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Search for Wreck of FV *Emmy Rose*

Side Scan Sonar Sheds Light on New England Maritime Tragedy

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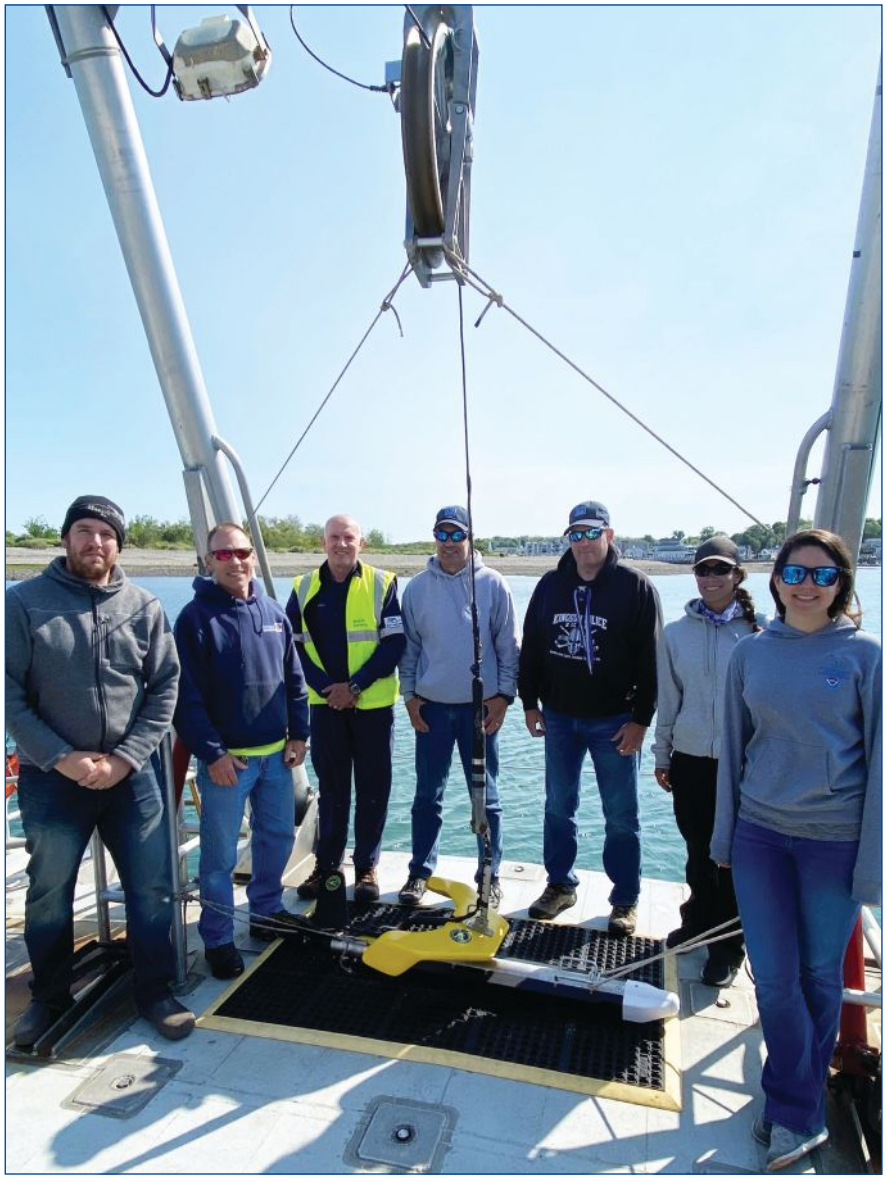
The 82-ft. fishing vessel *Emmy Rose* was returning from a seven-day trip to the Georges Bank when it sank in the early morning on November 23, 2020 with four crew members on board. At about 1:30 a.m. U.S. Eastern Standard Time, the emergency position-indicating radio beacon (EPIRB) on the vessel emitted a distress signal, and the U.S. Coast Guard (USCG) arrived on scene 1.5 hr. later and found a debris field, diesel fuel odor and an empty life raft. The Coast Guard searched more than 7,555 sq. km (2,200 sq. mi.) over a 38-hr. period but was unable to locate the vessel or its crew, who are presumed dead. The accident was classified by the U.S. Coast Guard as a major marine casualty.

In May 2021, MIND Technology was contacted by NOAA, USCG and the National Transportation Safety Board (NTSB) to conduct a side scan sonar search for the fishing vessel *Emmy Rose*. The FV *Emmy Rose* was presumed to have sunk, with all hands lost, in approximately 244 m of water (800 ft.) off the Massachusetts coastline about six months earlier. The MIND Technology team worked closely with the USCG, NTSB and NOAA in analyzing the vessel monitoring system (VMS), EPIRB

Photograph of the starboard side of the FV* Emmy Rose *(courtesy of Robert Serbagi). Note the ladder on the outrigger and other superstructure features, which can be clearly seen in the side scan sonar imagery.



