

**Capsizing of U.S. Small Passenger Vessel  
*Taki-Too*, Tillamook Bay Inlet, Oregon  
June 14, 2003**



**Marine Accident Report**

**NTSB/MAR-05/02**

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**PB2005-916402**

**Notation 7582B**



**National  
Transportation  
Safety Board**  
Washington, D.C.



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Adopted June 28, 2005**



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

**National Transportation Safety Board. 2005. *Capsizing of U.S. Small Passenger Vessel Taki-Tooo, Tillamook Bay Inlet, Oregon, June 14, 2003. Marine Accident Report NTSB/MAR-05/02. Washington, DC.***

**Abstract:** This report discusses the June 14, 2003, accident in which the U.S. small passenger vessel *Taki-Tooo* capsized while attempting to cross the bar at Tillamook Bay, Oregon. A master, deckhand, and 17 passengers were on board the charter fishing vessel when it was struck broadside by a wave and overturned. The master and 10 passengers died in the capsizing; the deckhand and 7 passengers sustained minor injuries. The *Taki-Tooo*, with a replacement value of \$180,000, was a total loss.

From its investigation of the accident, the Safety Board identified the following major safety issues: decision to cross the bar, Tillamook Bay operations, and survivability.

On the basis of its findings, the Safety Board made recommendations to the U.S. Coast Guard, the National Marine Charter Association, and the owners and operators of charter fishing vessels operating out of Tillamook Bay, Oregon.

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## Acronyms and Abbreviations

|              |  |
|--------------|--|
| <b>A-VIP</b> | Accredited Vessel Inspection Program       |
| <b>CFR</b>   | <i>Code of Federal Regulations</i>         |
| <b>COI</b>   | certificate of inspection                  |
| <b>COTP</b>  | Captain of the Port                        |
| <b>EMS</b>   | emergency medical service                  |
| <b>EPIRB</b> | emergency position indicating radio beacon |
| <b>GPS</b>   | Global Positioning System                  |
| <b>ICAO</b>  | International Civil Aviation Organization  |
| <b>IFR</b>   | interim final rule                         |
| <b>MLB</b>   | motor lifeboat                             |
| <b>NMCA</b>  | National Marine Charter Association        |
| <b>NPRM</b>  | notice of proposed rulemaking              |
| <b>NWG</b>   | Natural Working Group                      |
| <b>OHSU</b>  | Oregon Health and Science University       |
| <b>PFD</b>   | personal flotation device                  |
| <b>SNPRM</b> | supplemental notice of proposed rulemaking |
| <b>WAAS</b>  | Wide Area Augmentation System              |

## Executive Summary

On June 14, 2003, the small passenger vessel *Taki-Too*, a U.S. charter fishing vessel with 2 crewmen and 17 passengers on board, was en route from the marina at Garibaldi, Oregon, to the Pacific Ocean for a day of fishing. A small craft advisory was in effect for the northern Oregon and southern Washington coasts, and personnel at U.S. Coast Guard Station Tillamook Bay had activated the rough bar warning signs based on their assessments of existing hazardous conditions. At the Tillamook Bay inlet, the *Taki-Too* operator waited in the channel for an opening in the ocean swells so that he could cross the bar. After the *Taki-Too* exited the inlet and turned northward around the north jetty, a wave struck and capsized the vessel. As a result of this accident, the master and 10 passengers died; the deckhand and 7 passengers sustained minor injuries. The vessel, which had a replacement value of \$180,000, was declared a total loss.

The Safety Board's investigation of this accident identified the following major safety issues:

- Decision to cross the bar
- Tillamook Bay operations
- Survivability

The National Transportation Safety Board determines that the probable cause of the capsizing of the *Taki-Too* was the decision of the master to attempt to cross Tillamook Bay bar despite the hazardous sea state that existed at the time. Contributing to the severity of the accident was the failure of the *Taki-Too* master to ensure that he, the deckhand, and the passengers donned lifejackets before crossing the bar. Also contributing to the severity of the accident was the failure of the U.S. Coast Guard to enforce the regulatory requirement at 46 *Code of Federal Regulations* 185.508, which stipulates that vessel masters shall require passengers to wear lifejackets when transiting a hazardous bar.

As a result of this investigation, the Safety Board makes recommendations to the U.S. Coast Guard, the National Marine Charter Association, and the owners and operators of charter fishing vessels operating out of Tillamook Bay, Oregon.



# Factual Information

## Synopsis

About 0605 the morning of June 14, 2003,<sup>1</sup> the U.S. charter fishing vessel *Taki-Too* departed the marina at Garibaldi, Oregon, with 17 passengers and 2 crewmembers on board. The vessel proceeded to an area near the seaward entrance to Tillamook Bay, where the master waited for an opening in the ocean swells to navigate the hazardous shoal area.<sup>2</sup> About 0715, the *Taki-Too* left the inlet, turned to the north, and encountered a wave that capsized the vessel. The master and 10 passengers died (two persons were missing and were declared dead). The deckhand and seven passengers either washed or swam ashore on a nearby beach and survived.

## Accident Narrative

The day before the accident—Friday, June 13, 2003—the National Weather Service in Portland, Oregon, had issued marine forecasts<sup>3</sup> containing a small craft advisory<sup>4</sup> for coastal areas of southern Washington and northern Oregon, which included Tillamook Bay (see figure 1).

For most of the day, the U.S. Coast Guard Station at Tillamook Bay (Station Tillamook Bay) did not place any vessel restrictions on marine traffic into or out of the bay. At 1645, the National Weather Service updated the area small craft advisory, predicting heavy seas with wind waves of 4 feet and 10-foot swells. According to its station log, Station Tillamook Bay immediately restricted vessel passage across Tillamook bar, the sandy shoal at the mouth of Tillamook Bay, which is flanked by jetties on the north and south (figure 2).

