NTSB/MAR-02/03
PB2002-916403

Marine Accident Report

Grounding of the Small Passenger Vessel *Finest* Sandy Hook, New Jersey January 4, 2001

National Transportation Safety Board
Washington, D.C.

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Notation 7493
Adopted Septembwer 17, 2002

National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

National Transportation Safety Board. 2002. ***Grounding of the Small Passenger Vessel*** **Finest** ***Sandy Hook, New Jersey January 4, 2001.*** **Marine Accident Report NTSB/MAR-02/03. Washington, DC.**

Abstract: About 1930 on January 4, 2001, the domestic high-speed vessel *Finest*, with 258 passengers, 5 crewmembers, and one company official on board, ran aground outside the channel to the Shrewsbury River, Sandy Hook Bay, while en route from New York City, New York, to Highlands, New Jersey. The *Finest* refloated at 0007 on January 5, after the tide changed, and proceeded to Sandy Hook Bay Marina, where it docked at 0026 and discharged its passengers. No one on board the vessel suffered any injury, and the vessel sustained no damage. One person on board had to be evacuated from the vessel by helicopter for medical treatment of an allergic reaction unrelated to the accident.

The major safety issues in this report are the adequacy of the navigational procedures and navigational aids in the Shrewsbury River and the appropriateness of alcoholic beverage service after an accident.

As a result of its investigation of this accident, the Safety Board makes one safety recommendation to the U.S. Coast Guard and three to New York Fast Ferry Services.

The National Transportation Safety Board is an independent Federal agency dedicated to promoting aviation, railroad, highway, marine, pipeline, and hazardous materials safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The Safety Board makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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Acronyms and Abbreviations

COI	Certificate of inspection
EBL	electronic bearing line
GPS	global positioning system
MLLW	mean lower low water
NVIC	Navigation and Vessel Inspection Circular
NYFF	New York Fast Ferry
SHBM	Sandy Hook Bay Marina
VRM	variable range marker

Executive Summary

About 1930 on January 4, 2001, the domestic high-speed vessel *Finest*, with 258 passengers, 5 crewmembers, and one company official on board, ran aground outside the channel to the Shrewsbury River, Sandy Hook Bay, while en route from New York City, New York, to Highlands, New Jersey. The *Finest* refloated at 0007 on January 5, after the tide changed, and proceeded to Sandy Hook Bay Marina, where it docked at 0026 and discharged its passengers. No one on board the vessel suffered any injury, and the vessel sustained no damage. One person on board had to be evacuated from the vessel by helicopter for medical treatment of an allergic reaction unrelated to the accident.

The National Transportation Safety Board determines that the probable cause of the grounding of the *Finest* was the failure of the vessel master to use appropriate navigational procedures and equipment to determine the vessel's position while approaching the Shrewsbury River channel. Contributing to the cause of the grounding was the lack of readily visible fixed navigational aids. Also contributing to the cause of the grounding was the failure of New York Fast Ferry to require the use of installed navigation equipment and to set guidelines for operations in adverse environmental conditions.

The major safety issues in this report are as follows:

- Adequacy of navigational procedures;
- Adequacy of navigational aids in the Shrewsbury River; and
- Appropriateness of alcoholic beverage service after an accident.

As a result of its investigation of this accident, the Safety Board makes one safety recommendation to the U.S. Coast Guard and three to New York Fast Ferry Services.

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Factual Information

Accident Narrative

At 1805 on January 4, 2001, the twin-hulled (catamaran), water-jet propelled, domestic high-speed vessel[1] *Finest* (figure 1), with five crewmembers and one company officer on board, departed the East 34th Street Terminal in the borough of Manhattan, New York, New York, after loading 66 passengers. The vessel, which was owned and operated by New York Fast Ferry (NYFF), proceeded down the East River to Pier 11, the Wall Street loading point, where, at 1825, the *Finest* boarded an additional 192 passengers.

Figure 1. The *Finest*

The *Finest* then departed for the Sandy Hook Bay Marina (SHBM) in Highlands, New Jersey, with a draft of about 6 feet. The crewmembers included a master, a senior deckhand, and three deckhands. After maneuvering the *Finest* away from Pier 11, the master turned over the conn (steering and speed control) to the senior deckhand and remained in the wheelhouse.

According to the crewmembers, the *Finest* was midway between the Verrazano-Narrows Bridge and Sandy Hook Point (figure 2) when a passenger came to the pilothouse and stated that he was having trouble breathing and might be suffering an allergic reaction. The passenger asked that the crewmembers arrange for medical assistance to meet the vessel when it docked at the SHBM. The master called two crewmen to the bridge and had

[1] The Coast Guard defines vessels such as the *Finest*, which can attain speeds of 30 knots or more with a full complement of passengers, as domestic high-speed vessels. U.S. Coast Guard, *Navigation and Vessel Inspection Circular* (NVIC) *5-01, Guidance For Enhancing the Operational Safety of Domestic High-Speed Vessels* (Washington, D.C.: U.S. Coast Guard, April 23, 2001).

them escort the passenger to an auxiliary room near the vessel's disembarkation station so he could be the first person off the *Finest* when it arrived at the SHBM.

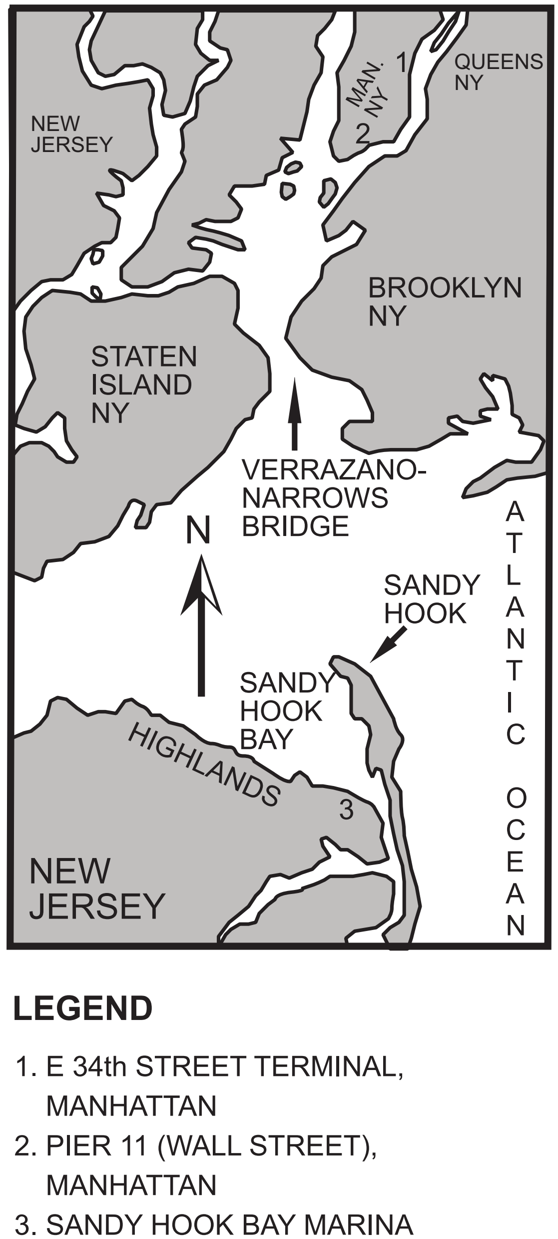

Figure 2. Area of operation for the *Finest*

At 1916, the senior deckhand radioed Coast Guard Station Sandy Hook on VHF-Channel 16 asking that the Coast Guard arrange to have medical assistance at the SHBM. The Coast Guard, in turn, contacted the Highlands Police Department, which dispatched police officers and notified local medical personnel to standby at the marina. By 1920, the responders were in place at the SHBM, awaiting the arrival of the *Finest*.

As the *Finest* passed buoy 17, about 1/2 nautical mile[2] west of the northern end of Sandy Hook Point, the master observed an ice field inside Sandy Hook Bay that extended from Sandy Hook peninsula about 1 mile into the bay. The vessel's normal trackline to the SHBM would have taken the vessel through the ice field. After passing buoy 17 and Sandy Hook Point, the senior deckhand, in accordance with the master's orders, changed to a southerly course toward the Atlantic Highlands breakwater. The new trackline ran parallel to the western edge of the ice field and allowed the vessel to operate outside of the ice. (See figures 3 and 4.)

