



National Transportation Safety Board

Marine Accident Brief

Collision between US Coast Guard Cutter *Key Largo* and Fishing Vessel *Sea Shepherd*, with Subsequent Sinking of *Sea Shepherd*

Accident no.	DCA14PM019
Vessel names	<i>Key Largo</i> and <i>Sea Shepherd</i>
Accident type	Collision and subsequent sinking of the <i>Sea Shepherd</i>
Location	Virgin Passage, 9 miles east-northeast of Vieques Island, Puerto Rico; 18°11.12' N, 65°07.87' W; about 65 miles southeast of San Juan, Puerto Rico*
Date	September 23, 2014
Time	0635 Atlantic standard time (coordinated universal time – 4 hours)
Injuries	None
Property damage	Total loss of the <i>Sea Shepherd</i> , valued at \$200,000
Environmental damage	None reported; an estimated 250 gallons of diesel fuel and 2 gallons of lubricating oil sank with the <i>Sea Shepherd</i>
Weather	Visibility 6 miles, east winds at 11 knots gusting to 16 knots, seas at 2.6–3 ft
Waterway information	Open waters of the Caribbean Sea

On September 23, 2014, about 0635, the 110-foot-long US Coast Guard cutter *Key Largo* collided with the 42-foot-long fishing vessel *Sea Shepherd* in the Virgin Passage, about 9 miles east-northeast of Vieques Island, Puerto Rico. Just before the collision, the two *Sea Shepherd* crewmembers, who were hauling lobster traps on board, jumped in the water. No one was injured. The *Key Largo* sustained minor damage; the *Sea Shepherd* sank about 2 hours after the collision.



Coast Guard cutter *Key Largo*. (Photo by Coast Guard)

* Unless otherwise noted, all miles in this report are nautical miles (1.15 statute miles).

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Satellite image of the accident area, with the collision site overlaid by a red triangle. (Background by Google Earth)

Accident Events

The *Sea Shepherd* crewmembers (a captain, who was also the vessel owner, and a mate) told investigators that they had departed the Saga Haven Marina on southeast St. Thomas, US Virgin Islands, about 0435 on the morning of the accident. They planned to work 5 lines of lobster traps.

Around 90 minutes later, about sunrise, the *Sea Shepherd* was roughly 9 miles east-northeast of Vieques Island, Puerto Rico, and was stopped while retrieving a line of traps. The two crewmembers saw a Coast Guard vessel in the far distance on a course toward their vessel. The captain told investigators that he was not concerned about the approaching vessel because he thought that the Coast Guard intended to board the *Sea Shepherd* and examine it. The captain placed the engine in neutral to let the fishing vessel drift, and he and the mate continued working on the lobster traps.

The *Key Largo* had left the island country of St. Maarten at 1020 the previous morning, September 22. Its crew planned to meet a Dutch Caribbean Coast Guard cutter for a joint exercise at 0900 on September 23, south of St. Thomas.¹ The *Key Largo* briefly refueled in St. Thomas on the evening of September 22 and, about 1910, continued south and then southwest toward Vieques Island.

¹The Dutch Caribbean Coast Guard or DCCG is the coast guard of the Kingdom of the Netherlands in the Caribbean.

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On the morning of the accident, the *Key Largo* was patrolling a 5-by-10-mile area off the east end of Vieques Island. The cutter's officer of the deck (OOD) took the watch at 0513 and was to be relieved at 0800. He and the quartermaster of the watch (QMOW) were the only crewmembers on the navigation bridge watch. The OOD told investigators that in the moments leading up to the collision he became concerned as to the whereabouts of the QMOW. He said that the QMOW had left the bridge shortly before the collision to complete a safety assignment—observing the engineer of the watch (EOW) make a round of the aft main deck—but had not returned within the expected timeframe. The OOD told investigators that he eventually walked toward the door on the bridge's rear starboard side to call out to the QMOW. He said that as he opened the door he saw the *Sea Shepherd* in the corner of his eye, about 100–150 feet in front of the cutter.

