February 6, 2024 MIR-24-03

Capsizing and Sinking of Fishing Vessel *Hotspur*

On August 2, 2022, about 1955 local time, the fishing vessel *Hotspur* developed a list, capsized, and sank while transiting west through Dixon Entrance near Nunez Rocks, off the southern tip of Prince of Wales Island, Alaska.[1] The captain and four crewmembers abandoned the vessel to a liferaft and were rescued by two Good Samaritan vessels. There were no injuries. Multiple sheens were reported. The *Hotspur*, which was declared a total loss, had an estimated value of $1.2 million.

Figure 1. *Hotspur* pierside precasualty in Ketchikan, Alaska. (Source: US Coast Guard)

[1] (a) In this report, all times are Alaska daylight time, and all miles are statute miles. (b) Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA22FM033). Use the CAROL Query to search investigations.

Casualty type	Capsizing/Listing
Location	Dixon Entrance, near Nunez Rocks, 43 miles south-southwest of Ketchikan, Alaska 54°40.39' N, 132°5.19' W
Date	August 2, 2022
Time	1955 Alaska daylight time (coordinated universal time -8 hrs)
Persons on board	5
Injuries	None
Property damage	$1.2 million est.
Environmental damage	Multiple oil sheens reported (1,100 gallons diesel reported on board)
Weather	Visibility 10 mi, scattered clouds, winds west 6 kts, seas 4-5 ft, air temperature 58°F, water temperature 60°F, sunset 2234
Waterway information	Strait, about 50 mi wide, depth over 200 ft (at casualty location)

