



UNITED STATES COAST GUARD

REPORT OF INVESTIGATION INTO THE SINKING AND LOSS OF TWO CREW MEMBERS ABOARD THE COMMERCIAL FISHING VESSEL LADY LUCK

IN THE GULF OF MAINE
ON 01/31/2007



MISLE ACTIVITY NUMBER: 2865282



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May 29, 2008

INVESTIGATION INTO THE SINKING AND LOSS OF TWO CREW MEMBERS
ABOARD THE COMMERCIAL FISHING VESSEL LADY LUCK IN THE GULF OF
MAINE ON JANUARY 31, 2007

ACTION BY THE COMMANDANT

The record, the report and the investigating officer's addendum for the Formal Investigation convened to investigate the subject casualty have been reviewed. The record and the report, as modified by the addendum and reproduced as a supplemental report, including the findings of fact, analysis, conclusions, and recommendations are approved subject to the following comments.

COMMENTS ON ANALYSIS

Comment: In Section 2.4, *Analysis: Deployment of Lifesaving Equipment*, the Investigating Officer expresses the opinion that the life raft floated free and deployed as designed, but that the weak link failed, was improperly installed, or installed in a way that prohibited the life raft from separating from the sinking vessel. We do not agree that the weak link, if installed, might have failed. The 500 lb specification for weak links ensures that they are strong enough to pull the painter out and initiate inflation, but weak enough to break when the raft inflates. Even at double the specified strength, the smallest liferaft has a sufficient amount of buoyancy, with a substantial safety factor, to break a weak link when it inflates. We believe it is more likely that one or more of the following were factors in the life raft not separating from the sinking vessel:

1. The hydrostatic release unit (HRU), if one was installed, did not work.
2. The painter was secured directly to the cradle, bypassing the weak link.
3. The liferaft became tangled up in fishing gear as the vessel sank, preventing it from inflating until it was too deep for the inflation systems to overcome the hydrostatic pressure.

ACTION ON RECOMMENDATIONS

Recommendation 1: Recommend that the Coast Guard expedite publishing the stability standards for commercial fishing vessels less than 79 feet in length.

Action: We concur with this recommendation. We have indicated our intention to establish stability standards for vessels between 50 and 79 feet in length on several occasions and expect to publish a Notice of Proposed Rulemaking soon.

Recommendation 2: Recommend continued outreach to fishing communities, highlighting marine casualty evidence of the proper and improper installation of safety gear on fishing vessels. It is apparent that the connection of the sea painter to the cradle was improper,

defective, or improperly installed. The Coast Guard should emphasize the importance of proper weak link installation and educate life raft owners of the weak link's purpose and life raft deployment theories. Based on interviews with fishermen, there may also be a false sense of security with some VMS providers. Some fishermen may be under the impression that VMS is monitored for Search and Rescue purposes when it is really a Living Marine Resources tool.

Action: We concur with this recommendation. In the absence of the statutory authority for mandatory inspections, we will continue to implement our strategy to educate the members of the commercial fishing industry on the risks involved and on how to better manage those risks, using information based on the analysis of past casualties. This strategy includes monthly contribution of articles to National Fishermen, with each one highlighting a particular casualty, the lessons learned from it, and guidance on how to better manage the risks associated with it.

Supplemental Recommendation 3: We recommend that the Coast Guard (CG-5214) study the feasibility of re-engineering weak link locations from the raft cradle to be located inside the life raft's tamper proof canister for Coast Guard approved life rafts. Conceptually, trained technicians would install the weak link during servicing and leave the painter to be secured to the vessel by the crew. This proposal could simplify the installation process and better protect the weak link.

Action: We do not concur with this recommendation. The weak link is an installation requirement and, in practice, is usually part of the hydrostatic release unit (HRU), not the liferaft. We are presently in the process of drafting an update to Navigation and Vessel Inspection Circular (NVIC) 4-86. The revised NVIC will take into account new disposable HRU designs, and will clearly illustrate correct, and incorrect, HRU installations for all types. This guidance will be beneficial to mariners and marine inspectors to ensure correct installation of HRUs and their associated weak links.

W. D. Rabe //s//
By direction

INVESTIGATING OFFICER'S SUPPLEMENTAL REPORT
REGARDING THE SINKING AND LOSS OF TWO CREW MEMEBERS
ABOARD THE COMMERCIAL FISHING VESSEL

F/V LADY LUCK

IN THE GULF OF MAINE ON January 31, 2007

Prepared by:
U.S. Coast Guard
Sector Northern New England
South Portland, Maine

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EXECUTIVE SUMMARY

The following is an addendum to the Investigating Officers' Summary for the F/V LADY LUCK informal investigation. **[Italicized text reflects updated language from the original Investigating Officers' Summary].*

After the case was closed, new information was presented to the Coast Guard which required corrections. We also took the opportunity to make editorial enhancements in the narrative to further clarify certain wording, theories, and nomenclature. This supplemental report also provides an additional recommendation regarding survival craft. Though the investigation was reopened in order to make these changes, the overall findings and conclusions of the case remain the same. The Coast Guard reiterates that the goal of the marine casualty investigative process is to help the Coast Guard, marine industry, and public learn from accidents in an effort to prevent future cases.

The U.S. Coast Guard conducted an investigation of the F/V LADYLUCK that disappeared on January 31, 2007 with 2 persons on board. LADY LUCK was home ported in Newburyport, Massachusetts. The casualty occurred outbound with no fish aboard as the vessel was on its way to fishing grounds after an overnight port call in Portland, Maine. The Coast Guard was alerted of the vessel's distress by an Emergency Positioning Indicating Radio Beacon (EPIRB) signal. There were no other distress calls or signals on the evening of the incident. A search commenced in the area of the EPIRB signal and a debris field was discovered as well as oil floating to the surface. No life saving appliances or crew members were sighted. The Coast Guard enlisted the voluntary assistance of a private contractor to further investigate the incident with a Remote Operated Vehicle (ROV). The vessel was located on the bottom of the Gulf of Maine at a depth of over 500 feet. There was no catastrophic vessel damage noted on the visible portions of the hull or superstructure. *The life raft was observed deployed but was still attached to the cradle indicating that the painter may have fouled, that there was a failure of the weak link, or that the weak link was improperly installed.* Conditions and visibility were difficult for close up observations by the ROV. To better understand the vessel's stability characteristics, the Coast Guard Marine Safety Center conducted a computer-aided evaluation of the vessel's stability characteristics.