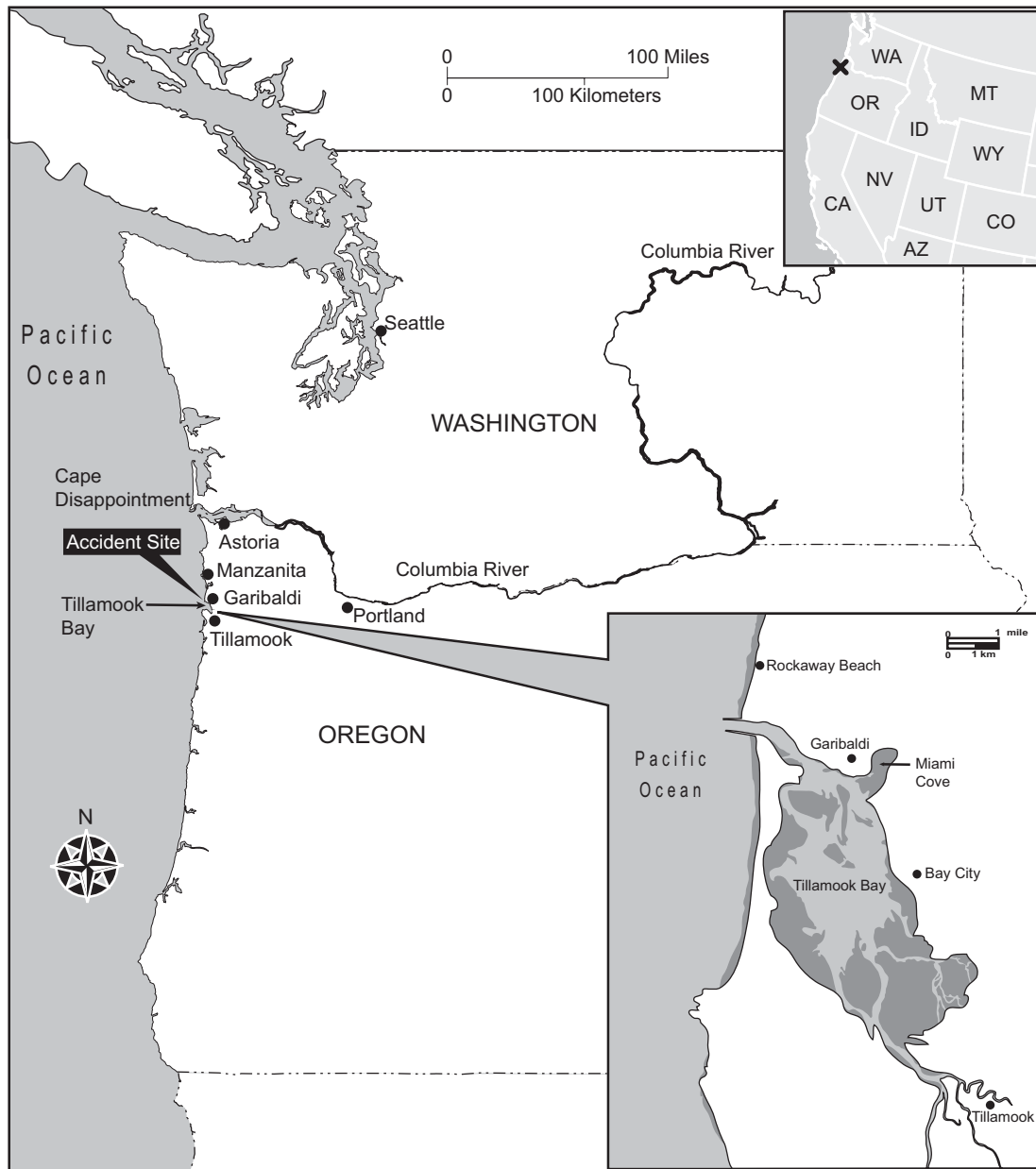
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<sup>1</sup> All times are Pacific daylight time, based on the 24-hour clock. A complete accident chronology is found in appendix B.

<sup>2</sup> On the West Coast, the open expanse of the Pacific Ocean permits the wind energy to build, generating large swells, or waves created over a long distance. Wave conditions at the estuary at Tillamook Bay are compounded by the wave action caused by the prevailing winds in the immediate area. Navigation at the site is further complicated by the complex current characteristics at the bay inlet.

<sup>3</sup> Marine forecasts for ocean-coastal zones. In the case of the coastal zone that included Tillamook, coastal waters are 20 nautical miles from shore. Thus, the 11-foot swells predicted for coastal waters could have improved or worsened by the time they reached the bar area and shore.

<sup>4</sup> A small craft advisory is issued to alert vessel operators whenever sustained winds of 20 to 33 knots inclusive, or seas of 7 feet or greater, are either ongoing or forecast to develop in the next 12 hours. The National Weather Service has no official definition for the term “small craft.” However, the U.S. Coast Guard considers any vessel less than or equal to 33 feet to be a small craft.



**Figure 1.** Location of Tillamook Bay and accident area.

Station Tillamook Bay broadcast the bar restriction via VHF-FM channels 16 and 22A<sup>5</sup> and on citizens band channel 9. In addition, Coast Guard personnel raised a small-craft advisory flag at the station and activated the yellow lights on the rough bar advisory signs at both the station and the 68-foot-high Coast Guard observation tower on the north side of the Tillamook Bay inlet, about 900 yards east of the north jetty tip. The restriction

<sup>5</sup> Channel 16 (156.8 MHz), which the Coast Guard monitors continuously, is the international calling and distress frequency. Channel 22A (157.1 MHz) is the Coast Guard's primary working channel, which it uses to broadcast severe weather warnings, hazards to navigation, and other maritime safety warnings to recreational and commercial mariners.

established by the Coast Guard station applied only to all recreational boats and uninspected small passenger vessels; it did not apply to inspected charter or commercial fishing vessels in the area.<sup>6</sup>



**Figure 2.** Looking southeast from Pacific Ocean toward Tillamook Bay, with inlet between north jetty (left) and south jetty (right). The Tillamook bar, not shown, is west of the jetty tips. The *Taki-Too* capsized outside the tip of the north jetty and washed up on the sandy beach on the left of the photo.

At 0330 the morning of the accident (Saturday, June 14), the National Weather Service issued another small craft advisory for the northern Oregon and southern Washington coasts, this time forecasting wind waves of 3 feet and northwest swells of 11 feet at 11-second intervals.