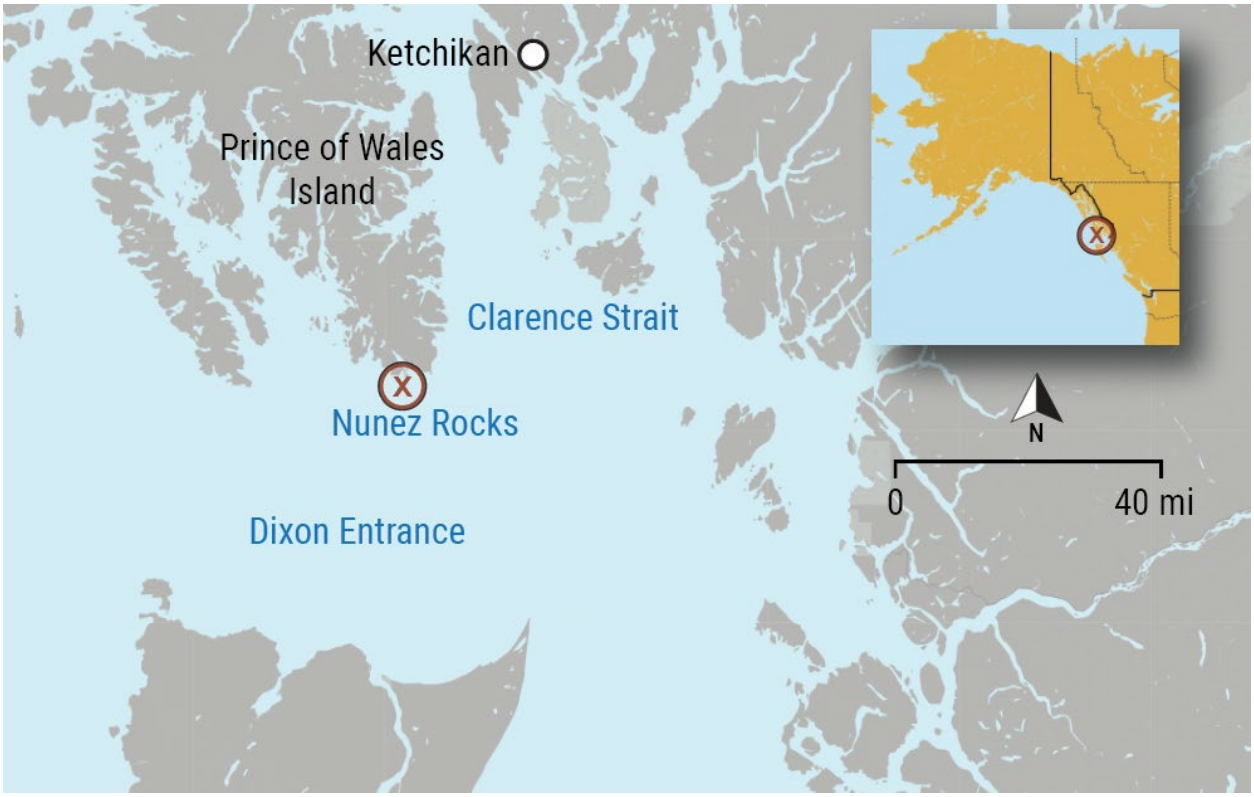

Figure 2. Area where the Hotspur sank, as indicated by a red X. (Background source: Google Maps)

1 Factual Information

1.1 Background

The 53-foot-long *Hotspur* was a steel-hulled, single propeller, commercial fishing vessel built by Workboats Northwest Inc., of Seattle, Washington, in 1988 (see figure 1). In 1995, Hotspur Inc. (a company owned by the captain of the vessel at the time of the casualty), acquired the vessel and outfitted it as a purse seiner.[2]

The vessel had a single fish hold that remained filled with seawater during transits. Outboard of the fish hold were void spaces and tanks. The vessel had six fuel tanks positioned outboard: two "day tanks" in the engine room, two "mid tanks" just aft of the day tanks separated by a watertight bulkhead, and two fuel tanks near the stern (see figure 3). The total carrying capacity of fuel oil was 8,000 gallons. There was one 100-gallon-capacity lube oil tank and one 150-gallon hydraulic oil tank in the engine room. The vessel had a single rudder and a single propeller driven via a reduction gear by a diesel engine rated at 1,050 hp.

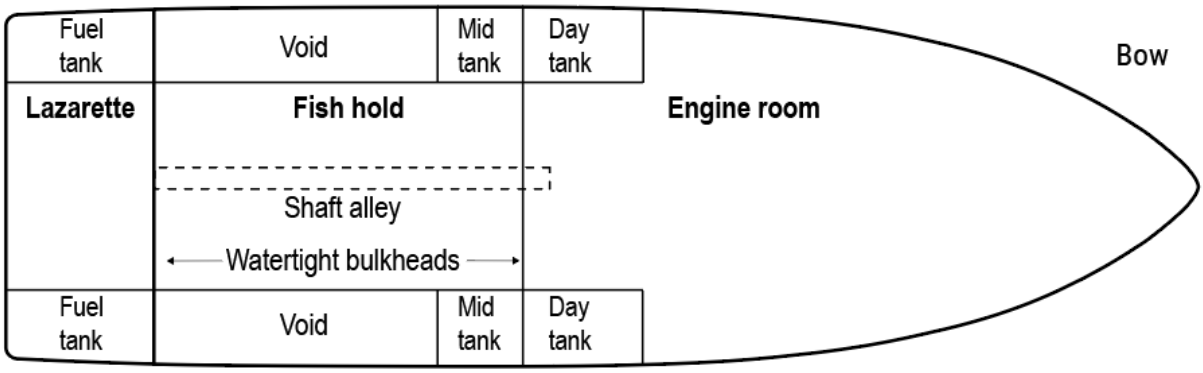

Figure 3. Layout of *Hotspur* lower level, based on owner's drawing (not to scale).

1.2 Event Sequence

On the afternoon of July 29, 2022, the *Hotspur* departed Port Townsend, Washington, loaded with purse seiner netting and tackle along with its 16-foot-long

[2] *Purse seiners* use a large wall of netting with floats on the top of the net and a lead line strung through rings at the bottom of the net. The net is deployed using a skiff and then circled around fish as they school or run. Once the fish are encircled, the lead line is drawn tight to close, or "purse," the bottom of the net, preventing the catch from escaping downward. The net is then pulled alongside the fishing vessel, where the fish are loaded into holds.

skiff on the stern; the main fish hold, a "wet hold," was completely filled with water. The captain told investigators that, when the fish hold was completely filled (with the fuel on board, skiff, and other loads at departure), there was usually at least 12 inches of freeboard from the stern deck (aft main deck) to the waterline.