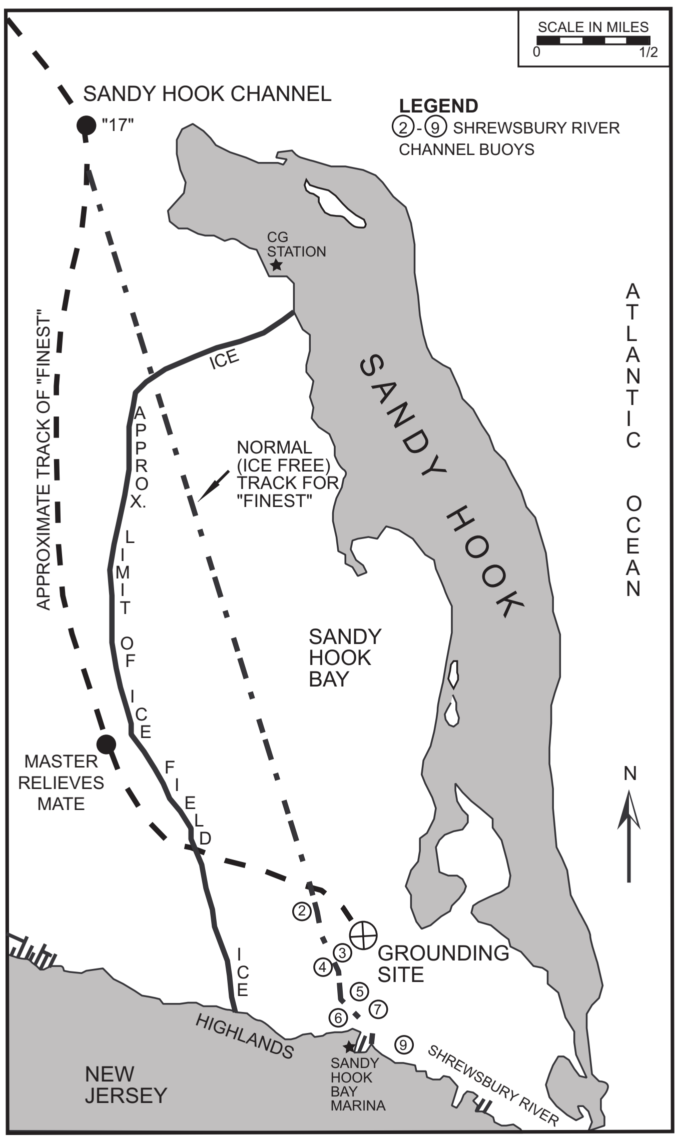

Figure 3. Accident site.

2 All distances given are nautical miles, except where noted otherwise. A nautical mile equals 6,080 feet versus 5,280 feet for a statute mile.

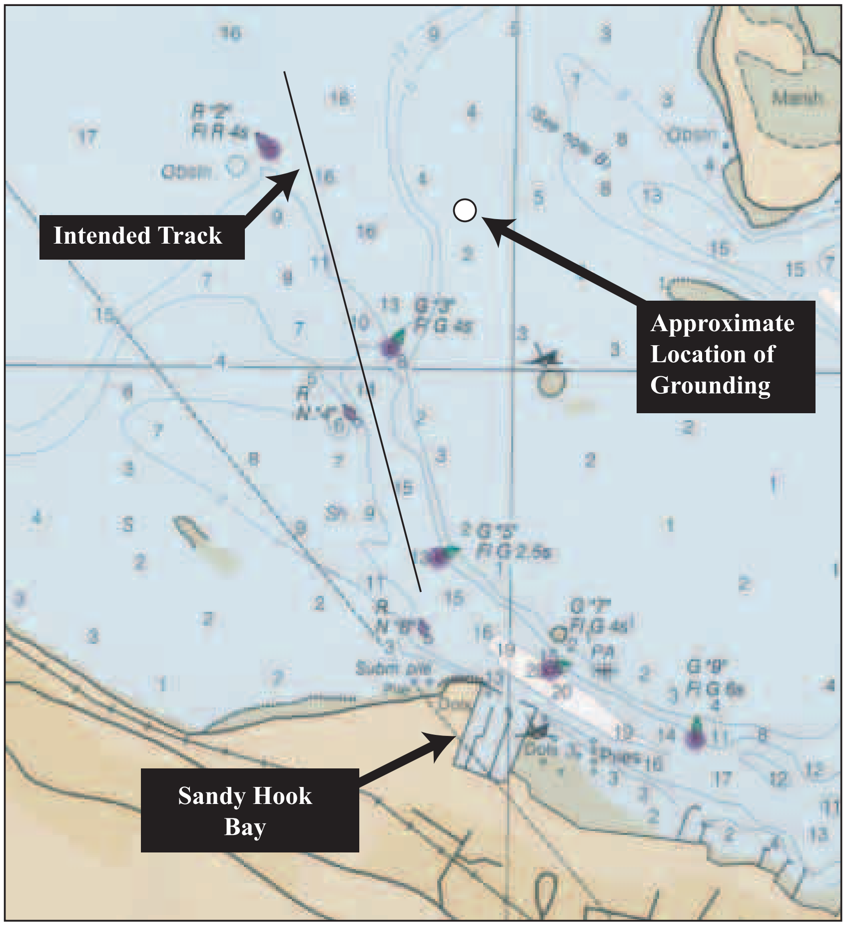

Figure 4. Section of the National Oceanic and Atmospheric Administration navigation chart No. 12401, showing channel course line, location of grounding site and SHBM. Water depths indicated are in feet at mean lower low water.

After the *Finest* passed Sandy Hook Point, the two buoys (Nos. 2 and 3) marking the approach to the Shrewsbury River channel were within the range of the vessel's radar, but the master could not locate them by radar. The master took over the conn about 2 1/2 miles past Sandy Hook Point and continued southbound, operating the vessel at a speed of about 34 knots. The master and the senior deckhand estimated that when the vessel's position was between a 1/2-mile and 1 mile from the Atlantic Highlands breakwater, the master began to turn the vessel to the east. The master said that before the *Finest* entered the ice field, he had the deckhands secure the electrical generators, which required the mate's radar to be turned off. The master's radar, however, ran off the ship's battery supply and continued to operate.

At the point of entering the ice field, the approximate distance to the position of buoy 2 was 6/10 mile. The master continued into the ice field and approached the estimated position of buoy 2 at a speed of about 32 to 34 knots. According to the master, he continued to look for the approach buoys visually and by radar. When the vessel was approximately 3/10 mile from buoy 2, he began reducing his speed to about 25 knots. The master made one final attempt to locate the buoys by having the deckhand go on the bridge wing to obtain a visual sighting. After the deckhand reported that he could not see the buoys, the master made a right turn toward the marina based on a visual observation of the marina's lights and a radar observation of the marina.

After completing the turn, he reduced his engine speed to about 10 knots. Moments later the vessel's forward motion was stopped and the master thought that he was stuck in the ice field. At 1929, the master called the Coast Guard Station Sandy Hook for assistance to get his vessel through the ice. After repeated attempts to free the vessel using engine maneuvers, the master realized that the *Finest* had grounded. It was determined later that the *Finest* was about 300 yards east of the channel. At 1939, the master advised the Coast Guard that his vessel was aground. With the vessel's generators secured, the public address system was inoperative. Using a portable radio to communicate with the deckhands, the master directed them to walk through the two passenger cabins and advise the passengers of the situation.

When it became apparent that there would be an extended delay in refloating the *Finest*, the two deckhands with engineering experience improvised a means of providing cooling water to the electrical generator in the port engineroom. This restored full electrical service to the vessel in about 1 hour, including the public address system and the heating, ventilation, and cooling systems. The master also instructed the deckhands to inspect the hull voids to ensure that the vessel was not taking on water. Their inspection revealed that there were no hull penetrations or flooding.

After the grounding, the passengers were given access to an "open bar" by the vessel's management. The alcohol service continued for roughly an hour. According to the master, the vessel's management, in consultation with the Coast Guard, then stopped the alcohol service because of concerns about passenger control in the event of evacuation. According to the Coast Guard report of this accident, the alcohol service

> presented a safety concern that now had to be factored into the planning. We wanted to avoid a situation where we now had inebriated passengers to rescue. This became a grave concern, and if it became necessary, prohibited the USCG from using helos [helicopters] or other assets if feasible.

At 1957, a 47-foot motor lifeboat from Coast Guard Station Sandy Hook was dispatched and reached the area at 2015. The Coast Guard coxswain reported that the channel had 100 percent ice coverage and the buoys in the entrance to the channel were not visible. He used radar range and bearings to determine the channel's location and concluded that the *Finest* was clearly to the east of the channel. He slowly edged toward the *Finest* but could not reach it because of the shallow water.

When advised by Coast Guard Station Sandy Hook that the motor lifeboat was unable to reach the *Finest* and that there were 264 persons on board, Coast Guard Activities New York assumed control of the Coast Guard response and diverted the Coast

Guard tug *Line* from a patrol in the Hudson River to offer assistance to the *Finest*. Activities New York also contacted the First Coast Guard District in Boston requesting helicopter support in the event air evacuation of the passengers became necessary.

The two closest Coast Guard Air Stations, at Cape Cod, Massachusetts, and Atlantic City, New Jersey, each had one helicopter on alert duty, and the First Coast Guard District directed them to proceed to the area. Each Air Station was directed to recall another crew to provide additional helicopters. By about 2300, four Coast Guard helicopters were on standby at Floyd Bennett Field, Brooklyn, New York, about 12 miles from the grounding site. The helicopters remained at the field until the *Finest* was safely moored.