At 0445, a Coast Guard seaman began duty in the observation tower to monitor vessel traffic. He was equipped with a VHF radio, handheld binoculars, and tripod-mounted “big-eye” binoculars with a 25 × 150 millimeter lens. At first light (0446), a 47-foot motor lifeboat (MLB) left Station Tillamook Bay to assess conditions at the Tillamook bar.<sup>7</sup> The MLB was manned by a crew of four, including a coxswain.<sup>8</sup> Coast

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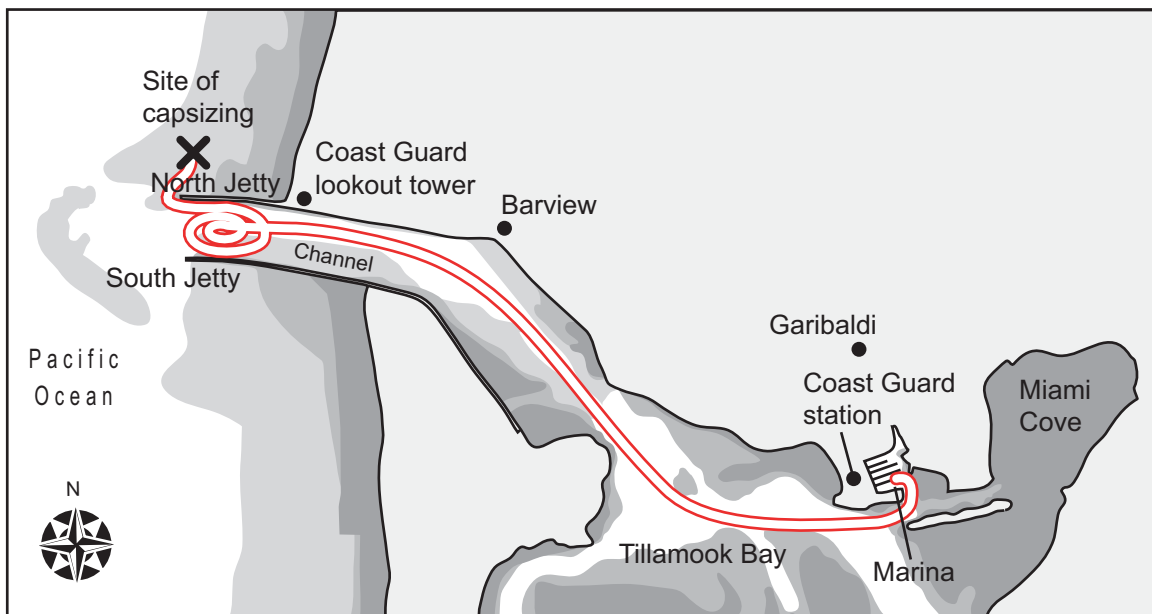
<sup>6</sup> To restrict the waterway to all vessel traffic required that the Coast Guard authority for the zone, in this case, the Captain of the Port in Portland, Oregon, order the closure. Additional information related to Coast Guard procedures regarding bar closures appears in the “Waterways” section of this report.

<sup>7</sup> The Coast Guard’s 47-foot MLBs are high-speed craft especially designed for use in severe weather and rough seas.

<sup>8</sup> A coxswain is the authority in charge of a boat and its crew while under way. The coxswain in question was a qualified MLB coxswain who had undergone special training to direct the 47-foot MLB. He was training to be a *surfman* (a coxswain certified by the Coast Guard to perform rescues in surf and heavy, breaking seas) but had not attained that qualification by the time of the accident. See “Coast Guard Surf Stations” section for further information on surfmen.

Guard logs indicate that, at 0512, the MLB coxswain notified Station Tillamook Bay that he recommended continuing the bar restriction because of turbulent (sloughing and plunging) seas at the ends of the jetties and 8- to 10-foot swells outside the jetties. The staff duty officer and officer of the day concurred with the coxswain's assessment and at 0514, the Coast Guard rebroadcast the previous day's bar restriction. The MLB then remained on patrol in the waterway to prevent any recreational boats or uninspected small passenger vessels from attempting to transit the bar.

Shortly before 0530, the *Taki-Too* master left his home in Garibaldi, Oregon, for Garibaldi harbor, where the vessel was moored (see figure 3).<sup>9</sup> The *Taki-Too* was a charter fishing vessel inspected by the Coast Guard under Title 46 *Code of Federal Regulations* (CFR) parts 175-185 (subchapter T). The master had been scheduled by the couple who owned Garibaldi Charters to take a fishing party of 17 into the Pacific Ocean for 6 hours of bottom fishing<sup>10</sup> that morning.



**Figure 3.** Approximate route of the *Taki-Too* from Garibaldi marina to accident site.

The master had checked the weather forecast posted on computer websites the evening of June 13. The following morning, he continued to monitor the weather and bar conditions on his VHF radio at home. He also had a VHF radio in his truck that he typically listened to while en route to the harbor.

The manager of the charter company office stated that the *Taki-Too* master “bounced in the door that morning. . . . he was joking with people and laughing.” The

<sup>9</sup> Except as noted otherwise, the actions of the *Taki-Too* master are based on his wife's recollection as told to Safety Board investigators.

<sup>10</sup> Dropping or casting a weighted, baited hook to the bottom of a body of water and waiting for a bite from bottom fish such as ling cod, flounder, and rockfish.

deckhand of the *Taki-Too*, one of the survivors of the accident, told Safety Board investigators that when the master arrived at the charter company office shortly after 0530, she and he agreed that because of weather conditions at the bar, they would not set crab pots<sup>11</sup> as originally planned.

At the Garibaldi marina, vessels were preparing to depart for a day's fishing in the ocean. The *Taki-Too* was a 32.5-foot-long vessel having a single 250-horsepower diesel engine. The other commercial vessels that sailed early that morning and their characteristics were as follows:

- Small passenger vessel *Oakland Pilot* (44.4-foot-long, 730-horsepower, twin-engine charter fishing boat).
- Small passenger vessel *Norwester* (41.8-foot-long, 420-horsepower, twin-engine charter fishing boat).
- Small passenger vessel *D & D* (32.4-foot-long, 230-horsepower, single-engine charter fishing boat built by the same manufacturer as the *Taki-Too* and having the same molded hull and virtually the same size).
- Uninspected commercial fishing vessel *Amanda* (23 feet long, single engine).