In addition to the captain, the crew consisted of four deckhands (one senior deckhand, one deckhand, and two junior deckhands). The captain had 39 years of experience in the fishing industry and had been captain of the *Hotspur* for the last 27 years. The senior deckhand had about 2 years' experience in the industry and had spent the previous year's summer salmon season seining on board the *Hotspur*. This was the first trip on board the vessel for the three remaining deckhands. None of the crew were credentialed mariners.

The vessel traveled northward along the Inside Passage toward Ketchikan, Alaska, to fish for salmon (see figures 2 and 4). The captain stated they had "pretty nice weather" during their transit, and he decided to alter the desired destination from Ketchikan to Sitka, Alaska, which was about 180 miles farther. He indicated that the forecasted weather would allow for "a few more days to fish" and "a little bit easier fishing [at Sitka]."

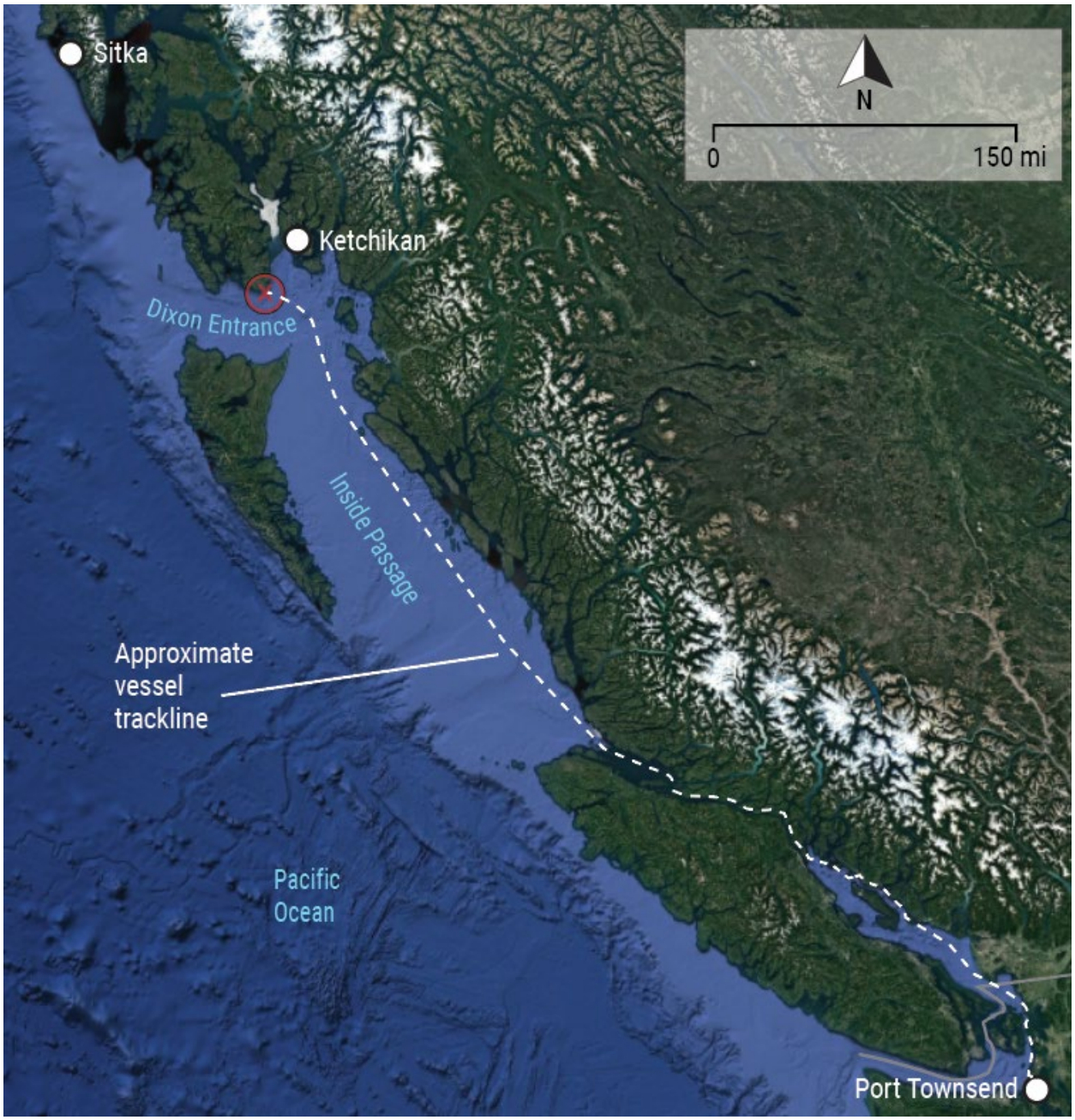

Figure 4. Approximate trackline of the *Hotspur*'s casualty voyage from Port Townsend toward Ketchikan, with the location where the sinking occurred, as indicated by a red *X*. (Background source: Google Earth)

Four days later, on August 2 about 1935, the vessel was crossing the Clarence Strait on a northwesterly course at 6 knots, with the captain and senior deckhand in the wheelhouse, when they noticed the vessel listing slightly to port. Due to the port list, the captain decided to go down to the engine room and check the bilges and fuel tank levels while the senior deckhand remained at the helm.

In the engine room, the captain tried to correct the port list by draining (gravity transfer) some diesel fuel oil out of the port mid tank to the starboard day tank. During the transfer, the captain checked the engine room bilge and day tanks and noted that "everything looked normal, the bilge and everything looked fine."

About 5 minutes into the fuel transfer, the senior deckhand noticed increased rolling to port. He saw the seas entering main aft deck via the freeing ports, submerging the vessel's port quarter. He left the helm to notify the captain in the engine room that "we're really listing now." They both made their way up to the wheelhouse, and the captain took control of the helm and "tried to turn the boat into the [list]." However, he told investigators that "it just kept going and going and going."