(Above) Chart showing the Blocks 1 and 2 search areas and the survey line plan in relation to the last VMS position of the FV **Emmy Rose***, first EPIRB position at 1:47 a.m. and last EPIRB position at 3:02 a.m. The 100-kHz side scan sonar mosaic of four lines covered in Block 1 is overlayed on the chart together with the location of the FV* **Emmy Rose** *wreck. (Left) The MIND Technology and NOAA survey team posing on the RV* **Auk** *with the prototype Klein 4K-SVY side scan sonar used to obtain high-resolution imagery over the wreck site.*

and life raft positional information to define search blocks for the survey.

Even with all this information at our disposal, the team could only narrow the sonar search area to two blocks, covering 26 sq. km and 10 sq. km, respectively. It was anticipated that a thorough side scan search of these areas would take at least two to three days to complete, based on the long transit times to get to the site from Scituate Harbor, Massachusetts.

Survey Methodology

A Klein 4000 (100/400 kHz) and prototype Klein 4K-SVY (300/600 kHz) side scan sonars were mobilized onto the NOAA vessel RV *Auk*

for the search. The Klein 4000's lower frequency pairs were better suited to longer scan ranges, and this sonar was used as the primary search sonar. The prototype Klein 4K-SVY's 600-kHz side scan sonar frequency was used to obtain higher resolution data over the wreck site to assess the condition of the vessel on the seafloor. The towfish was accurately positioned using a combination of differential GNSS (DGNSS) positioning, cable counter on the winch cable and layback algorithms in Klein's SonarPro and HYPACK software packages. A real-time side scan sonar mosaic was produced to assess the data coverage, targets of interest and potential wreck debris fields on the seafloor.

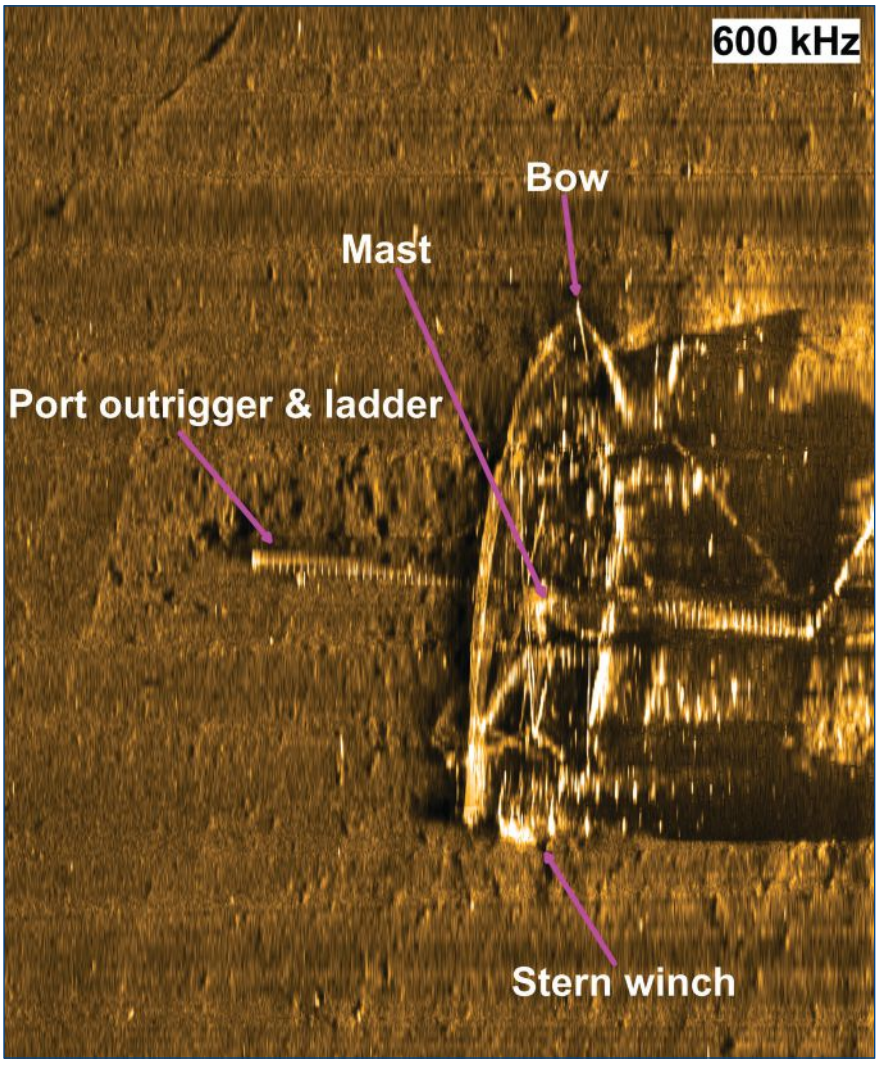
The initial side scan sonar search plan was based on a scan range of 200 m (producing a 400-m-wide seafloor swath), and survey lines were spaced 350 m apart to ensure sufficient coverage of adjacent swaths. For the primary search, the side scan sonar towfish was flown at an altitude of 30 to 40 m above the seafloor for a 200-m-range scale, whereas the higher resolution passes over the wreck site were acquired at towfish altitudes of 15 to 20 m above the seafloor on a 75-m-range scale. The depth of water necessitated the use of long winch cable lengths, with much of the survey being conducted using 700 to 800 m of armored cable. A maximum cable length of 818 m and vessel speed of 3.8 kt. was used to get the towfish sufficiently close to the seafloor for high-resolution, 600-kHz wreck imagery without the risk of entangling the towfish in the vessel rigging.