Two other small charter boats, the *Bullfrog* and the *Kerri Lin*, had scheduled fishing trips for the day. However, the operator of the *Bullfrog*, a six-passenger uninspected vessel that fell under the Coast Guard's bar restriction, cancelled the fishing trip. His two passengers then elected to go on other vessels, with one being assigned to the *Taki-Too* and the other to the *D & D*. The owner of the *Kerri Lin*, a 29.4-foot-long small passenger vessel having a single 330-horsepower engine, later told investigators that he decided to cancel his day's charter because he had a policy of not operating once the sea swell reached "double digits," meaning 10 feet.

At 0530, the *Oakland Pilot* left the Garibaldi marina and headed for Tillamook Bay inlet. Shortly afterward, the *Taki-Too* master and deckhand went to their boat and boarded the 17 passengers. According to the deckhand, the master gave a safety briefing informing the passengers that lifejackets were stored inside the cabin in labeled bins under the table, and that if anybody wanted to put one on, "it was up to them" and that passengers should "just ask us if they needed help getting them on or anything." The deckhand stated that the master also told passengers that the vessel was equipped with a liferaft and a throw ring, and that the cabin had an emergency flare kit and a first aid kit. She said that the master described his personal rules against alcohol, drugs, throwing trash overboard, or being sick in the cabin, and told the passengers that they were not going to take crab pots out because of the rough seas.

The safety briefing did not include a demonstration of how to don a lifejacket. According to Federal regulations at 46 CFR 186.506, as an alternative to a demonstration,

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<sup>11</sup> Crab pots are wire-mesh cages that contain bait, such as fishheads, to attract crabs. Crab-fishing ("crabbing") from a boat involves setting the pots in the water attached by a line to a buoy so they can be pulled up later. Charter boats often set crab pots on the way out to the fishing grounds and retrieve them on the return trip.

passengers can receive a card or pamphlet containing the required lifejacket information before the vessel gets under way. The deckhand told Safety Board investigators that the *Taki-Tooo*'s cabin had a placard showing how to don a lifejacket.

About 0600, the *Taki-Tooo*, the *Norwester*, the *D & D*, and the *Amanda* departed the marina. The *Taki-Tooo* master assumed control of his vessel from the flying bridge<sup>12</sup> and proceeded toward the entrance to the inlet. The deckhand described the master as being happy and joking, "just like normal."

By 0645, the *Taki-Tooo* had arrived at the north jetty, along with the *Norwester*, the *D & D*, the *Amanda*, and the *Oakland Pilot*, which had been there nearly an hour. At this time, the tide was ebbing, which, according to a boating safety pamphlet for recreational vessels jointly published by the Oregon State Marine Board and the Coast Guard, makes the Tillamook Bay bar especially dangerous to cross.<sup>13</sup> The pamphlet indicates that vessels should cross the bar during "slack water," that is, during the time at high or low tide when no appreciable current is flowing in a body of water. On this morning, the low tide (minus 2.1 feet) was predicted at 0721. The slack water would occur at the same time.

Federal regulations at 46 CFR 185.508 stipulate "the master of a vessel shall require passengers to don lifejackets when possible hazardous conditions exist, including, but not limited to . . . when transiting hazardous bars and inlets." (See "Coast Guard Regulations on Wearing of Lifejackets" section for further information.) None of the vessel operators preparing to cross the bar, including the master of the *Taki-Tooo*, directed his passengers to don lifejackets. Several of the masters later told Safety Board investigators that if the conditions were so dangerous that they needed to ask passengers to wear lifejackets, they would not, or should not, take their vessels out.

Meanwhile, the MLB coxswain moved his boat up to the jetty tips to observe each charter vessel go across the bar and then repositioned himself next to the tower so other vessels could pass him. The tower watch prepared to maintain visual contact with the vessels until he observed that they had safely crossed the bar and made it out to calmer seas. Other witnesses to the crossings included the *Amanda* master, who later told investigators that he decided not to attempt the crossing but to stay and watch the other vessels, and one of the owners of Garibaldi Charters, whose son was operating the *Norwester* and whose daughter was the deckhand on the *Taki-Tooo*. The Garibaldi Charters co-owner had driven to the parking area near the Coast Guard observation tower, where he had a "good view" of the vessels in the waterway. A little later, about 0700, the *Kerri Lin* owner arrived at the north jetty to watch the vessels leave the inlet.

The *Taki-Tooo*, the *D & D*, the MLB, and the *Amanda* were on the north side of the channel, near the jetty, and the *Norwester* and *Oakland Pilot* were "backing strongly" near the jetty tips because of the outgoing channel current. The Garibaldi Charters co-owner said the vessel operators appeared to be "milling around," waiting for better conditions,

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<sup>12</sup> A permanent, raised steering cabin or platform on a vessel.

<sup>13</sup> "Crossing the Tillamook Bay Bar" describes the dangers specific to the bar area, the north jetty, the middle grounds, and the south jetty areas. A copy of the brochure appears in appendix C.

and watching the pattern of the waves, which came in sets. He said that the large waves were coming too close together for a boat to avoid going over at least one of them on the way out of the inlet, and that the masters had to depart the jaws of the jetty when the seas were not good to be “in the right position when it does get good.” The masters could not proceed due west out of the channel because of breaking water on the shallow bar. Instead, they had to proceed either southwest or northwest around one of the jetties to reach deep water. On the day of the accident, all the boats took a north-northwest course.

The *Norwester* crossed the bar first, at 0650. The *Norwester* master told Safety Board investigators that he waited 30 to 45 minutes before seeing a “window” that would allow him through the surf (the area where waves break into foam as they approach the shoreline). According to the seaman on watch at the Coast Guard observation tower, the *Norwester* rode over one swell on its way across the bar and then “stood straight up” on a second one. The coxswain on the *MLB* said he saw the stern of the *Norwester* “just go way up in the air and come back down.” The tower watch maintained visual contact with the *Norwester* until it cleared the surf.