When the grounding prevented the *Finest* from arriving at the dock, NYFF company personnel and a police officer from the Highlands, New Jersey, Police Department got underway on the small commercial tug *Marcie* that had been moored at the SHBM, about 1/2 mile from the grounding site. However, because of the shallow water, the *Marcie* grounded about 100 feet from the *Finest* and was unable to offer assistance. The New York City Police Aviation Unit responded to the Highlands Police Department's request for the evacuation of the ill passenger. A hoist-equipped helicopter was dispatched and a crewman with a stretcher was lowered to the rooftop of the *Finest*. The passenger was hoisted from the *Finest* and taken to a local hospital, where he was treated for an allergic reaction and released.

The *Line* arrived on scene at about 2345. It could get no closer than 75 feet from the *Finest* because of the shallow water. By then, the smaller tug *Marcie* had been able to plow its way alongside the *Finest*. However, there was insufficient water depth for the *Marcie* to maneuver and free the *Finest* from its strand.

The *Finest* was refloated by the incoming tide at 0007 on January 5. The vessel proceeded under its own power, arriving at the SHBM berth at 0026. There was no hull damage to the *Finest* and no pollution resulted from the accident. At 0035, the Coast Guard MLB was ordered to return to its station, and the four Coast Guard helicopters were released at 0040 to return to their respective air stations.

At the postaccident interview, the master stated that he typically used visual line of sight to set the course from buoy 17 to the river channel buoys. However, if the buoys were not sighted visually, the SHBM presented a distinct target on his radar, and the master would adjust his course toward the marina until the buoys were located visually. After visually locating the buoys, the final approach into the river channel and marina would be accomplished by following the buoys in the channel. He further stated that he typically navigated using the radar as a check—"looking back and forth" between the radar and visual observations. The master said that, on the run during which the accident occurred, he followed his typical procedure and navigated primarily by using the radar and visual observations to estimate his position offshore and then using the lights of the marina as a specific visual reference for making the turn into the channel. When the master was asked if he knew of a feasible alternative to navigating to the marina without the use of buoys, he replied that he did not. The master said that during the afternoon trip to New

York, the approach buoys to the river had been visible. On the evening ferry run, however, the ice obscured all the buoys.[3] The master had never before made an approach to the river when all the buoys were obscured. When the master was asked, if faced with the same circumstances in the future, what could he have done differently to avoid grounding the vessel, he recommended that the Coast Guard break up the ice or have a range[4] installed. He also recommended that the company have an alternate landing site.

Injuries

No passengers or crewmembers sustained any injuries.

Damage

Inspection of the two hulls showed no damage or flooding. The weekend after the grounding, the cooling water systems for the main engines were partially disassembled to remove accumulated sand that had been ingested during the grounding. The following Monday, January 8, the *Finest* began a normally scheduled run from New Jersey to New York. During that trip, the engines overheated whenever they were operated at a high speed. After discharging passengers in New York, the remaining morning runs were cancelled, and the crewmembers spent the day cleaning out the engine cooling systems once again.

Personnel Information

Small passenger vessels carrying more than six passengers for hire may not be operated without a valid Coast Guard Certificate of Inspection (COI), which is issued by the Coast Guard Officer in Charge, Marine Inspection, for the zone. The COI, among other conditions, stipulates the minimum staffing requirements. When determining the number and competencies of the crewmembers, the Officer in Charge, Marine Inspection, considers many factors, including the size of the vessel, its route, the type and horsepower of the vessel's propulsion machinery, the number of passengers, the type and location of lifesaving equipment, and the hazards peculiar to the route and service. According to its COI, the *Finest* was required to carry a specific complement of crewmembers based on the number of passengers. (See table 1.)

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[3] To prevent their being damaged, the buoys were designed to roll under an ice floe and then right themselves when the ice breaksoke up or melted.

[4] Bowditch defines range as being when two or more objects are in line. When used with beacons, an observer having the two in line is said to be on the range. Ranges are used to indicate a safe route or the centerline of the channel. Bowditch, Nathaniel, *The American Practical Navigator*, 1995 ed. (Bethesda, Maryland: Defense Mapping Agency Hydrographic/Topographic Center, 1995): 812.

Table 1. Required Crewmember Complement for the *Finest*

Number of Passengers	Required Crewmembers*
1–149	One master, two deckhands
150–299	One master, one licensed mate, two deckhands
300–350	One master, one licensed mate, three deckhands

*The licensed mate can be substituted with a senior deckhand, designated in writing by the master and qualified in accordance with policy contained in NVIC 1-91, "Recommended Qualifications for Small Passenger Vessel Deckhands."

According to the COI,

> When underway on the navigable waters of the United States, the vessel must be under the direction and control of an individual qualified to serve as a pilot. The requirement for a pilot may be met by a first class pilot or a master or mate. When using a master or mate to serve as pilot, the individual must:
>
> Be at least 21 years old;
>
> Maintain current knowledge of the waters to be navigated by having made one round trip within the past 60 months; and
>
> Have 4 round trips over the route. If the route is to be traversed during darkness, then 1 of the 4 round trips used to qualify must be made during darkness.

At the time of the grounding, the vessel crewmembers included a master, senior deckhand, and three other deckhands. According to the Company's *Vessel Operating Manual*, the duties of the crewmembers were as follows:

> **Master** Total responsibility for the operation of the vessel and the safety of the passengers, crew and the overall condition of the vessel.
>
> **"Navigator" (Senior Deckhand)** Assist with the operation of navigational equipment, act as lookout when required and operation of deck gear.
>
> **"Steward" (Deckhand)** Operation of the Service Bar Including Its Stocking, Maintenance and Sales Transactions. Also responsible for passenger saloon cleaning and proper garbage removal from vessel.
>
> **"Engineer" (Deckhand)** Operation of the main and auxiliary machinery, its daily startup and shut down and logs.

Master

The master, age 30, held a license as "Master Near Coastal Steam or Motor Vessels of Not More than 100 Gross Tons" and held a radar observer's endorsement. He had been in the maritime industry since 1990, serving on fishing, towing, and small passenger vessels. He had previously worked as a master for another ferry company in New York. The master had completed, in 1997, a Coast Guard-approved Basic Radar and Simulator Course, which covered radar theory, observation, operation and use, interpretation and plotting, advanced radar plotting, collision avoidance, and navigational exercises. Before becoming master, while serving as a mate on a high-speed vessel, the master received on-the-job training under the supervision of another master. The master of the *Finest* stated that it took 3 months of training on the singlestick jet control system for him to become proficient in its use. The company's port captain observed the master on several check rides before he was made the master on the *Finest*. However, the NYFF had no piloting or radar training requirements or formal evaluation of these skills, and none were required.

The master joined the NYFF in September 1999 as a deckhand and was promoted to master in the spring of 2000. Although he had previously worked on another ferry, he had no previous experience on high-speed vessels before being hired at the NYFF. The master had been off duty the week before the grounding and stated he was well rested. He reported that, on the day of the grounding, he had followed his normal schedule and felt well rested.

Senior Deckhand

The senior deckhand, age 28, held no license, nor was he required to be licensed. On October 10, 2000, he had been qualified as a senior deckhand by the master, as permitted by the vessel's COI and NVIC 1-91. The NVIC recommends that a deckhand have 30 days of experience on board the vessel and 30 hours at the helm under the supervision of a master or mate in order to qualify as the senior deckhand. The senior deckhand had joined the company in August 2000. His previous maritime experience was as a boatswain mate in the Coast Guard, serving both on large cutters and at small boat stations.

Deckhands

Three other deckhands were on board. The second deckhand was the designated engineer and held a license as a "Master Inland Steam or Motor Vessels of Not More Than 100 Gross Tons," although he was not required to have a license. Another deckhand was assigned to serve as engineer and held a license as a "Master Near Coastal Steam of Motor Vessels of Not More Than 50 Gross Tons." He, too, was not required to have a license. The last deckhand was assigned to the service bar to provide concession duties and did not hold a Coast Guard license. All of the crewmembers reported that, on the day of the grounding, they had not done any unusual work and that they had followed their normal schedules, which included taking naps in the afternoon.

Vessel Information

The *Finest* is an aluminum catamaran ferry built in 1996 by Derecktor Shipyards, Mamaroneck, New York. Its overall length is 127 feet, with a beam of 33 feet. It was powered by twin diesel water jet drives and had a maximum speed of about 38 knots. The *Finest* had a capacity of 349 passengers, which could be carried in two cabins. One cabin was on the main deck, and the other was on the upper deck. A concession stand was on the main deck in the center of the vessel. The vessel's draft varied from 3.6 feet to 6.6 feet forward and 4.9 feet to 5.9 feet aft, depending on the load condition. The NYFF is a wholly owned subsidiary of Lighthouse Fast Ferry, Inc.

The *Finest*'s COI permitted the vessel to operate on a route described as "Limited Coastwise, Atlantic Ocean not more than 20 miles from a harbor of safe refuge between Montauk Point, New York and Cape May, New Jersey."

The *Finest*'s navigation and communications equipment included the following items:

- Two VHF-FM marine band radios;
- Two 3-centimeter radars, one automatic radar plotting aid equipped;
- One PinPoint electronic chart plotter;
- One Global Positioning System (GPS) with a differential GPS;
- One autopilot;
- One digital gyro compass; and
- Six portable FM business band radios.