The *Sea Shepherd* captain told investigators that he and the mate kept an eye on the cutter as it continued to approach their vessel. The *Sea Shepherd* did not attempt to contact the Coast Guard cutter via radio prior to the collision. The captain and the mate had pulled 7 traps on board of a trawl of 15 when the cutter closed to about 50 feet from the *Sea Shepherd*'s starboard side without having slowed down or changed course. The captain realized that the *Key Largo* was going to strike the *Sea Shepherd*, and he and the mate jumped overboard at the stern just before impact. Had the captain radioed the cutter or sounded the danger signal (5 short blasts of an appropriate sound-signaling device) at any time before the accident became inevitable, there may have been sufficient warning to avoid the collision.

The OOD told investigators that he saw the two men jump from the *Sea Shepherd*'s stern and quickly assessed his options. He said that he decided not to change course to port, which would have made the cutter go astern of the *Sea Shepherd*, as doing so risked striking the two people in the water. He also decided not to change course to starboard, believing that the cutter might not clear the fishing vessel's bow because of the *Key Largo*'s slow rate of turn to starboard (the cutter was running solely on the starboard engine). Instead, the OOD said that he maintained the same course and attempted to slow the cutter by putting the engine in full reverse. However, his effort was not enough to avoid the collision. About 0635, the *Key Largo* struck the starboard side of the *Sea Shepherd*, pushing the fishing vessel sideways 50–70 feet before the two vessels separated. Data from the shipboard command and control system, captured at 1-minute intervals, showed that the *Key Largo* was on a steady course of 110 degrees (east-southeast) at a speed of 9.7 knots prior to the collision.

After both vessels had come to a stop, the *Key Largo* crew pulled the *Sea Shepherd* captain on board the cutter. The mate swam back to the *Sea Shepherd* to retrieve personal belongings and navigation gear. He also placed the lobster traps remaining on board in the water. A small boat from the *Key Largo* then transported the mate from the *Sea Shepherd* to the cutter.

The *Sea Shepherd* sustained a 4-inch-wide vertical fracture on the starboard side just aft of the raised cabin, running from the top of the deck to below the waterline. A *Key Largo* machinery technician was sent over to assess the damage and found that all of the *Sea Shepherd*'s compartments were flooded. About 2 hours after the collision, the *Sea Shepherd* sank.

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Postaccident photo of *Sea Shepherd* with the vertical hull fracture visible on the vessel's starboard side. (Photo by Coast Guard)

Accident Analysis

The *Key Largo* OOD told investigators that leading up to the collision he was transiting directly toward the sun, which he characterized as “annoyingly bright.” Astronomical data reviewed by investigators confirmed that the sun was just off the bow and near the horizon (sunrise was at 0610), and the glare off the water would have made it more difficult to identify vessels immediately ahead. The OOD could have mitigated risk by changing course away from the line of the sun, assigning the QMOW as lookout, or adding another crewmember to the bridge watch as lookout. The OOD may have been reluctant to change course because turning perpendicular to the seas would have made for a rougher ride for sleeping crewmembers, and putting the sun at his back would have forced him to leave the patrol area, which required the commanding officer's permission. Reducing speed was not an option to mitigate the risk because the cutter was operating on one engine at its lowest cruising speed.

The OOD said that, because of the bright sun in his eyes, he relied heavily on the cutter's radar. However, in the time leading up to the accident, the OOD stated that the *Sea Shepherd* did not appear on the screen (he did not consult the cutter's second radar during this period). Crewmembers did not identify any issues with the radar, and it functioned normally during operations after the accident, including during the cutter's return transit to San Juan following the collision.

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It is possible that the *Sea Shepherd* was not detected by the radar due to the fishing vessel's fiberglass-reinforced plastic construction and relatively short height above the water. Coast Guard Safety Alert 04-97, issued on March 11, 1997, notes that "wood and fiberglass vessels make poor radar targets." Furthermore, under Coast Guard commercial fishing industry vessel regulations (28 CFR 28.235(b)), vessels like the *Sea Shepherd* are required to be fitted with radar reflectors to improve detectability. However, Coast Guard dockside safety examinations for commercial fishing vessels were not mandatory until 2015 (over a year after the accident), and the *Sea Shepherd* was not fitted with a reflector.