The *Norwester* master said that after clearing the bar, he contacted the other vessels waiting at the inlet by VHF radiotelephone. The transmission was not taped or monitored by the Coast Guard tower, but the *Taki-Too* deckhand told Safety Board investigators that she heard the *Norwester* master say, “It wasn’t worth it to go out,” and that the vessels should wait until conditions at the bar “settled down a little bit. . . .” The *Norwester*’s message was corroborated by a passenger on the *D & D* who was standing near its master and by the co-owner of Garibaldi Charters, who was monitoring radio traffic with a handheld VHF radio. The charter company co-owner told investigators that he thought the message was intended for the *Taki-Too* master. One of the *Taki-Too* passengers said he also heard the *Norwester* master say over the radio that he had to avoid hitting a log. The *Norwester* master told investigators that there were “logs all over the tips and stuff.”

In preparation for crossing the bar, the *Oakland Pilot* master directed his passengers to sit down. Passengers told the Tillamook County sheriff that when the *Oakland Pilot* “went over a huge swell and dropped 10 to 12 feet off the back end,” the deckhand hit his head against the ceiling, was knocked unconscious, and bit his tongue, causing it to bleed; a passenger hit his head and cracked a window; and another passenger injured his hip. The *Taki-Too* deckhand told Safety Board investigators that after clearing the bar, the *Oakland Pilot* master called back on the VHF radio and said that he had had to dodge a log and that there were “a lot of logs floating out there.”

The watch at the Coast Guard observation tower changed at 0700. In briefing his replacement, the watchstander from the first shift advised that the surf was rough and that he had “just missed some cowboy stuff pulled off by the *Norwester* and the *Oakland Pilot*.”

The *D & D* started over the bar next, shortly after 0700. From his vantage point on the north jetty, the *Kerri Lin* owner observed that the *D & D* master did not hurry his departure and had no trouble going past the bar. According to a *D & D* passenger, the vessel went over two or three “good” waves, and the master turned north to maneuver around a log at the end of the jetty. The *D & D* master said, however, that he did not recall

seeing any logs. A passenger on the *D & D* told investigators that as soon as the *D & D* crossed the bar, “a lot of people” donned lifejackets and left them on for the rest of the trip. He said, “I would never cross the bar again without [a lifejacket].”

Meanwhile, the *Taki-Tooo* master was circling between the north jetty and the jetty tips to assess the bar conditions and, according to the deckhand, waiting for a favorable surf. The deckhand joined the *Taki-Tooo* master on the flying bridge shortly before they departed the inlet. The deckhand told investigators that she “didn’t notice any” debris in the water. She said that the vessel rode over one swell and that she yelled for everyone to hold on. The waves got larger, she said, and the master said, “I didn’t want to get into this.” The deckhand said that she believed the master put the engines in reverse or astern power so the vessel “didn’t go flying off the other end” of the wave. She said that the boat twisted to the north, and that the swell was coming from the west. The deckhand said that the *Taki-Tooo* never lost power.

The Coast Guard tower watch observed the *Taki-Tooo* depart the inlet and followed the vessel’s track by looking through his “big-eye” binoculars. He told Safety Board investigators that he had never seen a vessel pass as close to the tip of the north jetty as the *Taki-Tooo* did. He said that the *Taki-Tooo* descended into a trough between the waves, and that a 15-foot wave then hit the vessel on the port side and capsized it. The tower watch, the observers on the north jetty, the surviving passengers, and the deckhand all agreed that the *Taki-Tooo* was parallel to the wave that capsized it. The deckhand described the capsizing as follows:

When we were going over the first wave, it kind of got us tilted, when he backed up, I saw the wave coming and I told everybody to hold on, I didn’t look back to see where everybody was, I said, hold on. And I grabbed onto the boat and we went over it and the, okay, I was telling somebody that that was probably about 9- or 10-foot wave. But, right on the other side of it, right on the backside of it, I saw a huge one building and it was really steep and it was coming straight at us. And somehow, I am really not clear on how this happened, whether it was the captain that had turned the boat or whether we were still turning from sliding down the back of the wave, but somehow we got completely sideways to it. And my first impression was that he was trying to turn the boat around to ride with it. But, we got completely sideways to the wave and by the time it was real close, I could tell that we were going to go over. And it was probably about 12 to 15 feet because I was looking up at it. And it just smashed in the side of the boat and went over and, I knew it was going to go over, so it just went straight over. I don’t know [whether] it landed on me or not. I heard it, and somehow I touched the boat, so it may have pushed me down.

During his postaccident interview, the *Amanda* master said that as he watched the *Taki-Tooo*, it did not appear as if “the vessel was being pushed” by the wave but as if the *Taki-Tooo* master “just backed off the throttle some, turned, and hit his throttle again to go north, you know, to get off of the bar.” The *Kerri Lin* master told investigators that he saw the *Taki-Tooo* go over a 10- to 12-foot wave and that he believed the master reduced speed, which should have allowed the wave to roll under the vessel so it would not crash down on the backside of the wave. The *Kerri Lin* master said the *Taki-Tooo* “backed down and . . . kind of went sideways.” He thought the *Taki-Tooo* master gave more power to the engines as the vessel rolled up and into the curl of a 12- to 15-foot wave that he described as a “monster.”



From interviews with the survivors, the Safety Board determined that just before the capsizing, six of the passengers were sitting in the cabin, six were sitting on either side of the engine cover in the middle of the deck, and five were sitting or standing at the stern (table 1). The passengers at the stern were thrown into the water during the capsizing, along with all but one of those sitting on the engine cover. That passenger stated that he was washed into the water and then surfaced in the cabin but could not recall how he wound up there.