The main propulsion cooling systems on the *Finest* had been modified to allow for operation in the ice. However, the cooling water system for the two electrical generators had not been modified and frequently became clogged when operating in ice. It was, therefore, a routine practice for vessel personnel to secure the generators when in an ice field. The engine's computerized monitoring system, the emergency lighting, the PinPoint chart plotter, and the 3-centimeter radar used by the captain operated on the 24-volt D.C. circuit and remained operational when the generators were secured because there was a battery backup system for the 24-volt system. The public address system, the second radar with the automatic radar plotting aid, and the heating, ventilation, and cooling systems required 120-volt power supplied by either one of the two generators; therefore, they were not operational while the vessel was in the ice.

The public address system was operated from the steering station on the bridge and in postaccident testing was found to be loud and clear in both cabins. Communications between the crewmembers was via portable radios on the FM business spectrum.

Waterway Information

The *Finest* operated in New York Harbor from the East 34th Street terminal in the East River to the SHBM terminal in the Shrewsbury River, an overall distance of 23 nautical miles. The route included passage through the Upper Bay through the Narrows into the Lower Bay of New York Harbor to Sandy Hook Bay. A vessel entering Sandy Hook Bay from the north will pass buoy 17, which is located 0.4 miles west of the northern tip of the peninsula. It was a direct course line from buoy 17 to the Shrewsbury River channel approach buoy number 2, a distance of 3.5 miles.

The channel into the Shrewsbury River was 100 yards wide and began at buoy 2 about 0.6 miles north of the New Jersey mainland shore. The depth in the channel approaching Sandy Hook Bay Marina is 13 to 17 feet at mean lower low water (MLLW).[5] Immediately to the east of the channel is a shoal where the depth is 2 feet at MLLW.

At the time of grounding, the tide was ebbing[6] and its level was 0.7 feet above MLLW; the tide dropped to a low level of 0.2 feet above MLLW at 2125. The *Finest* was refloated at 0007 on January 5, when the flood tide reached 1.8 feet above MLLW.

Ice coverage of the bay and river varies from year to year depending upon the winter temperatures. Ice coverage this year had begun developing two weeks before the night of the grounding. The prevailing west wind for the previous two days had blown all the ice in Sandy Hook Bay to the east side of the bay.

The Light List Volume I, *Atlantic Coast*, lists the buoys in the Shrewsbury River with the caution that, "Buoys in river are maintained from April 15 to December 1 unless otherwise noted." The buoys in the river are replaced as needed in the winter with smaller unlighted buoys that are less susceptible to ice damage. This replacement had occurred the week before the accident. On January 3, the Coast Guard had issued a Broadcast Notice to Mariners[7] advising that aids to navigation on the Shrewsbury River may be off station or missing. They further warned, "Mariners are advised not to rely upon navigational aids to affix their position."

Operational Information

On the day of the accident, the NYFF operated two domestic high-speed vessels from Highlands, New Jersey, to Manhattan, New York City, New York. The combined daily ridership was approximately 2,000 passengers. The company reported a 6 percent

[5] MLLW is the chart datum (reference point) for charted depths used in this area of the coast and is the average of the lower of two daily low tides. At most states of the tide, the mariner has at least the water depth as marked on the navigation charts. Tide tables use the same reference as the navigation charts.

[6] An ebbing tide is when water is going out (North in this case) and the water level is decreasing. A flood tide is the reverse: water coming in and water level increasing.

[7] A Broadcast Notice to Mariners is transmitted by the Coast Guard as an advisory to all mariners on VHF-FM radio every 6 hours in the area that is affected by the information.

increase in annual ridership to 297,775 passengers from the Highlands site for 2001, as compared with 2000. Highlands, New Jersey, is located on the Shrewsbury River in Monmouth County, New Jersey, one of the fastest growing counties in the state, and many of its residents commute daily to New York City for work.[8] High-speed vessel service from Highlands began in 1996 and supplemented bus and rail service into Manhattan. (See Waterways Analysis and Management section).

The NYFF has expanded operations to Keyport, New Jersey, and is scheduled to commence service from Perth Amboy, New Jersey, to Manhattan in the fall of 2002. The company also has plans to expand high-speed vessel service to Stamford and Bridgeport, Connecticut, to Manhattan, LaGuardia Airport, and Jersey City, New Jersey.[9]

Meteorological Information

The weather at the time of the accident was reported[10] to be partly cloudy, with visibility greater than 10 miles. Winds were from the west at 10 knots and had been westerly for the preceding 48 hours. Air temperature was 31º F, and it had been below freezing for more than 4 days.

Toxicological Testing

At 0128 on January 5, a Coast Guard boarding team from Coast Guard Station Sandy Hook arrived at the SHBM to conduct a postaccident test for alcohol of the master. The alcohol (breathalyzer) test was administered to the master at 0130 on January 5, approximately 6 hours after the grounding, with negative results. The president of NYFF then took the master and the 5 crewmembers to a local hospital for postaccident drug screening and had them tested for the following five drugs or classes of drugs: marijuana, cocaine, opiates, phencyclidine (PCP), and amphetamines in compliance with 46 CFR part 16. Those results were also negative.

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[8] Information obtained on June 18, 2002, from the home page for "Monmouth County Economic Development<http://www.visitmonmouth.com/econdev/facts.asp>.

[9] Electronic Maritime Newsletter, "Record Year for New York Fast Ferry" (April 26, 2002).

[10] From Newark Airport, 14 miles to the Northwest.

Survival Factors

Passenger Evacuation

The passenger with the allergic reaction was the only passenger evacuated while the vessel was aground. The passenger had been taken to a waiting area in the aft end of the vessel. The remaining passengers were kept on board in anticipation that the incoming tide would refloat the vessel. The president of NYFF stated that he had discussed with Coast Guard Activities New York the possibility of arranging for a tug and shallow draft barge if passenger evacuation became necessary.

Passenger Information

There were 258 passengers on board at the time of the grounding. Passengers are boarded with tickets purchased beforehand, but names and other identification are not recorded routinely. The passenger count is developed from the collection of tickets as the passengers board and is recorded in the vessel's log. On this trip, 66 passengers boarded at the E. 34th Street pier and 192 boarded at pier 11. After the grounding, passengers were asked to provide a business card or their names on a piece of paper to one of the crewmembers. Safety Board investigators interviewed eight passengers by telephone, all of whom described the situation after the grounding as calm. The passengers also reported that the first announcement came 45 minutes after the grounding. Before that, they said, they had felt the vessel come to a stop, and some passengers recalled deckhands walking through the cabins telling passengers that the vessel was aground. All of the passengers said that more updates should have been given as the event unfolded.

Lifesaving Equipment

The *Finest* was required to carry 354 adult lifejackets, 36 child lifejackets, and 3 inflatable buoyant apparatus for 250 people.[11] The equipment was on board, accessible, and in good condition.

Other Information

High-Speed Vessels

High-speed vessels, often called fast ferries, are a relatively new form of commuter transportation in the United States. High-speed vessels are the result of technological advancements in wave piercing multi-hulls as well as improvements in diesel engine designs. In 1999, the Coast Guard, in partnership with the Passenger Vessel

[11] In accordance with Title 46 CFR Part 117.200, vessels on a Limited Coastwise without overnight accommodations are required to carry Inflatable Buoyant Apparatus for 67% of the total persons that can be carried in accordance with the COI.

Association, of which the NYFF is a member, recognized the need to address safety and training issues that were unique to high-speed vessels in domestic trade and chartered a working group of Coast Guard and industry people to develop voluntary risk mitigation measures in the areas of training, operations, and bridge equipment. Navigational safety was the primary consideration in defining high-speed vessels. According to the working group's findings, "International studies have concluded that the primary risk associated with high-speed vessel operations is risk of collision."[12] The working group also developed guidelines for crewmember training that were designed to ensure that crewmembers are prepared "to safely handle all aspects of vessel operations, both routine and non-routine."[13]

Waterways Analysis and Management System

In 1992, the Coast Guard conducted a Waterways Analysis and Management System review of the Sandy Hook Bay and tributaries, including the Shrewsbury River. The review was conducted to determine if changes in traffic patterns in the waterways warranted changes in navigational aids. A Local Notice to Mariners solicited comments from area waterway user groups, but no comments were received. However, in response to a Coast Guard questionnaire, the user groups stated that Shrewsbury River navigational aids were difficult to locate while entering the channel because of background lights and the size of the aids. In addition, two commercial companies had sent letters to the Coast Guard in the mid-1980's requesting better navigational aids in the river entrance. The correspondence was included in the review.

The review concluded that commercial operators had been able to transit the Shrewsbury River during the winter months with almost no navigational aids. However, the review acknowledged that although navigation into the Shrewsbury River was possible with inadequate or missing navigational aids, the situation was "unsafe."[14]

As a result of the review and because of the requests from commercial operators, buoys 2 and 3 were replaced by fixed lighted structures with dayboards.[15] However, during the winter of 1993 and 1994, the beacons were rendered inoperable by ice storms, and the buoys were returned. The fixed structures were never returned, and the smaller unlighted buoys were in use on the night of the grounding.