While it was impossible to determine the exact cause(s) of the vessel sinking, several possible casualty scenarios were explored in this investigation. Although there were no witnesses and limited physical and documentary evidence, the Coast Guard used the ROV footage and the Marine Safety Center modeling study to narrow down potential causes. The Coast Guard views the sinking as a very rapid event that did not allow the crew ample time to respond or access lifesaving gear. Sadly, both crewmembers were never rescued or recovered and are presumed dead. The vessel is on the ocean floor and is not feasible for recovery.

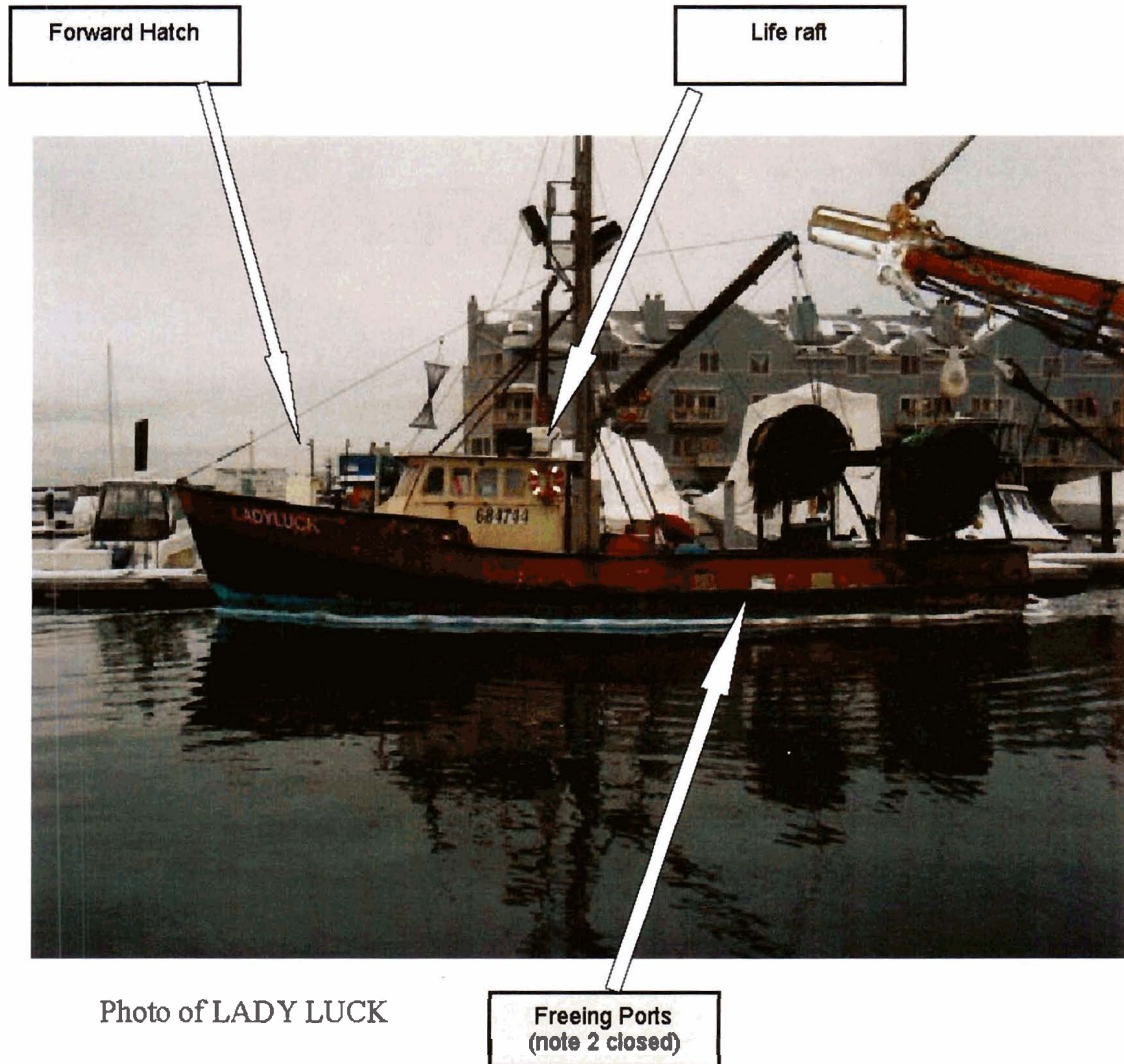
The Coast Guard believes the most likely cause of the casualty was capsizing due to water on deck or flooding with a subsequent rapid loss of vessel stability. Due to the lack of evidence, however, this conclusion cannot be unquestionably verified.

The Investigating Officer summary is inconclusive in identifying all of the causal factors of the casualty. The investigators used available evidence and the Marine Safety Center evaluation to analyze different scenarios and ultimately opine as to the most and least likely causes for the casualty. The computer generated model used by the Marine Safety Center to conduct a stability evaluation, was based on rough vessel information. The investigators sought only to test the general hull configuration with known vessel particulars in an effort to better understand its stability characteristics. The Coast Guard reiterates that the Marine Safety Center evaluation, although helpful, is ultimately inconclusive.

Section 1 - FINDINGS OF FACT

1.1 Vessel Particulars

Name:	LADY LUCK
Owner:	Leslie Ann Fisheries, LLC
Official number:	684744
Gross Tons:	58
Length:	52.3 feet
Breadth:	16 feet
Depth:	10 feet
Hull design:	Offshore, Stern Trawler
Hull material:	Steel
Propulsion:	Single Diesel rated at 350 hp.
Build date:	1985
Flag:	United States



1.2 Vessel, Personnel

The crew consisted of two people.

	<p>Crewmember: [REDACTED] DOB: [REDACTED] Time on vessel: 3 years Position on vessel: Master Status: Missing and presumed deceased</p>
	<p>Crewmember: [REDACTED] DOB: [REDACTED] Time on vessel: Approximately 18 months Position on vessel: Deck hand Status: Missing and presumed deceased</p>

At the time of the incident, LADY LUCK was owned by *Leslie Ann Fisheries, LLC* of which Mr. [REDACTED] is the Resident Agent and Manager. His son, Mr. [REDACTED] ((age [REDACTED] presumed deceased), was LADY LUCK's master, primary operator, and a manager of *Leslie Ann Fisheries, LLC*. Although Mr. [REDACTED] was *Leslie Ann Fisheries, LLC* Resident Agent and Manager, the vessel was principally operated by his son, [REDACTED]. [REDACTED] only had limited first hand knowledge of the vessel only having been aboard a few times.