**Table 1.** Relation of occupants' location on boat and use of lifejacket to survivability.

| Age/<br>Gender          | Location      |             | Use of<br>Lifejacket | Remarks   |
|-------------------------|---------------|-------------|----------------------|---|
|                         | Precapsize    | Postcapsize |                      |   |
| <b>Fatality Victims</b> |               |             |                      |   |
| 66/M                    | Flying bridge | Water       | No                   | Master of vessel. Body recovered by Coast Guard lifeboat; taken to Station Tillamook Bay.   |
| 66/M                    | Cabin         | Cabin       | Yes                  | Donned lifejacket. Unable to exit cabin. Body recovered from cabin when vessel washed up on beach.  |
| 70/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 49/F                    | Open deck     | Water       | No                   | Body recovered.   |
| 53/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 65/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 54/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 61/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 46/M                    | Open deck     | Water       | No                   | Body recovered.   |
| 52/M                    | Open deck     | Water       | No                   | Body not recovered.   |
| 43/M                    | Open deck     | Water       | No                   | Body not recovered.   |
| <b>Survivors</b>        |               |             |                      |   |
| 22/F                    | Flying bridge | Water       | No                   | Deckhand on vessel. Removed boots and outer clothing gear; made it to shore.  |
| 18/M                    | Open deck     | Cabin       | Yes                  | Held onto lifejacket as exited through window. Made way to shore. Aided out of surf by bystanders.  |
| 28/M                    | Open deck     | Water       | No                   | Reached life float 5-6 times but unable to hold on. Washed to shore by wave action.   |
| 52/M                    | Cabin         | Cabin       | Yes                  | While <i>Taki-Too</i> was upside down, pulled out lifejackets and passed them out. Removed lifejacket to exit through window; put lifejacket on over his head. Floated to shore. Aided out of water by bystanders |
| 23/M                    | Cabin         | Cabin       | Yes                  | Tied lifejacket around arm. Exited through window. Floated to shore. Aided out of surf by bystanders.   |
| 34/M                    | Cabin         | Cabin       | Yes                  | Assisted in handing out lifejackets. Removed lifejacket to exit through window. Lost hold of lifejacket during exit. Swam to shore.   |
| 48/M                    | Cabin         | Cabin       | Yes                  | Put lifejacket around neck, exited through window. Floated to shore hanging onto lifejacket.  |
| 47/M                    | Cabin         | Cabin       | Yes                  | Exited through cabin door; made it to shore.  |

All but one of the surviving passengers were in the cabin, which they said came to rest upside down and filled with about 4 feet of water. One passenger pulled lifejackets out of the bins and handed them to the others. One survivor was able to exit through the cabin door. Five men had to remove their lifejackets to exit through the cabin window. Of those, four managed to hold onto their lifejackets as they exited into the water, which enabled them to use their lifejackets to make it to shore. One took off his lifejacket to exit through the window but was unable to hold on to it. He successfully swam to shore. One passenger wearing a lifejacket remained in the cabin and was fatally injured. According to survivors, as they were exiting the cabin, they repeatedly exhorted that passenger, their relative, to leave the boat. They said that he just sat down, however, and emitted a moan.

The survivor who had been thrown into the ocean from the open deck told investigators that he never had access to a lifejacket. He said that he had tried to reach the *Taki-Tooo*'s liferaft [rigid buoyant apparatus] but was repeatedly knocked away from it. The deckhand was thrown off the flying bridge and into the water without a lifejacket. She took off her boots, pants, and jacket and made it to shore. She told investigators that she was a good swimmer.

The Garibaldi Charters co-owner told investigators that from his vantage point on the north jetty, he watched the *Taki-Tooo* pass the end of the jetty, going almost straight north. Then he lost sight of the *Taki-Tooo* but could see a large wave rise about 4 feet above the outline of the boat. The next thing he saw was the boat upside down. Then he said that he "estimated [he saw] about 5 people in the raft," which overturned, "and when it came back up, no one was in it." He radioed the Coast Guard on channel 16 and ran onto the beach, looking for his daughter, who was the *Taki-Tooo* deckhand.

The Coast Guard coxswain said he had moved the MLB toward the bar, from where he watched the *Taki-Tooo* depart the inlet and pass "really close to the north tip." He said he then lost view of the *Taki-Tooo* and waited for the tower watch to tell him what happened to the vessel. Shortly after 0715, the Coast Guard tower notified the MLB that the *Taki-Tooo* had capsized. The MLB coxswain said he waited about a minute before he felt he could get safe passage across the bar. He described the seas as "really, really choppy and big" and said that the MLB had to travel over a 14-foot-high swell. He said the swells were breaking, and that the entire area around the bar was whitewater. The coxswain told investigators that the *Taki-Tooo* was very close to the rocks and he felt that any attempt to approach the capsized vessel would endanger the MLB. He estimated that he was within 50 to 75 yards of the jetty tip, as opposed to his typical distance from the jetty of 100 yards. He also told investigators that after clearing the inlet, he remembered that he was not qualified to attempt a rescue in the surf.

At 0725, the Thirteenth Coast Guard District's rescue coordination center in Seattle, Washington, received a distress alert from an EPIRB (emergency position indicating radio beacon) registered to the *Taki-Tooo*. At 0730, the rescue coordination center received confirmation from Station Tillamook Bay that the vessel had capsized with 19 persons in the water.

The *Kerri Lin* master told investigators that by the time he called 911 at 0732, survivors were already coming ashore. Civilians who happened to be in the area provided the initial aid to the survivors. Emergency response personnel arrived soon thereafter and transported seven of the eight survivors by ambulance to Tillamook County General Hospital in Tillamook, Oregon. The *Taki-Too* deckhand was brought to the hospital by private automobile.

The Coast Guard recovered the body of the *Taki-Too*'s master a half-hour after the capsizing. (See "Survival Aspects" section for details of the search-and-rescue effort.) Within 2 hours of the accident, the Coast Guard had retrieved two passengers from the surf and the bodies of six other passengers had washed ashore. Two male passengers, whose bodies were never recovered, were declared dead, bringing the fatality total to 11.

## Injuries

The injuries sustained in the *Taki-Too* accident, shown in table 2, are categorized according to the injury criteria of the International Civil Aviation Organization (ICAO). The Safety Board uses the ICAO injury criteria in all its accident reports, regardless of transportation mode.