Navigational Procedures

Piloting in restricted waters requires frequent determination of a vessel's position because the situation can change rapidly, requiring frequent course changes while

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[12] NVIC No. 5-01, Enclosure, 5.

[13] Ibid, 6.

[14] U.S. Coast Guard Activities New York, *Waterways Analysis and Management System (WAMS) Review* (1992).

[15] According to the *Light List*, 26, a dayboard is "the daytime identifier of an aid to navigation presenting one of several shapes (square, triangle, rectangle) and colors (red, green, white, orange, yellow or black).

transiting channels, rivers, or bays, or adjusting to avoid other vessels in congested waterways.[16]

A navigator[17] should use all available information and make decisions based on a complete evaluation of the situation.[18] A vessel's position can be determined by use of the following navigational aids:

- Visual navigational aids, such as buoys and beacons in conjunction with nautical charts;
- Electronic navigational aids, such as radio detection and ranging (Radar), LORAN (long range navigation), and differential GPS;[19] and
- Electronic chart display and information systems and electronic nautical charts with GPS interface.

Navigational aids vary with the type of vessel, the conditions of the waterway, and the navigator's experience. However, it is accepted and documented in navigation textbooks that a prudent mariner does not rely on one single aid. Navigators must be aware of the vessel's position, maintain a lookout for other vessels, determine if the risk of collision exists, and adjust course as the situation dictates. To successfully accomplish all of these tasks, the navigator must rely on multiple sources of navigational information.

One simple method of radar navigation is accomplished by using the radar's variable range marker (VRM) and electronic bearing line (EBL) to establish the vessel's position. The VRM is an adjustable range ring that rotates or sweeps around the center of the radarscope. The EBL is a radial straight bearing line emanating from the center of the radarscope that can be adjusted and rotated around the radarscope to determine bearings to echoes.[20] The EBL can be aligned to a specific known target, and the VRM can be set so that the range ring coincides with the target. The result is the bearing and distance to the target which, when plotted on a chart, gives the vessel's position. The navigator can take multiple ranges, bearings, or combinations of both to accurately determine the vessel's position.

Radar VRMs can also be used to warn a navigator that a vessel is approaching a danger area. From a nautical chart, the navigator would determine the closest distance or range to a point of reference (land or a navigational aid) that the vessel could proceed to

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[16] Robert Watson-Watt, *The Use of Radar at Sea*, 4th ed. (Annapolis, Maryland: Naval Institute Press, 1976): 127.

[17] The navigator is the person who is directly responsible for the operation of the craft. In this analysis, the "navigator" is used when referring to the mariner, either master or mate/senior deckhand, who is conning the vessel. A navigator is not the same as the navigational officer who would be responsible for maintenance of navigational equipment and charts.

[18] Bowditch, 1.

[19] GPS stands for Global Positioning System, which is a satellite-based system that enables users to determine exactly where they are in terms of longitude and latitude.

[20] Echo is the indication on a radarscope representing a target, such as land or another vessel. It is also referred to as a return, blip, or pip. Bowditch, 750.

before endangering the vessel. The navigator would set the VRM equal to the distance that he got from the chart. When the range ring is tangent to the point of reference, the vessel is at the point that an alteration of course should be made. The range ring would warn the navigator not to approach closer than the preset range.

Another simple method of electronic navigation utilizes differential GPS in conjunction with an electronic chart. This method provides a high level of reliability and accuracy. The *Finest* had both a differential GPS and an electronic chart (PinPoint Plotter), but at the postaccident interview the captain stated that the PinPoint Plotter was not operational because the electrical generators had been shut down because the vessel was operating in ice. However, based on manufacturers' data and subsequent information from the company's port captain, it was determined that the PinPoint chart display and GPS systems were DC powered and, therefore, operable without the ship's generators and available for use on the night of this accident.

Marine Transportation System

In 1999, following an assessment of the U.S. marine transportation system, the Department of Transportation submitted a report to Congress that summarized "the adequacy of the Nation's marine transportation system (including ports, waterways, harbor approach channels and their intermodal connections) to operate in a safe, efficient, secure, and environmentally sound manner." The marine transportation system consists of waterways, ports and their intermodal connections, vessels, vehicles, and system users.[21] The report predicted that domestic waterways will experience rapid growth in commercial ferry transportation as a result of the congested land transport systems and that recreational use of the marine transportation system will increase by 65 percent over the next 20 years, to more than 130 million annual users.

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[21] Information obtained on June 18, 2002, from the marine transportation system home page titled "An Assessment of the U.S. Marine Transportation System, A Report to Congress, September 1999 <www.marad.dot.gov/publications/MTSreport>.

Analysis

General

This analysis first identifies factors that can be readily eliminated as causal or contributory to the grounding. The report then discusses the following safety issues that were identified during this investigation:

- Adequacy of navigational procedures;
- Adequacy of navigational aids in the Shrewsbury River; and
- Appropriateness of alcoholic beverage service after an accident.

Exclusions

The vessel's propulsion and steering equipment were operating properly and had no bearing on the cause of the grounding. Although the generators had to be shut off once the vessel was in the ice, the loss of the mate's radar did not contribute to the grounding because the master's radar, GPS, and chart plotter were available for use and were sufficient to allow the master to safely navigate his vessel under the circumstances. Securing the generators upon entering the ice during the approach to the SHBM was reasonable and had no impact on the safety of the passengers or the navigation of the vessel. Visibility and currents did not have any bearing on the accident. The emergency response was timely. A New York City Police Aviation Unit helicopter evacuated an ill passenger, and Coast Guard and local emergency responders stood by in the event further assistance was needed. While alcohol testing of the master was conducted within about 1 hour of the vessel's arrival at the dock, the elapsed time between the grounding and testing was about 6 hours. This time delay was attributed to the vessel being aground in the ice and unreachable; accordingly, it was not practical to have conducted the testing any sooner than it was. Because the results of the test were negative and because the master's behavior and performance postaccident were uniformly professional and appropriate for the circumstances, the use of alcohol was most probably not a factor in this accident. Nevertheless, because of the long delay in testing, the possibility of alcohol impairment cannot be completely eliminated.

In addition, postaccident drug testing was conducted on the crewmembers and results were negative. The crewmembers had the opportunity to rest for 5 hours before getting underway from New York for the evening run and had been on duty for only 3 1/2 hours before grounding. The crewmembers also stated that they were well rested. Therefore, fatigue was not likely an issue. Consequently, the Safety Board concludes that major equipment failure, visibility, currents, fatigue, and drugs were not factors in this accident.

Accident Analysis

The domestic high-speed vessel *Finest,* with a complement of 5 crewmembers, 258 passengers, and one company official, was en route from the borough of Manhattan, New York City, New York, to Highlands, New Jersey, when it grounded in Sandy Hook Bay on the approach to the Shrewsbury River entrance channel. The master had diverted his vessel to pass clear of an ice field that covered his normal route to the channel and made an approach with the channel buoys obscured by the ice. The master's turn into the channel entrance was based on his visual observations of the SHBM's lights. The vessel grounded about 300 yards east of the channel. No injuries or deaths resulted from this accident; however, one person on board had to be evacuated from the vessel by helicopter for medical treatment of an allergic reaction unrelated to the accident.

Adequacy of Navigational Procedures

Crewmember Actions

On a typical approach to the SHBM, the navigator would set the vessel's course for the Shrewsbury River channel after passing buoy 17 and Sandy Hook Point. He would look for the channel buoys visually and attempt to locate the buoys on his radar. The SHBM also presented a distinct target on the radar. The navigator could set the vessel's course in the approximate direction of the channel buoys and the SHBM. Because the bay was sufficiently deep and broad, the navigator would not be required to maintain a precise trackline until nearing the entrance to the channel. After the navigator had sighted the entrance buoys visually, he would make course adjustments into the channel using the buoys as reference. The distance from buoy 17 to buoy 2 (at the entrance to Shrewsbury River) is 3 1/2 miles. At 30 knots, it would take less than 8 minutes for the vessel to travel from buoy 17 to buoy 2.

On the trip during which the vessel grounded, the master chose to deviate from his normal approach to avoid an ice field. Instead of a direct course (165º true) from buoy 17 to the channel, the master headed the vessel in a southerly (180º true) direction toward Atlantic Highland breakwater and made the approach to the Shrewsbury channel from the west. To enter the channel, the master had to make a 90º starboard turn without the use of the buoys as references. (See figures 5 and 6.) However, he had sufficient electronic navigation equipment available to him to have executed the maneuver safely.

At the point of entering the ice field, the approximate distance to the position of buoy 2 was 6/10 mile. The master continued into the ice field toward the estimated position of buoy 2 at a speed of about 32 to 34 knots and continued to look for the approach buoys visually and by radar. When the vessel was approximately 3/10 mile from channel approach buoy 2, the master began reducing his speed to about 25 knots. He made one final attempt to locate the buoys by having the deckhand go on the bridge wing to obtain a visual sighting. The master then made his turn toward the SHBM based on a visual observation of the SHBM's lights and a radar observation of the SHBM. Attempting this maneuver at such a high speed was not prudent.