The captain recognized their dangerous situation and instructed the senior deckhand to alert the other crewmembers, who were in the galley at the time, to prepare the liferaft for abandoning ship. About 1930, the captain used a handheld VHF radio to broadcast a distress call on channel 16. The nearby fishing vessel *Lady Kodiak* and sport fishing vessel *The Codfather II* responded to the call and diverted to assist.

Meanwhile, the crew removed the liferaft canister from its cradle above the wheelhouse, tied off the painter for the liferaft to the portside midship area, and tossed the canister in the water. The captain arrived with the handheld radio and a box of flares and pulled the painter to inflate the liferaft.

The vessel continued to list to port. The captain held the liferaft to the side of the vessel while all four crewmembers entered it. About 1955, the captain entered the liferaft, and the *Hotspur* started to roll over. The captain ordered the crew to paddle away from the vessel, and he shot off a few signal flares.

Shortly thereafter, the *Lady Kodiak* and *The Codfather II* arrived on scene. According to the captain, the *Hotspur* turned completely upside down "within minutes" of abandoning the vessel, and he could see the propeller above the water. *The Codfather II* successfully retrieved all five crewmembers, and they were transported to Ketchikan.

The *Hotspur* sank in over 200 feet of water with 1,100 gallons of fuel oil on board. When he reported the casualty to the Coast Guard, the captain indicated all fuel tanks were less than half full at the time of the capsizing. It was declared a total loss, with a value estimated at $1.2 million. The captain stated that he did not know what caused the vessel to list and sink, since he was unable to determine the cause of

the list or find any flooding before being forced to abandon the vessel. The vessel was not salvaged.

There was no recorded AIS data for the casualty vessel voyage. The last AIS transmission received from the *Hotspur* by both terrestrial and satellite AIS receivers was on January 2, 2022.

1.3 Additional Information

1.3.1 Vessel Stability

Commercial fishing industry vessel stability regulations apply only to vessels 79 feet long or greater constructed or substantially altered on or after September 15, 1991. The *Hotspur* was less than 79 feet and therefore was not required to comply with any stability regulations, or the stability criteria referenced in them, or have a stability test. The captain did not have any training in trim and stability.