The crew onboard the LADY LUCK were young, in good health, and were not known to be taking any medications. Both were said to be practiced in the use of the survival suits onboard LADY LUCK.

1.3 Vessel, Condition & Survey

The last surveys completed on LADY LUCK in June of 1997 and April of 2004 indicated that the vessel did not have high water bilge alarms at those times. However, a Coast Guard boarding on December 15, 2006 verified that the bilge alarm was in place and functional.

The Condition and Value Survey Report issued in 1997 stated LADY LUCK had a single 7'9" net reel installed on a 4" steel pipe frame aft on the work deck. *LADY LUCK* was sold by the previous owner on April 20, 2004 with two net reels installed. The 2004 Condition and Value Survey shows the vessel with two net reels. Pictures taken in January of 2007 showed LADY LUCK with two net reels installed on a steel pipe "A" frame aft on the work deck.

The owner stated there was approximately \$100,000 recently invested in new rigging and electronics and other upgrades on LADY LUCK.

The crew of LADY LUCK conducted the majority of maintenance work onboard the vessel.

1.4 Vessel stability

To best appreciate the vessel's stability characteristics, the marine investigators sought the technical assistance of the Coast Guard Marine Safety Center (MSC) in Washington, DC. The MSC is an independent Coast Guard support command that provides regulatory technical, engineering and design compliance services for commercial vessels.

The marine investigators provided available documents, photographs and witness composed vessel schematics to create a computer generated model of LADY LUCK. In addition, marine investigators provided other pertinent details such as the vessel's course and speed, weather conditions and Remote Operated Vehicle video to assist with the analysis of the vessel's stability.

Although the MSC could not provide a conclusive report due to the limited raw data available, they were able to provide a general qualitative analysis of the vessel based on its approximated configuration and documented weather conditions. The January 11, 2008 report summarized the following:

Water on deck:

Water on deck, even in limited quantities, impacted the model's stability. One inch of water on deck caused the model to loll to an angle of 5 degrees due to free surface effect.

A similar test was conducted applying 3.5 inches of water on deck caused the model to heel to the point of submerging the bulwarks where the freeing ports would have also been submerged, reducing their dewatering effect.

At a heel angle of 25 degrees, the model's bulwark edge became submerged, allowing boarding seas to flood the deck, thus capsizing the model.

Engine room flooding:

Flooding of the engine room resulted in a slow reduction in the model's righting arm. In flat calm conditions the model was not susceptible to capsize from engine room flooding, however, as the model's draft increased, it made the model more susceptible to a wave topping event.

Lazarette flooding:

Lazarette flooding was also explored. In the study, flooding through the rudder post (as mentioned in the 1997 survey) was analyzed. Further on a September 15, 2006 boarding by CGC JEFFERSON ISLAND, the boarding officer noticed the vessel rode low in the water and the lazarette cover appeared corroded. Although

not documented as a potential factor, the quartering seas and demands on the steering system in a quartering sea made the scenario pertinent. Flooding the lazarette induced trim which after immersion of the deck, quickly reduced the model's stability. The model capsized beyond the 50% flooding point if the bulwark was submerged for any reason. At 90%-100% flooding, the aft main deck of the model was submerged.

The LADY LUCK's regulatory length was less than 79 feet in length, therefore not subject to 46 CFR Part 28.500 (stability for commercial industry fishing vessels) and not required by current regulations to perform a stability test prior to operating.

*Note: The length of the LADY LUCK was 52.3 feet. The build date was 1985. The official length and build date are used to determine stability applicability.

A vessel stability test had not been performed on LADY LUCK.

1.5 Freeing ports

Freeing ports are openings in the bulwarks that allow water to quickly drain from the deck. The vessel was equipped with three freeing ports on each side of the work deck. *The bulwarks also had other smaller openings which could have also allowed water to drain. The other openings, however, appear not to be solely positioned or designed to drain large volumes of water, as freeing ports are.* It is common practice for freeing ports to be intentionally closed to retain fish on deck or to prevent water from entering the deck from the sea. The Coast Guard obtained several recent photographs of LADY LUCK on separate occasions which show multiple freeing ports closed. The Remote Operated Vehicle video also showed *two* of three freeing ports closed on the starboard side. Closed freeing ports may have prevented water on deck from quickly draining and may have impacted stability.