**Table 2.** Injuries sustained in *Taki-Too* accident.

| Type of Injury | Crew | Passengers | Total |
|----------------|------|------------|-------|
| Fatal          | 1    | 10         | 11    |
| Serious        | 0    | 0          | 0     |
| Minor          | 1    | 7          | 8     |
| None           | 0    | 0          | 0     |
| <b>Total</b>   | 2    | 17         | 19    |

Title 49 CFR section 830.2 defines a fatal injury as any injury that results in death within 30 days of an accident. It defines serious injury as that which requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; results in a fracture of any bone (except simple fractures of fingers, toes, or nose); causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface.

## Damages

The *Taki-Too* had an estimated market value of \$60,000 and a replacement value of \$180,000.<sup>14</sup> The vessel was declared a total loss after the accident. Additional information about the damage sustained by the *Taki-Too* appears in the "Wreckage" section of this report.

<sup>14</sup> The values are based on a September 2002 survey performed by a marine surveyor.

## Personnel Information

### **Master**

The *Taki-Tooo* master, age 66, had over 26 years' experience operating charter fishing vessels, according to Coast Guard records. He was issued a license to operate small passenger vessels, good for 5 years, by the Coast Guard in 1984. As qualifying experience in his original application for his 1984 license, he indicated that he had worked 277 full (8-hour) days operating small passenger vessels on the Pacific Ocean in the previous 3 years. His application also indicated that beginning in 1976, he had over 700 days of experience operating small passenger vessels on the Columbia River between the Pacific Ocean and Bonneville Dam and on the Pacific Ocean from Tillamook Head, Oregon, to Leadbetter Point, Washington.

When his Coast Guard license was subject to renewal in 1989, as it was every 5 years, Federal regulations stipulated that support be submitted showing that the master had 1 year of experience in the previous 5 years on vessels of the appropriate tonnage or horsepower.<sup>15</sup> According to records submitted to the Coast Guard, from March 1984 until his licensure as "Master . . . of Steam or Motor Vessels of Not More Than 50 Gross Tons" in March 1999, all his experience was on the *Taki-Tooo*, departing from Tillamook Bay and sailing in the Pacific Ocean.

The master's Coast Guard license file indicates that at the time he applied for his current license in February 1999, he had operated the *Taki-Tooo* some 1,600 days. Three other area vessel operators stated that the *Taki-Tooo* master had crossed the Tillamook bar more than a thousand times and that he was regarded as a very capable vessel operator.

The *Taki-Tooo* master had lived in the Tillamook area for 15 years. He and his wife owned Davis Fisheries, Inc., of which the *Taki-Tooo* and the *D & D* were assets. They were the former owners of Garibaldi Charters, which they sold to the present owners in 2001. The terms of the charter company sale stipulated that the *Taki-Tooo* and the *D & D* would be leased to and operated by Garibaldi Charters; however, the owner of the *Taki-Tooo* continued to operate it part time for Garibaldi Charters because he was highly regarded by his former customers and they would frequently request that he serve as the vessel operator when they booked a fishing voyage.

The master and his wife had purchased a second home in Baja California and they divided their time between the Tillamook area in the summer and Mexico in the winter. They had returned from their winter home in Baja California a few weeks before the accident, and the master had operated the *Taki-Tooo* about three times since his return to become acquainted with new electronics equipment that had been installed on the boat.

The master's wife said that his sleep patterns had been consistent for several days before the accident. She said that he and she went to bed at 2100, as was their custom, and that the master rose at 0430 on the day of the accident, his usual time. She stated that he

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<sup>15</sup> Title 46 CFR 10.209 (c)(i).

had coffee, made a lunch to take with him, and listened to the weather report. She further stated that he was pleased that he had been asked to operate the *Taki-Tooo* that day and was looking forward to the trip.

The master had last undergone a physical examination to renew his license, as required by 46 CFR 10.209, on February 17, 1999. The examination record (Coast Guard form 719K, submitted by the master and signed by his evaluating physician) states that the master was taking five prescription medications daily: 40 milligrams of Accupril<sup>®</sup> [quinapril, used to treat high blood pressure], 25 milligrams of HCTZ [hydrochlorothiazide, used to treat high blood pressure], 2 milligrams of Tenex<sup>®</sup> [guanfacine, used to treat high blood pressure], 40 milligrams of Lipitor<sup>®</sup> [atorvastatin, used to treat high cholesterol], and 20 milligrams of amitriptyline, to be taken nightly [an antidepressant, trade name Elavil<sup>®</sup>]. The record indicates that the master had experienced dizziness in 1996 and that he had been treated for prostate cancer in 1993. The 719K form also indicates that the master's field of vision, color vision, and hearing were normal.<sup>16</sup> The examining physician found the master competent to carry out the duties to be performed on board a U.S. merchant vessel. The master then forwarded the completed 719K form to the Coast Guard regional examination center in Portland, one of 17 such centers that are responsible for overseeing and approving mariner licensing.<sup>17</sup> According to the Marine Safety Office in Portland, the Coast Guard regional examination center "had nothing in the file regarding any follow-up action on any of [the master's] physical examinations."

According to records of his primary care physician, the master had a history of coronary heart disease, high blood pressure, insomnia, prostate cancer, kidney stones, and high cholesterol. The physician's records indicate that Elavil had been prescribed to treat the master's insomnia.

### **Deckhand**

The deckhand, age 22, was the charter owners' daughter. She had worked as a deckhand for 5 years. She began her career working with the master on the *Taki-Tooo*, then worked with her brother, the master of the *Norwester*, for three summers before returning to the *Taki-Tooo* in June 2003. The accident trip was her first with the *Taki-Tooo* master in the 2003 season.

The deckhand told investigators that she slept 7 1/2 or 8 hours the night before the accident and that she kept regular hours. She said her usual schedule was to go to bed about 2000 or 2100 and rise at 0430, except when she did not have a scheduled charter.

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<sup>16</sup> The master wore glasses for reading.

<sup>17</sup> See <[www.uscg.mil/hq/g-m/marpers/recs.htm](http://www.uscg.mil/hq/g-m/marpers/recs.htm)> (accessed April 15, 2005).