1.3.2 Bilge Alarms

According to the captain, the void spaces, lazarette, and engine room had bilge alarms, which sounded in the wheelhouse. The captain and crew also told investigators that all the void spaces and the lazarette had been checked for water and "sealed" (deck flush hatches secured prior to departure from Port Townsend). The captain stated the engine room bilge alarm had been tested right before departure from Port Townsend, but he could not remember the last time the bilge alarms in the lazarette or void spaces were tested. The senior deckhand told investigators he didn't hear any alarms until the vessel's port side was "submerged," and he heard a bilge alarm. He did not know which bilge alarm was sounding.

The Coast Guard last conducted a dockside safety examination of the *Hotspur* in March 2015.[3] During the 2015 examination, the Coast Guard tested all bilge alarms and found them to be in satisfactory working condition. They noted no deficiencies.

[3] Under the Coast Guard Authorization Act of 2010, commercial fishing vessel safety examinations are required once every 5 years for fishing vessels that operate 3 nautical miles beyond the shore. These examinations help ensure that all the required safety equipment and systems on board are in serviceable condition; examinations do not include the hull, electrical systems, or machinery as required for Coast Guard-inspected vessels.

1.3.3 Vessel Maintenance

The vessel had been hauled out of the water three times for general maintenance and repair in 2022. The first time, in March 2022 in Port Townsend, was a scheduled haul out that included chipping and painting the hull, pulling the main propulsion shaft, repairing the rope guard, and installing a new chiller and associated condenser pump. Shortly after the vessel was relaunched, the sea chest valve for the condenser pump was damaged, requiring the vessel to be hauled out again in Seattle. The third haul out was due to a hull puncture near the transducer box's shell plating in early July. The captain was cleaning the engine room bilge, breaking up sludge near the fathometer transducer box, when he poked a hole in the hull. The hull was repaired about 3 weeks before the casualty voyage with a new steel insert plate, 8 inches by 5 inches.

2 Analysis

On the evening of August 2, the fishing vessel *Hotspur* was transiting west through Alaska's Dixon Entrance when it developed a port list, capsized, and sank.

When the vessel first listed, the captain checked the engine room and did not see any flooding. The fish hold was full of water at departure, and the captain had checked the fuel tank levels and found nothing abnormal, leaving the source of water ingress limited to the port and starboard void spaces or the lazarette. Because the senior deckhand did not see any engine room flooding or experience a loss of steering or unintended reduction in speed, investigators ruled out a failure or issue with the vessel's rudder stock or propeller and shafting (which would have allowed water to enter the shaft alley and then the engine room). Therefore, the list was likely a result of flooding into the lazarette (which would have allowed flood water to shift to the port side) or into the port void space.

Because the *Hotspur* was not salvaged, a postcasualty vessel examination could not be performed to determine the material condition of the hull and structure, and therefore a possible source of the flooding. The captain and crewmembers said they were not aware of any damage to the vessel along the transit. However, the hull plating in the engine room had corrosion and wastage that required repairs 3 weeks before the voyage. Without evidence that the vessel was damaged or that flooding originated from another source, it is possible that the flooding was caused by deterioration of the hull plating in another area, which went undetected.

The captain and senior deckhand first noticed a list about 1935, and the vessel capsized and sank about 1955. The captain and senior deckhand did not hear bilge alarms in the wheelhouse before the vessel list became severe—meaning the bilge high-level alarms in the port void space or the lazarette (the most likely areas of flooding) were most likely inoperative. Had the bilge alarm systems in these spaces been operable, the crew would have been alerted and could have taken earlier action.

Stability is the tendency of a vessel to return to its original upright position when a disturbing force (e.g., wind or wave) is removed. Vessels are often termed "stable" when they have enough positive stability to return to an upright position in the conditions encountered as loaded and "unstable" (negative stability) when they do not, and capsize. The short time between the captain first noticing a list and the vessel capsizing indicates that the vessel had limited stability while underway immediately before the casualty.