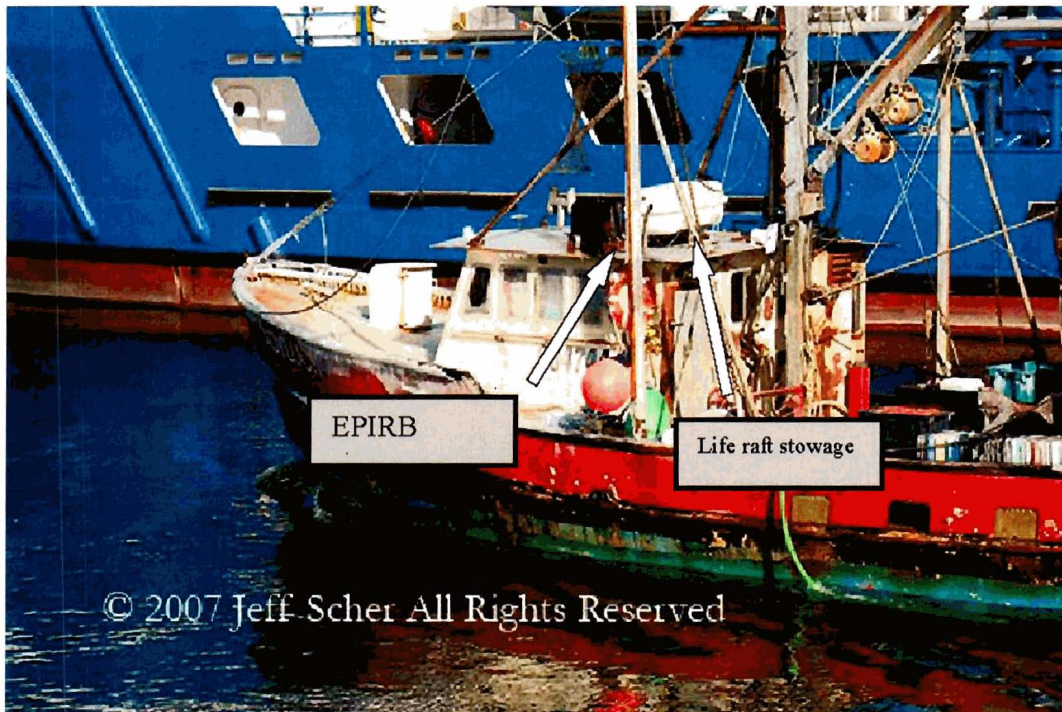
1.6 Roll-dampening paravanes

Roll-dampening paravanes were fitted aboard LADY LUCK on port and starboard outriggers. It is common practice for local outbound fishermen to deploy their paravanes in the vicinity of Portland Head Light. It is unknown if the paravanes were deployed at the time of the sinking. The Remote Operated Vehicle video revealed that the starboard outrigger was in the up (stowed) position. The Coast Guard could not ascertain if the outrigger was actually stowed or came to rest in the stowed position as a result of the sinking. The port outrigger could not be viewed.

* Note: Roll-dampening paravanes are lowered into the water port and starboard from extended outriggers while the vessel is underway, when dragged through the water each paravane exerts a downward force by the diving effect of its fin. This balanced downward pulling force at the end of each outrigger makes the moving vessel more resistant to heeling forces and dampens the rolling movement.

1.7 Vessel, lifesaving equipment

EQUIPMENT	NOTES
(1) inflatable life raft	Stowed on top of pilothouse Deployed during sinking but the sea painter never separated from the vessel
(1) EPIRB category 1 (406 MHz) (Emergency Position Indicating Beacon)	Battery expires January 2012 Re-registered with NOAA January 18, 2007 Beacon ID # ADCD04C62541401
Survival suits	Serviceable Stowed over table in pilothouse via bungee cords
Type 1 Personal Floatation Devices (Lifejackets)	Serviceable Stowed in pilothouse
(1) Ocean Service distress signal kit	Serviceable
(1) VHF-FM Radio	Installed Undetermined if radio was equipped with Digital Selective Calling (DSC).



1.8 Vessel Safety

A Fishing Vessel Safety Decal was issued to LADY LUCK on November 16, 2005.

The last Coast Guard boarding of LADY LUCK was conducted on December 15, 2006 and indicated that all safety equipment was onboard. The boarding summary shows that satisfactory tests were completed on the high water bilge alarm system. The only discrepancy noted during the December 15 boarding was that the registration for LADY LUCK's SATFIND-406 Survival Emergency Position Indicating Radio Beacon (EPIRB) had expired. On January 18, 2007 LADY LUCK's 406 EPIRB was re-registered.

The last servicing of the life raft was completed by Life Raft Servicing & Survival Equipment, Inc. on October 13, 2006.

1.9 Watertight doors

There was a watertight door on the rear of the pilothouse that appeared closed in the ROV footage. The starboard side pilothouse door also appeared closed. ROV video shows the forward door leading from the forward berthing compartment to the main deck open. The *manager of Leslie Ann Fisheries, LLC* stated during the initial viewing of the ROV video that the door is normally kept closed when underway. The condition of the door at the time LADY LUCK got underway is unknown. The door may have been used to abandon ship or may have sprung open due to air pressure as the vessel sank. It is unknown if either of the crew members of LADY LUCK were able to escape during the vessel's distress. No other watertight doors or hatches were visible in the ROV video.

1.10 Weather and Icing

Weather conditions recorded at the National Data Buoy Center by Station 44007 located 12 nautical miles southeast of Portland, ME show that at approximately 2200 on January 31, 2007 wind speeds were 20 knots with 23 knot gusts at 250 degrees True. The air temperature was 28 degrees F with a water temperature of 41 degrees F. Wave heights were 3.3 feet with a wave period of 5 seconds. The swell heights were 0.7 feet with a swell period of 11 seconds.

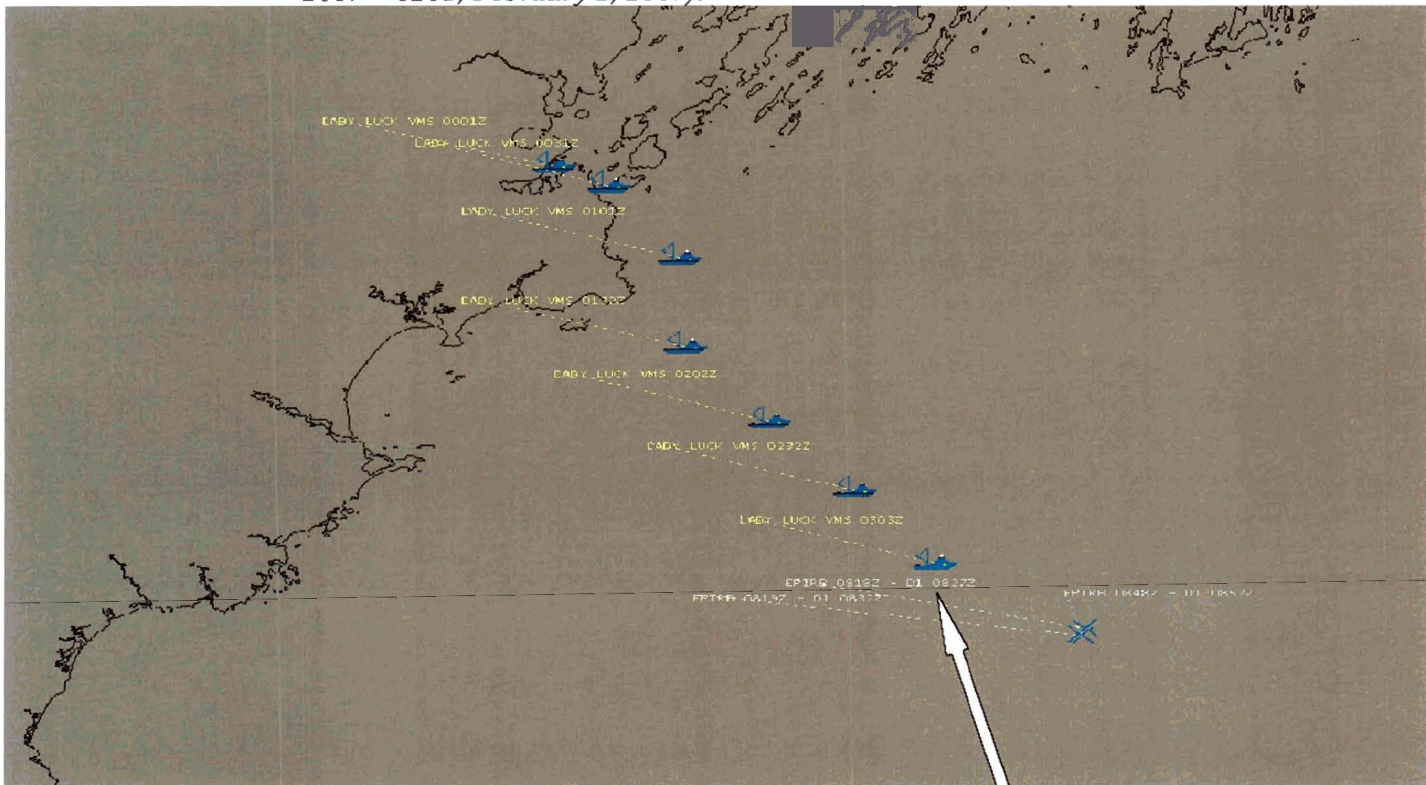
The ice accretion reported was 0.04" per hour, which is minimal. Further, Coast Guard vessels and fishermen operating in the area on January 31, 2007 were queried regarding icing conditions. No ice build up on vessels was reported.