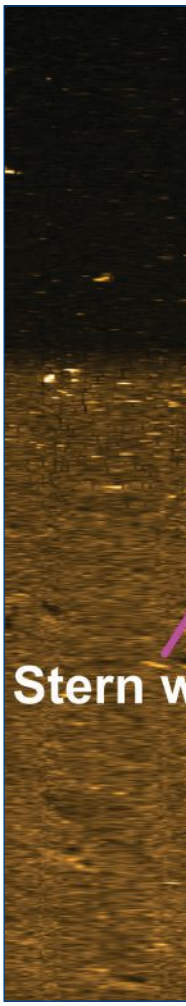
Finding the Wreck and Assessing the Condition

The FV *Emmy Rose* was located on the fourth survey line after only 6.5 hr. (40 line km) of the side scan sonar search on May 19, 2021 at 2:15 p.m. using a Klein 4000 (100/400 kHz) side scan sonar. Subsequent higher resolution 600-kHz sonar passes were acquired over the wreck site using a prototype Klein 4K-SVY (300/600 kHz) side scan sonar the following day. The wreck site is located approximately 6.5 km west of the last VMS position at a depth of 242 m and is approximately 46 km (25 mi.) off the coast of Provincetown, Massachusetts.

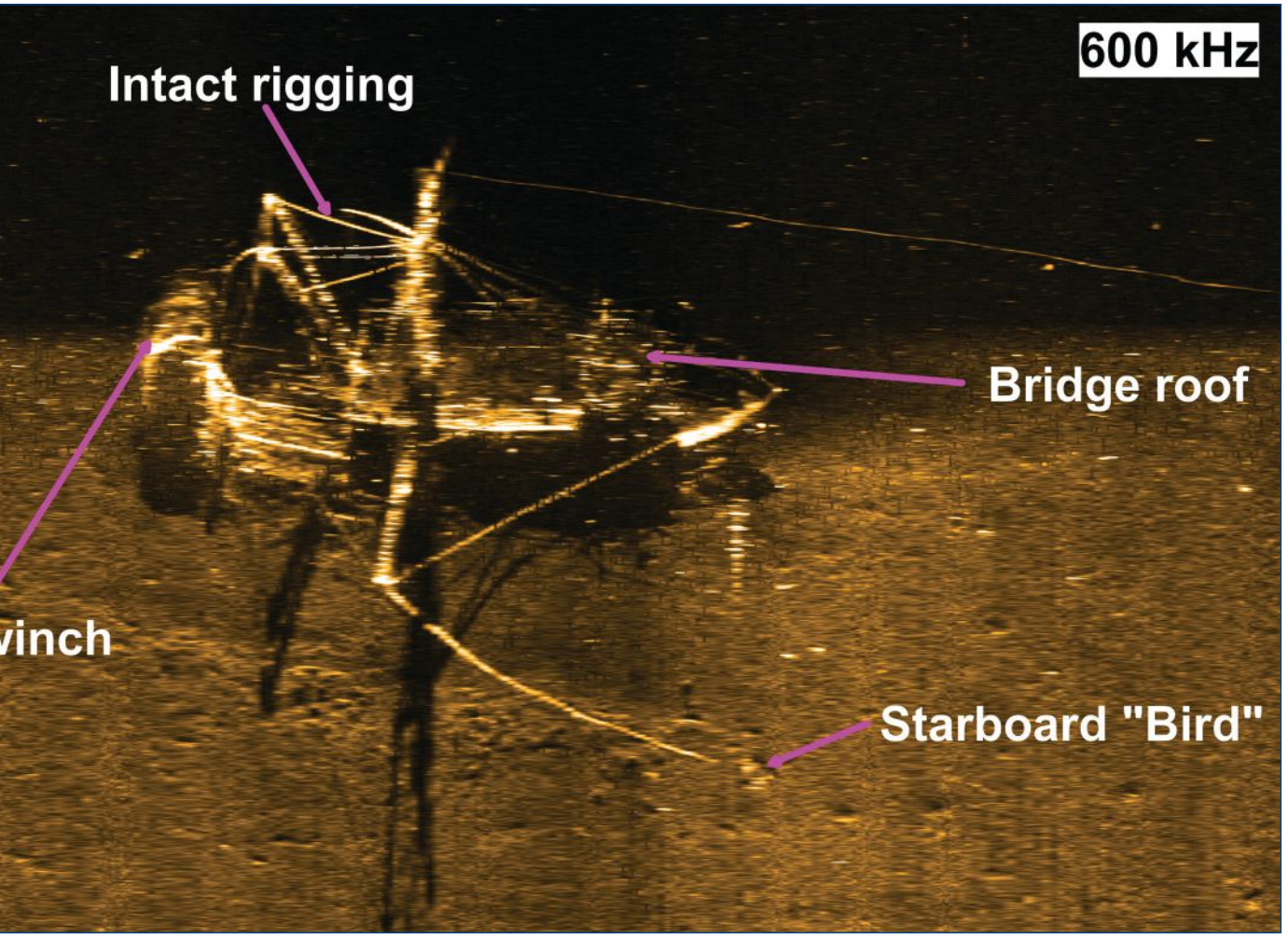
The seafloor in the search area is relatively flat, with water depths varying from 234 to 242 m. The seafloor consists of fine-grained silty sediments with areas of coarser shelly sediment in the northwest and southeast margins of Block 1. Evidence of fishing trawl marks in the seafloor sediments are prevalent throughout Block 1, which indicate that there is ongoing fishing activity in the area.

The FV *Emmy Rose* wreck was located sitting upright on the seafloor with the outriggers fully deployed. There was no apparent debris field on the seafloor close to the wreck. Additionally, there was no visible damage to FV *Emmy Rose* evident as the mast, wire rigging and superstructure features all appear intact. The ladders on both port and starboard outriggers were clearly visible in the sonar imagery together with the "birds" extending from the outriggers onto the seafloor (birds are stabilizers deployed from the outriggers of fishing vessels to reduce the amount of roll a vessel experiences when underway).