Because the *Hotspur* was less than 79 feet, it was not subject to Coast Guard commercial fishing vessel stability requirements. Regulatory stability criteria set numeric bounds for a vessel's stability, as determined through a set of calculations that account for the vessel's physical characteristics. Because the current regulatory stability criteria were developed for vessels of 79 feet or longer, these criteria would not necessarily be appropriate for the smaller, 53-foot-long vessel.[4] A margin of safety is built into the stability criteria to accommodate forces that can act on a vessel, such as rolling in waves, heeling due to wind, or some cargo movement. Because of this margin of safety, a vessel may be functionally stable even if it does not meet the criteria.

The vessel was also not required to have stability instructions (trim and stability booklet) on board, as would be typically required of a vessel subject to a regulatory stability standard.[5] Without stability calculations and stability instructions, a vessel's operator has limited understanding of the vessel's center of gravity. In this case, without stability instructions providing the crew guidance on loading, the loads carried on board the *Hotspur*—skiff, netting, fuel oil, water, and lube oil—were accepted as satisfactory based solely on the captain's assessment and his hands-on experience regarding how he previously loaded the vessel. Therefore, although the vessel was functionally stable, the casualty loading may not have provided an adequate margin of stability.

The *Hotspur* reported 1,100 gallons of diesel on board but had a total carrying capacity of 8,000 gallons of fuel, so most of the fuel tanks were slack (only partially filled). With slack fuel tanks, a heeling moment on the *Hotspur* from wind, waves, or turning would have likely induced a sustained list as the fuel in the tanks would have flowed to the low (port) side of the vessel. Slack tanks (or floodwater in a space) can also cause a free surface effect within the tank, which reduces a vessel's stability because liquids are free to move. The combination of the weight of floodwater increasing the vessel's draft, the free surface effect from the slack tanks, and the free

[4] In 2011, the NTSB recommended that the Coast Guard "establish standards for new and existing commercial fishing industry vessels less than 79 feet in length that address intact stability, subdivision, and watertight integrity and include periodic reassessment of the vessels' stability and watertight integrity" (M-11-23). The Coast Guard indicated that it would not consider stability requirements for existing vessels less than 79 feet long in future rulemaking, so the recommendation was classified Open—Unacceptable Response in June 2012.

[5] A *trim and stability booklet* provides the operator with instructions for maintaining the stability of the vessel, such as listing the loading amount and location of fish pots, fuel, and water.

surface created by flooding of the port void or lazarette decreased the vessel's remaining stability, resulting in capsizing.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of fishing vessel *Hotspur* was flooding from an unknown source into the lazarette or the port void space, causing the vessel to lose stability, capsize, and sink.

3.2 Lessons Learned

Testing of High-Level Alarms and Sensors

Automatic high-water bilge alarms are intended to provide crews with an early warning of vessel flooding. Manual detection (e.g. visually) often occurs only after flooding is underway and the crew has detected excessive rolling or listing, leaving little time for mitigating action. In inaccessible spaces, or small spaces with limited ability to inspect underway (such as a fishing vessel's smaller compartments, voids, or lazarette), bilge-level-monitoring alarms are often the sole means to alert operators of flooding. Operators should periodically test bilge high-water alarms and follow best marine practices and manufacturer recommendations for inspection and maintenance.

Vessel	*Hotspur*
Type	Fishing (Fishing vessel)
Owner/Operator	Hotspur Inc. (Commercial)
Flag	United States
Port of registry	Juneau, Alaska
Year built	1988
Official number (US)	942575
IMO number	N/A
Classification society	N/A
Length (overall)	52.6 ft (16.0 m)
Breadth (max.)	16.2. ft (4.9 m)
Draft (casualty)	5.8 ft (1.8 m)
Tonnage	66 GRT
Engine power; manufacturer	1,050 hp (783 kW); Detroit diesel engine, type 12-149

NTSB investigators worked closely with our counterparts from **Coast Guard Sector Southeast Alaska** and **Marine Safety Detachment Ketchikan** throughout this investigation.