1.11 Commercial fishing vessel safety examination

LADY LUCK was an un-inspected commercial fishing vessel and as such was not required to hold a Certificate of Inspection from the Coast Guard. However, the vessel's owner participated in the Voluntary Commercial Fishing Vessel Safety (CFVS) program. On November 16, 2005 LADY LUCK underwent a voluntary dockside safety exam and was found to be in compliance with all applicable CFVS regulations. A safety decal was issued to the vessel and the decal was valid at the time of the casualty.

1.12 Vessel Traffic

Using the Coast Guard's Ship Arrival Notification System (SANS), Automated Information System, commercial facility queries, local vessel arrival records, and eyewitness accounts, Coast Guard Sector Northern New England staff compiled a spreadsheet of deep draft vessels that could have potentially been in the greater Portland approach the night of January 31, 2007. The analysis indicated that no vessels were in the immediate vicinity of the LADY LUCK. The only deep draft traffic was a tug and barge (T/B NEW HAMPSHIRE) that were transiting from Portland southbound and were approximately 12 nautical miles from LADY LUCK during the estimated casualty window (*approximately 2200, January 31, 2007 – 0201, February 1, 2007*).



Charted track-line of LADY LUCK

1.13 Timeline of Key Events (all times local)

January 30, 2007

January 30, 2007: Before the sinking on January 31, 2007, the last known underway period for LADY LUCK was the morning of Tuesday, January 30,

2007. The Vessel Monitoring System (VMS) shows LADY LUCK underway from 4:22 a.m. to 11:45 a.m. On Tuesday morning, LADY LUCK was fishing in Bigelow Bight in the Gulf of Maine.

January 30, 2007: The VMS code that was declared for the morning of January 30, 2007 was multi-species fisheries.

January 30, 2007: The Portland Fish Exchange reported that they did not conduct business with LADY LUCK on January 30, 2007 or January 31, 2007.

Late afternoon January 30, 2007: [REDACTED] drove from Portland, ME to Newburyport, MA to obtain a larger size net between the fishing trips made on January 30, 2007 and the night of January 31, 2007. The exact time he drove to Newburyport is unknown.

Evening - January 30, 2007: [REDACTED] celebrated his [REDACTED] birthday the night of [REDACTED]. His father witnessed him drinking one beer past midnight.

January 31, 2007

Late afternoon - January 31, 2007: The crew received 6 tons of ice from Vessel Services in Portland, ME. Mr. [REDACTED], an employee at Vessel Services, stated that the vessel looked fine and he did not see any icing on the vessel. He remembers the crew loading a few items on the vessel that afternoon, including doors for ground fishing. Mr. [REDACTED] stated that both crewmembers looked well and did not appear tired, although he was not personally introduced to [REDACTED].

January 31, 2007: LADY LUCK was estimated to be carrying approximately 1,000 gallons of fuel and 8 tons of ice onboard (having topped off with the 6 tons of ice acquired from Vessel Services).

1900 January 31, 2007: LADY LUCK was underway at 7:00 p.m. on January 31, 2007 from Portland, ME with plans to arrive in Newburyport, MA on Friday, February 2, 2007. The crew was planning on ground fishing South of Platt's Bank in the Gulf of Maine on their way to Newburyport, MA.

1930 January 31, 2007 (approximately): LADY LUCK (heading outbound) passed F/V JUBILEE (heading inbound) in the vicinity of Spring Point Light in Portland Harbor.

1930 January 31, 2007 (approximately): [REDACTED], the master onboard F/V JUBILEE, stated that the LADY LUCK's navigation lights were not energized (i.e. the port and starboard lights and the masthead light).

1930 January 31, 2007 (approximately): Mr. [REDACTED] stated there was one deck light that was not very bright on LADY LUCK but was enough to illuminate the vessel that he could see it was LADY LUCK. Mr. [REDACTED] hailed LADY LUCK twice on VHF Channel 16 by name to alert the crew they did not have their

running lights energized. Mr. [REDACTED] stated that he did not receive a response and that he did not see LADY LUCK energize their lights after the call.

1945 January 31, 2007: Mr. [REDACTED] received a call from his son, [REDACTED], at around 7:45 p.m.. Mr. [REDACTED] stated that everything seemed fine.

2130 January 31, 2007: [REDACTED] called his family around 9:30 p.m., an hour before the vessel is believed to have sunk. [REDACTED] said it was a little rough and that he would be home ([REDACTED]) on Friday. [REDACTED] reported that [REDACTED] was below in the forward berthing area when this call was made, it cannot be confirmed if he was sleeping.

2203 January 31, 2007: The last VMS transmission from LADY LUCK was at 10:03 p.m. at position 43 22.7694 N / 069 59.6406 W.

February 1, 2007

0201 February 1, 2007: At 2:01 a.m. District One Command Center received a transmission from LADY LUCK's 406 EPIRB.

1.14 Search & Rescue

Sector Northern New England issued an Urgent Marine Information Broadcast for LADY LUCK and a Search and Rescue mission ensued for the vessel. During the Search and Rescue operations, the Coast Guard located an oil slick and a small debris field. There were no survivors or bodies recovered during the Coast Guard's Search and Rescue efforts. No distress calls were heard from the crew nor were any flares seen in the vicinity of the vessel. No survival suits or life rafts were found during the Search and Rescue mission. The Search and Rescue mission was suspended on February 2, 2007.