It is also possible that the *Sea Shepherd* did, in fact, display on the radar screen, but the OOD was not sufficiently monitoring the radar. Regardless of whether the vessel was displaying on the radar scope or not, the OOD was not standing an effective watch. The OOD told investigators that he normally stood an active watch, moving about the bridge and using all of the cutter's navigation equipment. Yet he said that leading up to the collision he spent much of the watch sitting. He also told investigators that in the 24-hour period before the collision he had slept only about 3.5 hours (he took a 1-hour nap the previous day and slept about 2.5 hours before assuming the watch). The OOD said that, due to personal and work-related stress, his mind was preoccupied and he was having difficulty sleeping.

Most people will experience fatigue with less than 8 hours of sleep in any 24-hour period; the less they sleep under 8 hours, the more fatigued they become. The amount of sleep that the OOD said that he received would have made it difficult for him to stay awake in the early-morning hours of his watch. Being seated and alone on the navigation bridge, the OOD would have had even more difficulty remaining awake. Given the OOD's lack of sufficient sleep and his actions prior to the collision (continuing a course and speed directly into a stopped vessel), the evidence suggests that he was likely asleep in the moments just prior to the accident.

Thinking about what could have been done to prevent the collision, the OOD said that he should have told the commanding officer about his stress and lack of sleep. In fact, he was required to do so. The commanding officer's *Standing Orders for the Officer of the Deck* stated:

- [OODs]...must be prepared mentally and physically for every watch you stand.
- Assure yourself as much rest as you can...Ensure your watchstanders are well-rested, in good health, and prepared for watch.
- If for any reason you feel that you are not prepared to relieve the watch, or that circumstances are such that you cannot accept responsibility for the ship, you shall notify me immediately.

The OOD was not asked to provide a reason for failing to inform the commanding officer, but he did provide investigators with information regarding the considerable personal and career-related stress that he was under at the time. This stress may have influenced his decision not to report his fatigue in the belief that failing to stand watch would have negative consequences.

Although the standing orders were clear about the commanding officer's expectations regarding crewmembers' fitness to stand watch, investigators also attempted to identify any Coast Guard policies or programs in place to mitigate fatigue in operational units. *Commandant Instruction 3500.2, Crew Endurance Management*, was issued on March 30, 2006, by the Coast Guard Office of Health, Safety and Work-Life. The Coast Guard had identified

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compromised endurance as an issue among operational personnel, including cutter crewmembers like the *Key Largo* watchstanders, and the instruction established the Crew Endurance Management (CEM) program to control risk factors, including insufficient daily sleep, work stress, family stress, and isolation from family.

As described in the *Commandant Instruction*, the CEM process

- a. advances a risk-based decision-making approach and tools that can be used at all levels of the organization to improve operational effectiveness and readiness by identifying and controlling hazards and improving human performance;
- b. promotes input and support from all levels of the work unit to build ownership in the process and commitment to the risk controls; and
- c. uses a systems approach to understand exposure to risk, and promotes systems-oriented solutions to managing risk.

The CEM program was not implemented on board the *Key Largo*, nor does it appear that the program has been implemented Coast Guard-wide. Because the CEM program was intended to be implemented based on the unique operating characteristics of each unit/vessel, it is not possible to determine how the program would have been implemented on board the *Key Largo* and whether it would have been able to prevent this accident. Nevertheless, it is disconcerting that the Coast Guard identified fatigue as well as other endurance risks and created a program to address these risks, but then did not implement the program throughout the Coast Guard as envisioned. The CEM program contains information that helps identify risks of fatigue and mitigate them; at a minimum, implementation of the program on the *Key Largo* would have provided its crew more awareness of fatigue risk. The NTSB concludes that the Coast Guard has not implemented the CEM program to mitigate fatigue and other crew endurance risks. Therefore, the NTSB recommends that the Coast Guard address the risks associated with watchstander fatigue by implementing the CEM program in all operational units.