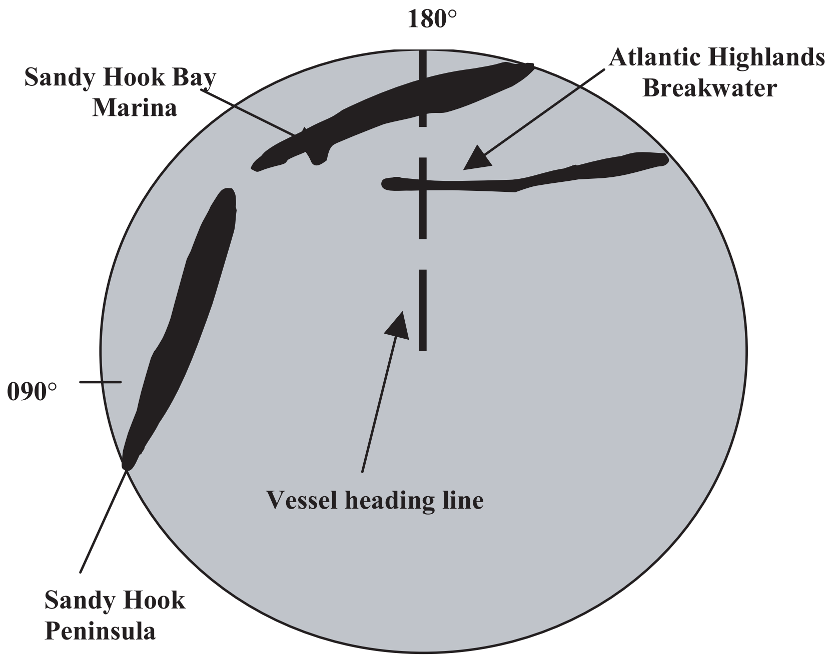

Figure 5. The radar presentation as the vessel proceeds on a southerly trackline (180°) toward Atlantic Highlands breakwater. The vessel is at center of the presentation. The dashed line is the vessel's heading line

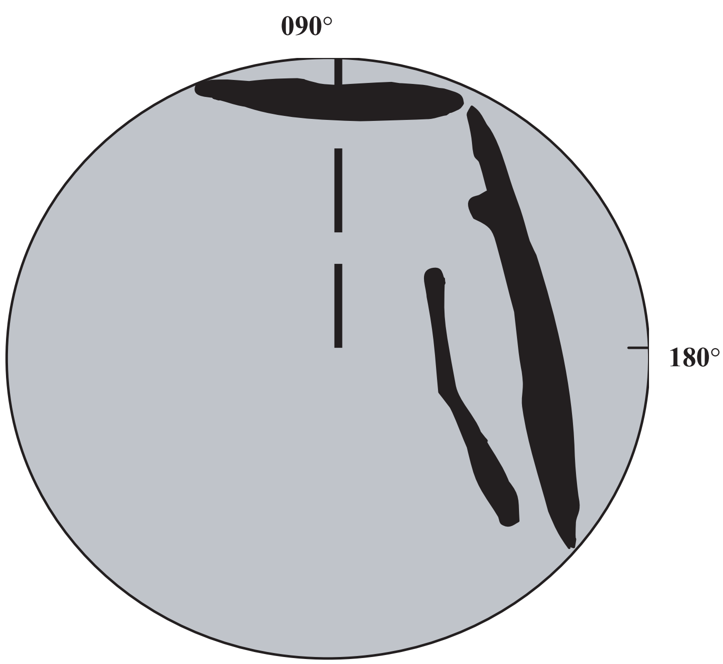

Figure 6. The radar presentation after the vessel turns left to the east toward Sandy Hook Peninsula and begins approaching the channel.

At the postaccident interview, the master was asked, if faced with the same circumstances in the future, what could he have done differently to avoid grounding the vessel. He recommended that the Coast Guard break up the ice or have a range installed. He also recommended that the company have an alternate landing site. When asked if there was an alternative to using the buoys to enter the marina, he stated that he did not know of an alternative.

There were alternative methods of navigation that the master could have used to safely navigate the vessel into the marina. He could have set his radar's VRM to a range of 1/2 mile to serve as a danger marker. (See figure 7.) As he approached Sandy Hook Peninsula on his trackline, the distance to the land would close or decrease and would be readily apparent on the radarscope. When the distance to land was 1/2 mile, the range ring would appear to be tangent to the land mass and the vessel would be at the turn point. (See figure 8.) If the vessel continued toward the land without changing course, the range ring would pass over the land, indicating that the distance was less than the 1/2 mile from the vessel and that, as a result, the vessel would be approaching shallow water.

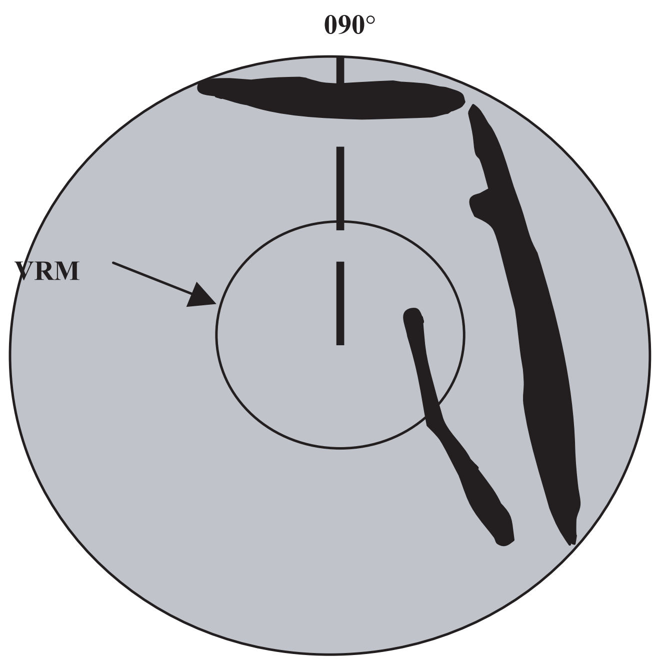

Figure 7. The VRM is set at the range that the vessel should be when it is to make the turn to the right toward the SBHM.

The master could have also determined the true course line of the channel and adjusted his EBL to display either the true or relative bearing from his easterly heading. (See figure 9.) At the point that the EBL was aligned into the marina, while the VRM became tangent with the land mass, the master would know that the vessel was at the point where it was safe for it to head toward the SHBM. (See figure 10.)

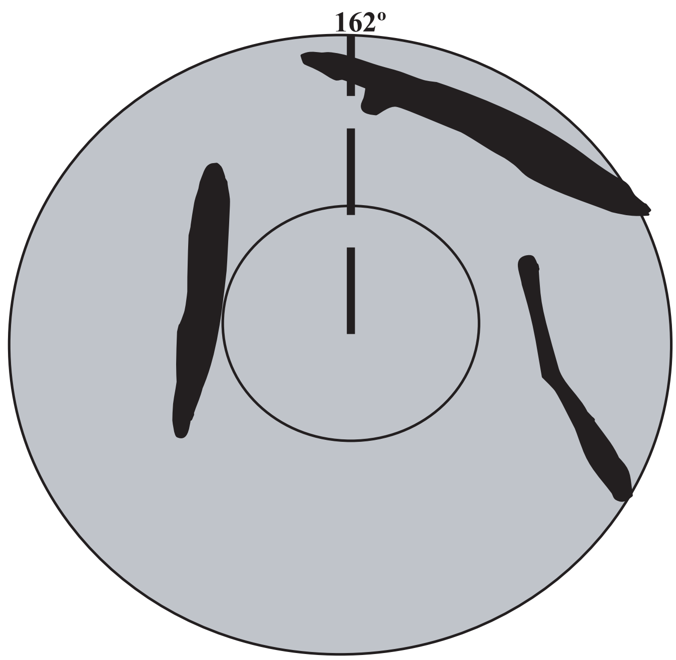

Figure 8. The radar presentation after the vessel turns to right toward the SHBM.

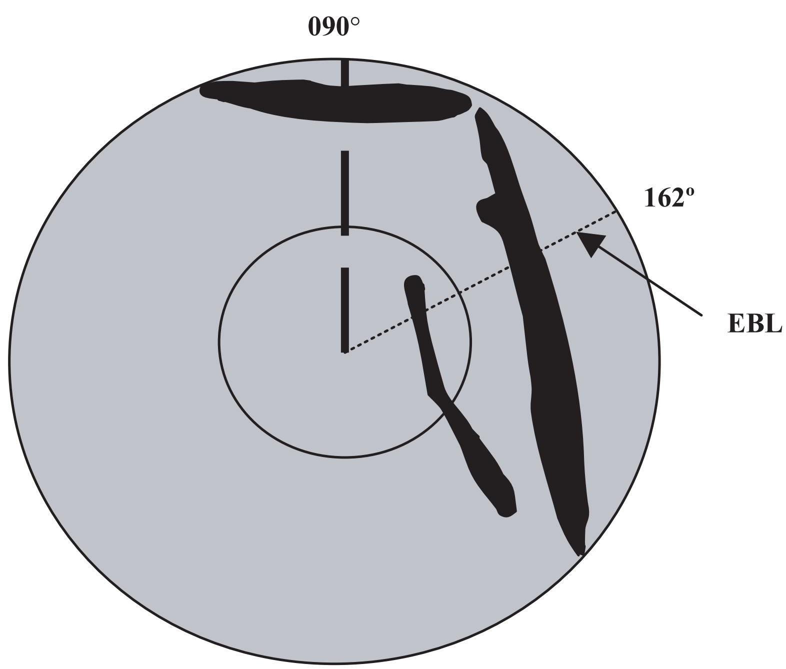

Figure 9. Electronic bearing line is set to the bearing that the vessel will have to change to when turning into the channel.