LADY LUCK's EPIRB was found by CGC SENECA's smallboat SENECA 2 on Feb 2 at 0904 in position 43 25.99N 069 48.05 W. The EPIRB was found in the automatic position indicating the crew did not activate the EPIRB manually, but rather the EPIRB had self deployed during the sinking.

1.15 Remote Operated Vehicle Operations

On March 13, 2007 Sector Northern New England, with the approval of the Commander, First Coast Guard District, commenced a Remotely Operated Vehicle (ROV) Operation to visually survey the LADY LUCK using the CGC MARCUS HANNA as the staging platform. The Coast Guard partnered with Video Ray Corporation to provide equipment and technicians to locate and video record the LADY LUCK. Coast Guard investigators, including a member of the Coast Guard's Quality Assurance Staff from Coast Guard Headquarters were on hand to observe the operation and assist with the casualty analysis.

LADY LUCK was found in position 43 20.67 N / 069 56.88 W in approximately 530 feet of water.



Starboard bow of LADY LUCK

The ROV operation showed all windows intact. The hull appeared to be in the same condition as shown in available pictures with no breaches. The entire rail around the port to starboard bow is also intact. There is one small inset on the starboard quarter but it is not apparently catastrophic.



Photo of stern indent

The ROV operation revealed that all fishing gear was stowed, indicating LADY LUCK was not engaged in fishing at the time of its sinking. Video also showed outriggers in the up position, although it cannot be determined if they were secured or deployed at the time of the sinking.

ROV video shows the forward watertight door that leads to the forward berthing of LADY LUCK open. The owner of the vessel stated that the door is normally kept closed while underway.

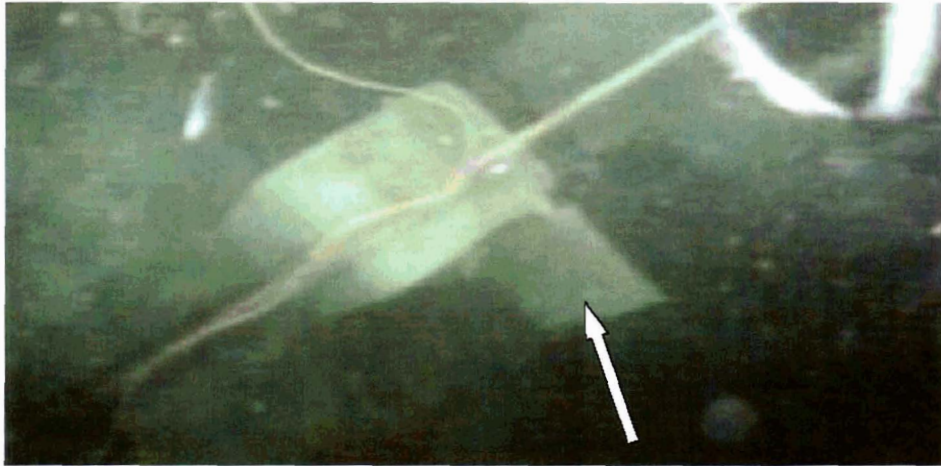


Photo of open door



Photo of life raft

During the ROV operation, the life raft was observed deployed and inflated with the sea painter still attached to the cradle. The life raft had deployed and was lying on the bottom of the ocean floor approximately 40 feet in front of the bow of LADY LUCK. *ROV video could not determine the weak link configuration or if an appropriate weak link was installed and/or installed properly or whether the painter fouled.* Investigators can only ascertain from the video that the life raft deployed as designed but the sea painter never separated from the cradle.

Section 2 - ANALYSIS AND OPINIONS

The exact cause of the sinking of LADY LUCK cannot be determined as there were no survivors and no eye witnesses. The potential causes listed below were all analyzed by the Coast Guard. The following opinions are based on the Findings of Fact listed in the previous sections. Additionally, the Coast Guard Marine Safety Center conducted a computer based model to study the vessel's stability.

The Coast Guard studied the below list as possible causes of the sinking of LADY LUCK:

1. Ship Strike/Collision;
2. Flooding; and
3. Capsizing.

Other issues studied were lifesaving equipment performance and the MSC Stability Evaluation.

2.1 ANALYSIS: *Ship Strike/Collision*

A ship strike or collision is a potential but the most unlikely cause for the sinking of LADY LUCK. Large vessel traffic in the area of the sinking over a period of time supports this conclusion. Coast Guard Sector Northern New England staff compiled a spreadsheet of deep draft vessels that were potentially in the area of LADY LUCK on the night of January 31, 2007. There were no large deep draft vessels close enough to the vessel within the specified time frame (from the last VMS signal to the first EPIRB signal) to have collided with LADY LUCK. Half hour overlays were used to track AIS positions to determine if vessels passed close to LADY LUCK. There were no commercial vessels carrying AIS in the vicinity of LADY LUCK at the time that the vessel sunk. The closest of the vessels (that were not in the immediate vicinity of LADY LUCK), were inspected by the Coast Guard and found to have no damage to the hull that would have resulted from a collision.

The *manager of Leslie Ann Fisheries, LLC* informed the Coast Guard that it had been rumored in the fishing community that there was a large vessel in the area at the time of the collision. No vessel name, flag, relative size, ship type or perceived course was ever provided to investigators. The Coast Guard queried all commercial facilities in Portland, Portsmouth, and Searsport area to verify SANS information and ascertain the presence of vessels not required to participate in SANS (i.e. tugs and barges). The rumored vessel may have been Moran Towing Company's T/B NEW HAMPSHIRE that had departed Portland Harbor shortly after the LADY LUCK had started their transit. After interviewing Moran

Towing Company representatives and receiving voyage data from the tug and barge in question, the Coast Guard verified that this particular tug and barge were not in the vicinity of the vessel at the time of the sinking but were approximately 12 nautical miles southwest on a course of 194 True at a speed of 11 knots.