Coast Guard Actions following the Accident

Following the accident, the *Key Largo* commanding officer updated his OOD standing orders to directly address fatigue and watchstanding procedures. His changes, dated November 6, 2014, included two amendments related to fatigue and one that put in writing the process that OODs and QMOWs should use when EOWs conduct the aft deck check. This process emphasized that OODs and QMOWs would maintain constant communication with each other. Specific changes were as follows:

- Added the following text (bold emphasis in original):

If you do not feel that you or any of your watchstanders can stand the watch due to fatigue CALL ME IMMEDIATELY. Do not allow your fatigue to place the safety of the ship in danger.

At no time shall you or the QMOW be seated during the watch.

- Incorporated a procedure for the QMOW to oversee the EOW:

Have the QMOW provide a watch over the EOW during their aft round and during boat checks. In order to maintain a proper lookout, the QMOW will head to the fly bridge such that they can maintain a 360° lookout. The door to the fly

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bridge will remain open during this period to ensure that communication is maintained between both the OOD and the QMOW.

On December 3, 2014, the Chief, Response Division, Seventh Coast Guard District (“District 7,” which includes Sector San Juan, where the *Key Largo* was based at the time) sent an e-mail to District 7 sector commanders addressing patrol boat bridge watches. The e-mail discussed the *Key Largo* collision and recommendations that resulted from the Coast Guard’s administrative investigation of the accident. In addition to other instructions, the e-mail directed sector commanders to have their patrol boat and cutter commanding officers review their standing orders to ensure compliance with “prudent watchstanding principles.”

Summary

Although the NTSB was unable to positively determine that the OOD fell asleep while on watch before the collision, the evidence indicates that it is likely. The accident occurred shortly after his circadian low (a time when people are most likely to be fatigued); he had only 3.5 hours of sleep in the preceding 24 hours; and he was seated alone on the navigation bridge. Further, there was no alteration in the vessel’s course or speed, nor was there radio communication with the *Sea Shepherd* or a collision alarm sounded before the accident. The *Sea Shepherd* should have been visible by radar or naked eye to the OOD for a considerable period of time prior to the accident despite the effects of the sun. The fact that the OOD was not able to identify the vessel until just before impact indicates poor watchstanding at a minimum, and it is likely that he fell asleep prior to the collision.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the collision between the Coast Guard cutter *Key Largo* and the fishing vessel *Sea Shepherd* was the failure of the cutter’s officer of the deck to detect and avoid the *Sea Shepherd*, most likely because he had fallen asleep prior to the accident. Contributing to the collision was the officer of the deck’s failure to report to the commanding officer his unfitness for duty due to lack of sleep.

Recommendation

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

Address the risks associated with watchstander fatigue by implementing *Commandant Instruction 3500.2, Crew Endurance Management*, issued on March 30, 2006, in all operational units (M-16-004)

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Adopted: 7/11/2016

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Vessel Particulars

Vessels	<i>Key Largo</i>	<i>Sea Shepherd</i>
Owner/operator	US Coast Guard	Island Trapping LLC
Port of registry	San Juan, Puerto Rico	St. Thomas, US Virgin Islands
Flag	United States	United States
Type	Coast Guard cutter	Provincial 42-ft fishing vessel
Year built	1988	1996
Official number	N/A	VI 3345 CA (Virgin Island number)
Construction	Steel	Fiberglass-reinforced plastic
Length	110.0 ft (33.00 m)	42.3 ft (12.7 m)
Draft	6.1 ft (1.8 m)	2.6 ft (0.8 m)
Beam/width	21.1 ft (6.3 m)	13.0 ft (3.9 m)
Gross and/or ITC tonnage	155 long tons	Unknown
Engine power; manufacturer	6,000 hp (4,474 kW); diesel; (2) Paxman Valenta @ 3,000 hp each	490 hp (365 kW) direct diesel; Cummins
Persons on board	17	2

NTSB investigators worked closely with our counterparts from Coast Guard Sector San Juan throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA14PM019.

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).