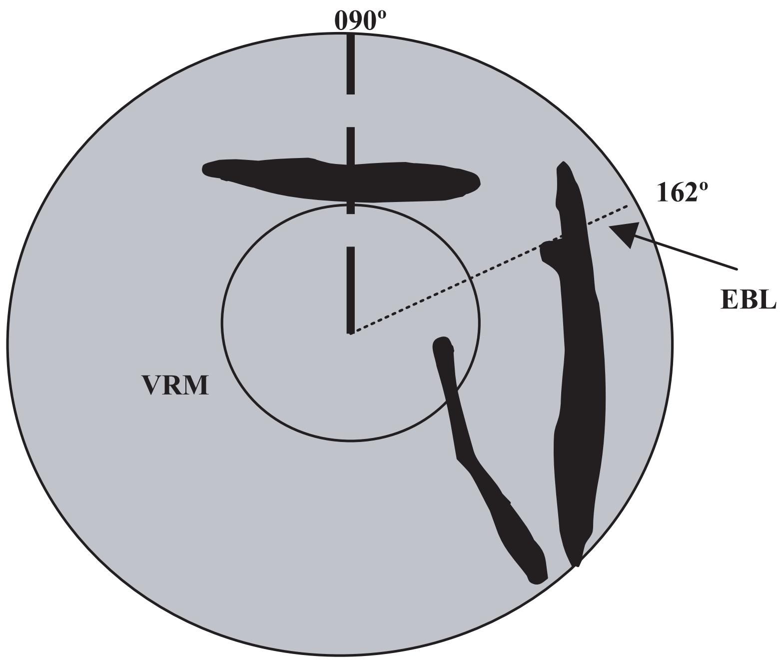

Figure 10. The VRM is tangent to Sandy Hook Peninsula and the EBL is tangent to the SHBM, indicating that the vessel is at the position to change course into the channel.

The master could also have used a prominent shoreline point to obtain a fix based on the range and bearing to that point. The Atlantic Highlands breakwater light would have provided a prominent mark for the master to fix the vessel's position. Yet another option that the master could have employed to determine the vessel's position was to use the PinPoint chart plotter with the appropriate GPS input. Had the master used radar range and bearing, or the GPS with the PinPoint chart plotter, he could have established the vessel's position and navigated into the marina without incident.

The master had a radar, GPS, paper chart, and electronic chart available to use to establish the vessel's position. The Safety Board concludes that the master could have successfully made the transit into the Shrewsbury River by using the navigational equipment that was available to him.

The master had never made an approach into the channel when all of the buoys were obscured by ice. On the trip before the grounding, buoy 2 was the only aid visible. Moreover, the master had adequate warning from the Light List and Broadcast Notice to Mariners that the possibility existed that ice might obscure all of the buoys. The master had traveled the route for months prior to the night of the grounding. He had ample opportunity to use alternate forms of navigation with the equipment available to him.

Because he did not have an alternate plan before entering the ice field, the master should have taken precautions by devising a plan before approaching the channel. As discussed earlier, his radar could have provided him with the information necessary to establish his position. However, the master continued at the service speed of 32 to 34 knots until he had entered the ice and proceeded to the channel entrance without establishing his position. He relied on visually locating the obscured buoys up until the vessel made the final turn toward the marina.

A vessel's position can be established by plotting[22] information that is determined by radar. The range and bearing plot to a distinctive landmark or fixed navigational aid is an effective tool for establishing a vessel's position. However, information from the radar must be transferred onto a nautical chart that, depending on the proficiency of the navigator, can take 30 to 60 seconds. In pilotage waters, the situation can change rapidly, and the navigator may only be able to use the chart as a guide and not have the time to transfer the radar information to the chart. A vessel traveling at 30 knots advances at 1/2 mile per minute. Therefore, if the master had attempted to establish his position by plotting the radar information without slowing down, the vessel would have traveled beyond the turning point and been in shallow water before the master would have been able to assess and react to the information and turn the vessel. Further, the existing conditions, including nighttime operations, the presence of ice, the lack of floating aids to navigation, and the unfamiliarity of the master with the attempted turn maneuver all demanded a more cautious approach to the turn point at the entrance to the Shrewsbury channel. Prudence should have dictated that the master approach the turn at a slower speed. The Safety Board, therefore, concludes that the master was going too fast to permit him to safely approach the entrance to the Shrewsbury River channel under the prevailing conditions.

Because it would have taken some time to plan and execute his approach, the master should have reduced speed once he could not locate the buoys visually or identify them on radar. After reducing his speed, the master should have determined his position by plotting a radar range and bearing or by using GPS and the electronic chart. Maintaining speeds in excess of 25 knots and relying on visual observations with only limited use of other navigational aids, is not prudent when attempting to turn into a narrow channel in a situation in which the vessel's position is not established.

The master had completed a radar course that included instructions in radar navigation. However, proficiency in radar navigation is a skill that is developed from hands-on experience. The principles can be introduced in a classroom environment or with a simulator, but the radar must be used in routine conditions so that the navigator can call upon the skill when needed as circumstances change. The master did not use the PinPoint chart plotter and did not consider using it on the night of the accident. The chart plotter, radar, buoys, and fixed structures are all navigational aids that should be used, when appropriate, by the prudent mariner. The master of the *Finest*, by his actions and answers to interview questions, indicated that he relied primarily on buoys and visual observations to navigate. He used the radar solely as an extension of his eyes for early warning. The observations he took from the radar were approximations and not measured bearing or ranges. The Safety Board concludes that because the master of the *Finest* did not routinely

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[22] Plotting is defined as drawing lines and points to represent certain conditions graphically, as on a nautical chart, to represent the position and progress of a vessel.

train on or use all the available navigational equipment in routine conditions, he may not have been prepared to use the equipment on the night of the grounding when conditions were nonroutine.

The Coast Guard and the high-speed small passenger vessel industry have approached the issue of operational safety of high-speed vessels as “partners.” The partnership hopes to improve safety by relying on a voluntary versus a regulatory approach. The Coast Guard has issued NVICs that serve as guidelines to the industry to improve safety. In theory, the company, in turn, by joining in the partnership, is supposed to improve the safe operation of its vessels through voluntary action without having burdensome regulations imposed upon it. One such improvement would be to ensure that people are capable of using all the navigational equipment on the ship.

The company hired the master and was responsible for ensuring that he was prepared to use all of the equipment available to ensure a safe operation. Before the master was promoted, the company’s port captain made a few check rides with the master. However, the company did not evaluate the master in the use of the on-board navigational equipment. The company also did not make subsequent evaluations of the master to determine if he was proficient in the use of all the available navigational equipment. If the NYFF had ensured that the master as well as senior deckhands operating in the capacity of navigator were trained on and used the installed navigational equipment to proficiency, the grounding would not have occurred. Therefore, the Safety Board believes that the NYFF should establish and implement requirements that vessel masters and crewmembers with navigational responsibilities use to proficiency all installed vessel navigation equipment and institute procedures to periodically monitor their performance.

The NYFF did not have any standard operating requirements for the navigation of its vessels in adverse environmental conditions. In the Safety Board’s opinion, the safe navigation of company vessels is as much a responsibility of the company management officials as it is the master of the vessel. To discharge its responsibility, the company should establish minimum operating standards for conducting navigation watches and for specifying actions to be taken by vessel operating crewmembers during periods of adverse environmental conditions. At a minimum, company officials should specify the minimum frequency of navigation fixes and the maximum speeds of advance during adverse conditions and require the use of electronic navigation equipment whenever the environmental conditions deteriorate to reduce visibility from any cause or result in any condition, such as ice, that precludes the use of visual aids to navigation. Had the NYFF enforced such operating standards for some time before this accident, the master would have been required to proceed at a slower speed and would have been acclimated to the use of the electronic navigation equipment provided. Had this occurred, this accident might have been avoided. Consequently, the Safety Board concludes that the lack of vessel operating standards for navigation in adverse environmental conditions played a decisive role in the vessel’s grounding. The Safety Board, therefore, believes that NYFF should establish and implement vessel operations standards for navigation in adverse environmental conditions, including fog, snow, heavy rain, and ice.