The ROV operation conducted on March 13, 2007 revealed the vessel resting on its port side, however, the entire structure of the bow can be seen clearly. Based on the video produced from the ROV operation, there is no indication of damage to LADY LUCK that would be consistent with a collision at sea, *however, over 40 feet of the port side could not be viewed with the ROV*. All windows are intact and the hull appears to be in the same condition as shown in available pictures taken before the accident. The entire rail around the port to starboard bow is intact. Although the mast itself is not shown clearly, it is not seen lying on or near LADY LUCK and appears to be in place. During the viewing of the ROV video, the manager of Leslie Ann Fisheries, LLC questioned a small dent in the starboard quarter of the vessel. The inset had no obvious tears, holes, fractures or scrapes that would be consistent with a catastrophic high impact collision. Therefore, the Coast Guard does not consider this inset to be associated with the sinking (see photo on pg 13).

Opinion: *Ship Strike/Collision* With the ROV video and data regarding vessel traffic in the closest proximity to LADY LUCK on the night of January 31, 2007, the Coast Guard views a ship strike or collision as the most unlikely causes of the vessel's sinking.

2.2 ANALYSIS: *Flooding*

LADY LUCK may have experienced uncontrolled flooding on the night of January 31, 2007.

A theory that supports flooding focuses on ruptured piping that could have caused flooding into LADY LUCK's engine room. LADY LUCK had two raw water sea intakes according to the Condition and Value Survey Report conducted in 1997. Witnesses familiar with the vessel stated that the engine room was heated. However, the only references to heating systems from surveys indicate a hot water heater in the engine room and a stove in the accommodation space. If the spaces were not heated when the vessel was moored, it would have been possible for piping to freeze as temperatures were well below freezing. The vessel's last underway period prior to the sinking ended at approximately 12:00 p.m. on January 30, 2007. The consistently low recorded temperature for January 31, 2007 was 10 degrees F at 7:00 a.m. The local temperatures were cold enough to freeze piping systems in the engine room if not protected with ambient heat, heat tape, or some other thermal protection. The freezing of a pipe could ultimately result in a piping fracture. When the frozen water in a fractured pipe thawed due to heating in the engine room while the vessel was being operated, it could possibly produce flooding. If flooding progressed enough to engulf the entire

engine room and if such flooding went undetected, it could have caused the vessel to sink.

Whether the high water bilge alarm sounded to alert the crew members or not of possible flooding in the engine room is unknown. However, based on the satisfactory test of the bilge alarm system conducted by the CGC JEFFERSON ISLAND on December 15, 2006, we consider that the system was likely working and reliable.

If water ingress occurred in the engine room, the crew of LADY LUCK may have attempted damage control measures. Sounding of the high water bilge alarm may have prompted the crew to try to first rectify the situation. It is unknown whether the crew had time to assess and manage any flooding. LADY LUCK did not have automatic bilge pumps, but did have a bilge pump manifold. It is unknown what experience the crew had in a damage control situation.

The MSC stability evaluation included this scenario. The MSC concluded that engine room flooding would have been gradual enough for the crew to respond. Furthermore, the MSC modeling suggested that the vessel's performance would have become gradually sluggish, alerting the helmsman or other crewmember to a potential problem.

The MSC also studied lazarette flooding with more significant impacts to stability.

Opinion: ***Flooding:*** The MSC evaluation was extremely helpful in analyzing the flooding scenarios. Flooding of the engine room would have activated the bilge alarm and would have impacted the performance of the vessel enough for the crew members to investigate. Additionally, the MSC study suggests that engine room flooding would have been gradual. A gradual flooding event would have afforded the crew time to respond with damage control or, at the very least, issue a mayday call. While it cannot be ruled out, based on the MSC's qualitative modeling study, the Coast Guard does not consider engine room flooding to be a likely cause of the sinking. MSC modeling indicated that lazarette flooding would lead to a more rapid and less detectable flooding event. Further, lazarette flooding may be more likely and could be supported with the 1997 survey report that highlighted a rudder post packing leak and the 2004 survey report that states the lazarette deck hatch was not watertight. Additionally, the September and December 2006 CGC JEFFERSON ISLAND boardings suggested that the lazarette cover was corroded. However, there is no more recent information available to suggest that the lazarette hatch was or was not watertight.

2.3 ANALYSIS: *Capsizing*

LADY LUCK may have capsized during her transit on the night of January 31, 2007. A rapid capsizing supports the lack of distress signals. The stability of LADY LUCK on the night of January 31, 2007 is unknown. A stability test was never conducted on this vessel and the photographs of the vessel taken a few weeks before the sinking show that it might have had low freeboard compared to

comparable vessels in similar service. LADY LUCK had two net reels on her stern. *The forward net reel's location onboard the vessel was modified after it was purchased from Mr. [REDACTED] in the spring of 2004. The exact weight, vertical and longitudinal placement of the modification is unknown.*

Mr. [REDACTED] recalled that LADY LUCK was not “snappy” as far as righting moment, meaning that the vessel righted itself slower than other vessels that he was familiar with. This is an opinion given by the former owner and cannot be confirmed.

LADY LUCK was not fishing the night of January 31, 2007 and therefore is believed to have had no catch onboard that would add to the overall weight of the vessel. There was an estimated 8 tons of ice in the holds, but boards were typically used to keep ice in the holds from shifting. If the boards were not in place, a large shifting of ice may have contributed to the vessel capsizing. It cannot be determined if the boards were in place or not on the night of January 31, 2007.

Severe icing on a vessel caused by sea spray and freezing temperatures adds weight to a vessel causing instability that could lead to capsizing. It is unlikely that LADY LUCK experienced icing in the three and a half hours she was underway leading up to its sinking. Fishermen contacted by the Coast Guard who were underway on the night of January 31, 2007 stated their vessels did not experience icing. The Officer in Charge of CGC SHACKLE was also underway that night and experienced “a little skim coat” of icing on the deck of CGC SHACKLE, but stated that it was not severe enough to impact stability. The ice accretion reported by the National Data Buoy Center Station 44007, located 12 nautical miles Southeast of Portland, ME was at 0.04” per hour. With no visible icing before getting underway (as reported by Mr. [REDACTED] from Vessel Services) and only three and a half hours underway with such minimal ice accretion reported, the conclusion is that icing most likely was not a cause for the capsizing of the vessel.



Photo of Open/Closed Freeing Ports

The MSC analysis focused mostly on the degradation of stability caused by water

on deck. Based on their modeling, only limited amounts of water was needed to negatively affect stability. The vessel's course exposed the vessel to a quartering sea which would make it susceptible to shipping seas from the stern. If any (if not most) of the freeing ports were closed (as the Coast Guard suspects) then water on deck would cause a free surface effect causing the vessel to further lose stability. *The altered forward net reel arrangement may have affected the overall intact stability characteristics of the vessel but without a stability test or inclining experiment, it is impossible to know to what extent.*

It is unlikely that a fishing gear hang up caused flooding by the stern. The ROV operations on March 13, 2007 revealed that all gear was stowed; indicating LADY LUCK was not engaged in fishing at the time of the sinking.

