading to a fatigue shear.[3] The *Ben & Casey* was 39 years old at the time of the sinking and, although the owner stated that he believed the propeller shaft had been changed out, investigators were not provided any documentation as to when or if the shaft was replaced. The crew did not indicate any change in operation that would have resulted in an increase in the shaft load during the transit, and thus investigators believe that the shearing of the trawler's shaft was likely due to metal fatigue.

During the investigation, the NTSB considered other sources of flooding, such as leaks in hull plating. There were no through-hull fittings in the freezer hold. Metal wastage is a concern in older vessels, and the *Ben & Casey* was nearly 4 decades old. However, the owner's practice of regularly hauling out the vessel, repairing and repainting the hull, and installing zinc plates and bars—as confirmed by shipyard records—indicates that sufficient action was being taken to address wastage. Although the captain did not see the shafting (or lack thereof) during the accident events and could not confirm that it had sheared, the location of water ingress from the shaftway into the freezer hold, and the lack of any other through-hull fittings in the freezer hold, further supports a determination of a shaft casualty vice a leak in the hull due to wastage.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the flooding and sinking of the fishing vessel *Ben & Casey* was a sheared propeller shaft that allowed water ingress into the hull through the shaft seal.

Recognizing Metal Fatigue in Propeller Shafting

This accident is similar to the sinking of the fishing vessel *Lady Gertrude* on August 15, 2016. In the *Lady Gertrude* accident, investigators determined that the propeller shaft had sheared near the shaft seal. The resulting opening allowed water ingress that exceeded the vessel's bilge pumping capacity. Vessel owners and operators should be aware of the limitations of visual inspections in determining the condition of shafting and should consider the use of periodic non-destructive testing as a tool to identify metal fatigue.

[3]Sachs, Neville, "Root Cause Failure Analysis – Understanding Mechanical Failures," *Plant Maintenance Resource Center*, www.plant-maintenance.com, revised 2015.

Vessel Particulars

Vessel	*Ben & Casey*
Owner/operator	POC-TAL Trawlers, Inc.
Port of registry	Brownsville, Texas
Flag	United States
Type	Fishing vessel
Year built	1978
IMO number	7832189
Classification society	N/A
Construction	Steel
Length	68 ft (20.7 m)
Draft	12 ft (3.7 m)
Beam/width	20 ft (6.1 m)
Gross tonnage (Domestic)	118 GRT
Engine power; manufacturer	402 hp (272 kW) Caterpillar 3408 marine diesel engine
Persons on board	4

NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Detachment Brownsville throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA18FM004.

Issued: November 1, 2018

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 Title 49 *United States Code*, Section 1131(b)(1). 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." Title 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. Title 49 *United States Code*, Section 1154(b).