Adequacy of Navigational Aids in the Shrewsbury River

The Coast Guard concluded in its 1992 Waterways Analysis and Management System study that while it was possible for vessels to navigate in the Shrewsbury River without navigational aids, to do so was “unsafe.” Commercial operators in the river had requested larger fixed aids for the Shrewsbury River Channel, and, in 1993, the Coast Guard installed two beacons at the position of buoys 2 and 3. The beacons were damaged during a winter storm and replaced with buoys. The lighted buoys in the Shrewsbury River channel are replaced in the winter by smaller unlit buoys, which are less susceptible to ice damage. These smaller buoys, however, can be moved off station or forced under the ice, thereby leaving the channel inadequately marked. On the evening of the grounding, all of the channel buoys were obscured by ice. Without the aids, the master used visual observations of shore lights to make the final turn, something he did not normally do, and went aground.

Beacons would be visible on radar and give the navigator a precise reference point to use in navigating regardless of conditions. (See figure 11.) Radar, especially in fog, is critical for determining the risk of collision. Because radar is used for collision avoidance and, at the same time, can be used for navigation, the importance of maintaining a radar watch cannot be overstated. Beacons that can be quickly identified by radar assist the mariner by allowing him to navigate and maintain a watch for other vessels at the same time.

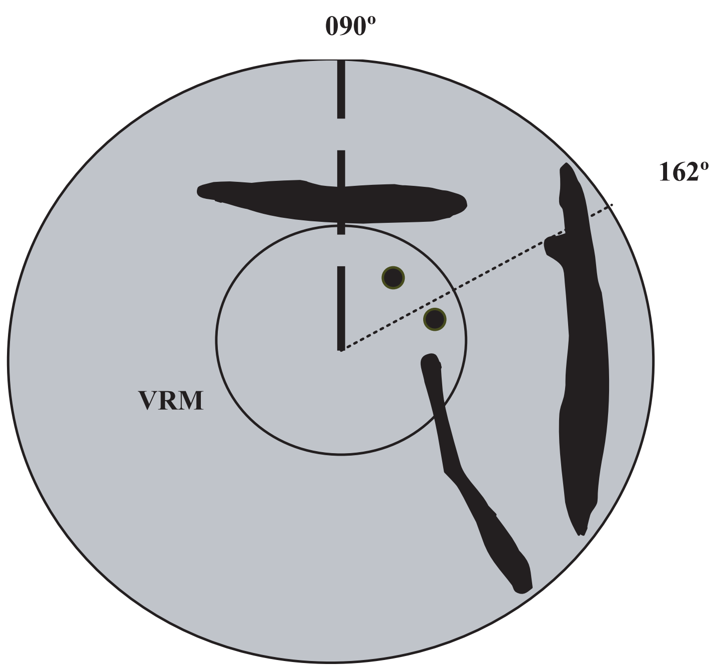

Figure 11. The radar presentation with beacons in place marking the channel.

Small passenger vessels were crucial to the evacuation of Manhattan on September 11, 2001. Because of their speed, in a time of disaster, high-speed vessels could evacuate large numbers of people from New York City. The potential use of high-speed vessels in such circumstances makes the provision of reliable navigational aids all the more critical.

The Safety Board considered whether the placement of ranges would help vessels transit the channel. However, ranges are ineffective in conditions of reduced visibility. Beacons that are permanently installed at the entrance to a channel, however, will not be hidden by ice and can also be identified by radar in fog. The Safety Board concludes that the safety of navigation in the Shrewsbury River channel would be enhanced by the installation of navigational aids that are available for use in all conditions of visibility. Therefore, the Safety Board believes that the Coast Guard should install beacons to augment or replace buoys at the entrance to the Shrewsbury River Channel.

Appropriateness of Alcoholic Beverage Service After an Accident

After the grounding, shoreside vessel management initiated an "open bar" as a means of compensating the passengers for the delay. This gesture included all items at the snack bar, including alcoholic beverages. Complimentary beverage service is a relatively common action in the food service industry as compensation for poor or interrupted service. However, unrestricted alcoholic beverage service could have created a serious problem in this situation. According to the Coast Guard report of this accident:

> It presented a safety concern that now had to be factored into the planning. We wanted to avoid a situation where we now had inebriated passengers to rescue. This became a grave concern, and if it became necessary, prohibited the USCG from using helos [helicopters] or other assets if feasible.

The Safety Board concurs with this assessment. Had evacuation by any means been necessary in the dark and the ice-choked waters, the operation itself would have been hazardous to passenger safety. Adding inebriated persons and the resulting loss of motor skills and impaired judgment would have created an unnecessary and serious threat to the safety of the rescuers as well as those they were trying to rescue.

Throughout the small passenger vessel industry, efforts aimed at customer satisfaction and appeasement must be balanced against the risk to passenger safety. Continued service of alcoholic beverages after an accident creates a potential crowd management problem. While this problem has not been identified in previous Safety Board investigations, the Safety Board feels that it is an important safety issue. These vessels may carry many hundreds of passengers with crews of varying size, depending on what their certification requires. For example, the *Finest* was certified to carry up to 389 passengers with six crewmembers, including a master and mate (or senior deckhand). Because the master and mate are responsible for controlling the vessel, that would leave only four deckhands to manage nearly 400 people during an emergency. With a ratio of deckhands to passengers of nearly 1 to 100, it would take very few inebriated passengers to overwhelm the ability of the crewmembers to maintain control. This is especially likely because the deckhands on the *Finest* had no training in crowd control management.

The situation on the *Finest* is not unique. All small passenger vessels face the potential of having to deal with an emergency in which the ratio of crewmembers to passengers is very low, in many cases much lower that 1 to 100. Similarly, most deckhands on small passenger vessels are not trained in crowd control management. This raises serious concerns about the ability of such crewmembers to maintain control of inebriated passengers during emergency situations. The Safety Board concludes that serving alcoholic beverages in emergency situations that may require passenger evacuation or other forms of passenger management is not a prudent action. Therefore, the Safety Board believes that NYFF should establish a company policy requiring the cessation of alcoholic beverage service during emergency situations and that policy should be included in its vessel operating manual.

Conclusions

Findings

1. Major equipment failure, visibility, currents, fatigue, and drugs were not factors in this accident.

2. The master could have successfully made the transit into the Shrewsbury River by using the navigational equipment that was available to him.

3. The master was going too fast to permit him to safely approach the entrance to the Shrewsbury River channel under the prevailing conditions.

4. Because the master of the *Finest* did not routinely train on or use all the available navigational equipment in routine conditions, he may not have been prepared to use the equipment on the night of the grounding when conditions were nonroutine.

5. If New York Fast Ferry had ensured that the master as well as senior deckhands operating in the capacity of navigator were trained on and used the installed navigational equipment to proficiency, the grounding would not have occurred.

6. The lack of vessel operating standards for navigation in adverse environmental conditions played a decisive role in the vessel's grounding.

7. The safety of navigation in the Shrewsbury River channel would be enhanced by the installation of navigational aids that are available for use in all conditions of visibility.

8. Serving alcoholic beverages in emergency situations that may require passenger evacuation or other forms of passenger management is not a prudent action.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding of the *Finest* was the failure of the vessel master to use appropriate navigational procedures and equipment to determine the vessel's position while approaching the Shrewsbury River channel. Contributing to the cause of the grounding was the lack of readily visible fixed navigational aids. Also contributing to the cause of the grounding was the failure of New York Fast Ferry to require the use of installed navigation equipment and to set guidelines for operations in adverse environmental conditions.

Recommendations

As a result of its investigation of this accident, the National Transportation Safety Board makes the following recommendations:

To the U. S. Coast Guard:

Install beacons to augment or replace buoys at the entrance to the Shrewsbury River channel. (M-02-18)

To New York Fast Ferry:

Establish and implement requirements that vessel masters and crewmembers with navigational responsibilities use to proficiency all installed vessel navigation equipment and institute procedures to periodically monitor their performance. (M-02-19)

Establish and implement vessel operations standards for navigation in adverse environmental conditions, including fog, snow, heavy rain, and ice. (M-02-20)

Establish a company policy requiring the cessation of alcoholic beverage service during emergency situations and include that policy in your Vessel Operating Manual. (M-02-21)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

CAROL J. CARMODY
Acting Chairman

JOHN A. HAMMERSCHMIDT
Member

JOHN J. GOGLIA
Member

GEORGE W. BLACK, JR.
Member

Adopted: September 17, 2002

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Appendix A

Investigation

The U.S. Coast Guard notified the Safety Board of the accident on the evening of January 4, 2001. Although no injuries and no damages resulted from the accident, the Safety Board decided to investigate because a large number of passengers were at risk and, had the situation unfolded differently, there was the potential for serious consequences. The Safety Board dispatched an investigative team from its Washington, D.C., headquarters on the morning of January 5. The team arrived on scene that same morning and commenced the investigation. Investigators examined the vessel and conducted interviews of the crewmembers and company officials. The on-scene investigation was completed on January 9, 2001.

The Safety Board investigated the accident under the authority of the Independent Safety Board Act of 1997, according to the Safety Board's rules. The designated parties to the investigation were the U.S. Coast Guard and New York Fast Ferry.