Opinion: *Capsize:* With the available evidence (ROV video and pre-casualty photographs) of the net reel arrangement along with the closed freeing ports, the Coast Guard feels that capsizing due to a rapid loss of stability is the most likely cause of the sinking. This opinion is supported by the lack of distress or mayday calls, or the recovery of survivors or bodies. The Coast Guard remains convinced that the sinking happened so rapidly that the crew had no time to react or access lifesaving equipment. The MSC evaluation supports this position as capsizing due to water on deck or a combination of water on deck with a flooding lazarette proved to leave their model highly prone to rapid capsizing.

2.4 ANALYSIS: *Deployment of Lifesaving Equipment*

LADY LUCK's life raft deployed properly; however, the sea painter *appears to be* attached to the cradle which prevented the raft from separating from the sinking vessel. During the ROV operation, the life raft was found approximately 40 feet forward of the bow of LADY LUCK still attached to the location of the weak link. ROV video could not determine the weak link configuration or if an appropriate weak link was installed (or installed properly). Investigators can only ascertain from the video that the life raft deployed as designed but the sea painter never separated from the cradle. It is unknown if the life raft surfaced at any time, only that the life raft was not released from the vessel. The life raft's sea painter suggests how the vessel may have sunk because of its positioning between the forward day shape (which is located on top of the pilot house). At this position it is possible that the vessel could have sunk by the stern. As it sank, the life raft deployed through the day shape on the pilot house structure over the bow of the vessel. *It is possible that the weak link was improperly installed which could have led to its not performing as designed; however, it cannot be conclusively determined from the available evidence whether the weak link did in fact fail, whether improper connections were made, or if the painter was otherwise fouled during the sinking. The December 15, 2006 boarding by CGC JEFFERSON ISLAND did not reference any weak link discrepancies.*

There is an unexplained delay in LADY LUCK's EPIRB transmission. Approximately four hours elapsed between the time that LADY LUCK

disappeared off of VMS to the time the vessel's SATFIND-406 Survival EPIRB started transmitting. VMS is a living marine resource tool used by NOAA to monitor fishing activity. VMS is not monitored as a means to start Search and Rescue. A VMS track, however, may be used during the Search and Rescue mission as an indication of where a vessel might be, as was the case with LADY LUCK. LADY LUCK's 406 EPIRB was a float free model that automatically released from the vessel when the EPIRB was submerged. Magnetic switches in this EPIRB model prevent activation unless it is removed from its bracket, manually energized or floating in the water. It is unknown why there was a four hour delay in the EPIRB transmission. The EPIRB may have been caught in the rigging of the vessel as it tried to float free or it could have been trapped under the vessel in the event the vessel capsized. The EPIRB's release may not have worked properly when initially submerged.

Opinion: ***Deployment of Lifesaving Equipment:*** The life raft floated free and deployed as designed. The weak link either failed, was improperly installed, or installed in a way that prohibited the life raft from separating from the sinking vessel. *Investigators cannot rule out that the painter may have been fouled as the vessel sank, which may also explain the painter's non-release.* Likewise, the EPIRB also deployed and transmitted.

2.5 ANALYSIS: *MSC Stability Evaluation*

Although LADY LUCK was not required to meet stability requirements for commercial fishing vessels, the requirements of 46 CFR 28.570 were used as a benchmark by MSC. The MSC model of LADY LUCK did not exhibit strong righting characteristics as required by the aforementioned regulation. The LADY LUCK model failed to meet the stability performance required by 46 CFR 28.570 in five out of seven criteria of intact righting energy.

Opinion: ***MSC Stability Evaluation:*** While exact dimensions and vessel features were unable to be provided to the MSC, they conducted a qualitative analysis of rough vessel data. Their study indicated that the vessel lacked strong righting energy in a regulatory comparison of LADY LUCK to the requirements of 46 CFR 28.570.

Section 3 - CONCLUSIONS

3.1 Stability

The Coast Guard believes LADY LUCK sank in a rapid event that prevented the two crewmembers from responding to the danger or issuing a distress call. Such an event was likely caused by a rapid capsizing. *The Coast Guard does not believe the casualty was caused by one single event but rather a combination of events and conditions which contributed to the sinking. The quartering seas, that the vessel was operating in, could have shipped water over the stern. Further, quartering seas can be the most demanding on steering gear which could have also allowed water to enter the lazarette. Therefore, while inconclusive, available evidence and analysis points to retention of water on deck or the combination of lazarette (or engine room) flooding and water on deck that led to the sinking of LADY LUCK.*

3.2 Weak Link Performance

The life raft deployed as designed but the weak link assembly failed to release the raft from the vessel bringing it to the ocean floor. *Investigators cannot rule out that the painter may have been fouled as the vessel sank, which may also explain the painter's non-release.* While investigators could not ascertain the cause of this failure, it raises visibility of the criticality of liferaft and buoyant apparatus weak links and their proper installation.

Section 4 - RECOMMENDATIONS

4.1 Expedite publishing of new stability requirements

Recommend that the Coast Guard expedite publishing the stability standards for commercial fishing vessels less than 79 feet in length.

4.2 Outreach

Coast Guard recommends continued outreach to fishing communities, highlighting marine casualty evidence of the proper and improper installation of safety gear on fishing vessels. It is *possible* that the connection of the sea painter to the cradle was improperly made, *the weak link did not function properly, or that the painter somehow fouled during the sinking*. The Coast Guard should emphasize the importance of proper weak link installation and educate life raft owners of the weak link's purpose and life raft deployment theories. Based on interviews with fishermen, there may also be a false sense of security with some VMS providers. Some fishermen may be under the impression that VMS is monitored for Search and Rescue purposes when it is really a Living Marine Resources tool.

4.3 *Weak Link Alternatives*

We recommend that the Coast Guard (CG-5214) study the feasibility of re-engineering weak link locations from the raft cradle to be located inside the life raft's tamper proof canister for Coast Guard approved life rafts. Conceptually, trained technicians would install the weak link during servicing and leave the painter to be secured to the vessel by the crew. This proposal could simplify the installation process and better protect the weak link.