(Left) Prototype Klein 4K-SVY 600-kHz (75-m scan range) imagery of the FV* Emmy Rose *lying upright on the seafloor with the port and starboard outriggers deployed. No vessel damage is visible. (Top right) Prototype Klein 4K-SVY 600-kHz (75-m scan range) imagery of the FV* Emmy Rose *with the towfish flown almost directly over the wreck, showing the intact rigging and superstructure features.



From the authors' personal perspective, the vessel seemed like it is resting peacefully on the seafloor.

Tribute to the FV *Emmy Rose* Crew

After the successful location of the FV *Emmy Rose* using side scan sonar, the NOAA and MIND Technology team aboard the survey vessel performed a memorial tribute at sea for the four souls who lost their lives in this tragedy. The crew consisted of Captain Robert Blethen Jr., Jeffrey Matthews, Ethan Ward and Michael Porper.

We hope that the finding of the wreck brings some closure to the families of the crewmen who lost their lives when the vessel sank.

WHOI ROV Dives on the FV *Emmy Rose*

In September 2021, NTSB and USCG investigators partnered with the National Science Foundation and Woods Hole Oceanographic Institution (WHOI) to survey the FV *Emmy Rose* using an ROV. The ROV was deployed from the Coast Guard Cutter Sycamore (WLB-209) and provided videos and high-resolution photos to assist investigators in attempting to determine the cause of the sinking. MIND Technology undertook a detailed analysis of the Klein sonar data and produced a report for the investigation. As of the writing of this article, the USCG and NTSB continue to investigate the sinking of the FV *Emmy Rose*.

Acknowledgments

The authors would like to express their sincere appreciation to the NOAA Stellwagen Marine Sanctuary team of Captain Pete DeCola, Ben Haskell, Dave Slocum, Amy Meloski, Doug Costa, Eric Morgan and Dr. Tammy Silva for providing the NOAA vessel RV *Auk* and their maritime expertise during the FV *Emmy Rose* search. **ST**

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