## Vessel Information

The *Taki-Too* was manufactured in 1977 in Tacoma, Washington, by Modutech Marine. The principal characteristics of the *Taki-Too* are summarized below:

|                     |  |
|---------------------|--|
| Length:             | 32.5 feet  |
| Beam:               | 12.33 feet   |
| Depth:              | 5.3 feet   |
| Gross tonnage:      | 14   |
| Crew:               | 2 (master and 1 deckhand)  |
| Passenger capacity: | 20   |
| Propulsion:         | 250-horsepower John Deere model 6076AFM30 turbocharged diesel engine |

## General Construction and Equipment

The *Taki-Too* was constructed of fiberglass-reinforced plastic. The decks, built on wood frames, consisted of plywood covered with fiberglass. The vessel's bronze propeller had four blades, was 26 inches in diameter, and was "right-handed" (rotated clockwise).

The vessel's electronic and communications equipment included a Furuno model 1833C/NT radar/chart plotter (type RDP-139, S/N 4312-1096), a magnetic compass, and a VHF radio. The vessel was also equipped with a second VHF radio, a citizens band radio, a single-sideband radio, a 24-mile-range radar, and an EPIRB.

## Lifesaving Apparatus

The *Taki-Too* was required by the Coast Guard to have lifesaving equipment on board for 22 people. The equipment included the following:

|   |                             |
|---|-----------------------------|
| Adult lifejackets                                 | 22                          |
| Child lifejackets                                 | 3                           |
| Life floats/rigid buoyant apparatus <sup>18</sup> | 1                           |
| Ring buoys  | 1 (light and line attached) |

The lifejackets were stowed under a table in the cabin. The deckhand told Safety Board investigators that a placard on the wall described how to don the lifejackets. A number of lifejackets floated free after the accident.

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<sup>18</sup> Flotation equipment with a line attached around the outside. Survivors in the water hold onto the line. The apparatus is not designed to support survivors out of the water.

### ***Certification and Inspection***

The *Taki-Too* was inspected and certificated by the Coast Guard as a small passenger vessel under the regulations at 46 CFR parts 175-185. The Coast Guard certificate of inspection (COI)<sup>19</sup> issued on March 13, 2001, permitted the *Taki-Too* to operate not more than 100 miles from land in the Pacific Ocean between Point St. George, California, and Angeles Point, Washington. According to the COI, the total number of persons allowed on the *Taki-Too* was 22, including 20 passengers and 2 crewmembers. The boat was required to have both a licensed master and a deckhand. If the boat was away from the dock or if passengers had access to it for more than 12 hours in one 24-hour period, the COI required that an alternate crew be provided.

The Marine Safety Office in Portland was the local Coast Guard office in charge of inspecting the *Taki-Too*. The *Taki-Too* was last drydocked for a complete hull examination on November 29, 2001. The only deficiency noted by the Coast Guard inspector was a leak entering the forward compartment from the kingpost (a short mast that carries a cargo boom) on the main deck. The COI stated that the repair had to be completed before the vessel could carry passengers again. The vessel's next drydock inspection was due in November 2003.

The *Taki-Too* underwent an annual inspection in March 2003. The inspector noted eight deficiencies having to do with lines, masthead light, high-water bilge alarm, bilge manifold labeling, fixed fire extinguisher system reinstallation, battery terminal guards, and *Rules of the Road* book. Coast Guard records contain three reports of marine casualties<sup>20</sup> for the *Taki-Too*, in 1993, 1997, and 1999. The reports do not indicate the type of casualty. The Coast Guard inspected the vessel after an onboard fire in March 2003.

### **Wreckage**

On Sunday, June 15, 2003, the day after the accident, an investigative group comprising a Safety Board investigator, a chief warrant officer from the Coast Guard, and a deputy from the Tillamook County sheriff's office conducted an on-site examination of the wreckage of the *Taki-Too*, which had been pulled onto the beach 3 hours after the accident (see figure 4). The flying bridge operating console was missing and never recovered. The deck railings on the bow were loose from their mountings.

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<sup>19</sup> Small passenger vessels carrying more than six passengers for hire may not operate without a valid Coast Guard COI, which is issued by the Coast Guard Officer in Charge, Marine Inspection, for the zone in which the boat operates. The COI, among other conditions, stipulates minimum firefighting, lifesaving, and crew 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.

<sup>20</sup> For any vessel (other than a public vessel) operating on the navigable waters of the United States, a marine casualty refers to any accidental grounding or incident resulting in damage by or to the vessel, its apparel, gear, or cargo, or injury or loss of life of any person. Marine casualties include collisions, strandings, groundings, foundering, heavy weather damage, fires, explosions, failure of gear and equipment, and any damage potentially affecting the seaworthiness of the vessel. See 46 CFR 4.03-1.



**Figure 4.** *Taki-Tooo* on beach after capsizing.

In examining the vessel's propulsion and steering components, investigators found that the rudder and rudder post were solidly mounted and undamaged. The propeller shaft was straight and unremarkable; however, the propeller's four blades had minor nicks and scratches consistent with normal operation, given the age of the propellers. Investigators noted that the propeller blades were curled at the tips, so they had the propeller removed and sent to the Safety Board's materials laboratory in Washington, D.C., for detailed examination and documentation of damage. The results are described below, in the "Tests and Research" section.

The diesel engine was intact, with no signs of oil leaks or obvious signs of catastrophic failure. All fuel lines, fittings, and linkages were intact and attached. When manipulated at the lower helm station, the throttle and transmission control moved the throttle linkage throughout its range. The lower helm station wheel turned freely in both directions.

The *Taki-Tooo* was then moved to a site in Tillamook, where investigators continued their inspection on June 16. In checking the propulsion and steering mechanisms, they found no evidence of preaccident mechanical malfunction. In addition, the engine and transmission were solidly mounted, the two fuel tanks were secure, the bilge pumps were connected and operable, the high-water bilge alarms were connected, and the electrical fuses in the cabin were intact, though several were filled with water. Investigators had the radar/chart plotter removed and sent to the Safety Board's recorder laboratory in Washington, D.C. (See "Tests and Research" section for more information.)



## Waterway Information

### General

The accident occurred at the entrance to Tillamook Bay, a large (6.2-mile-long, 2.1-mile-wide), shallow (averaging 6.6 feet deep) estuary on the northern Oregon coast. Five major rivers drain runoff from the west slopes of the Coast Range into the bay. At high tide, Tillamook Bay covers about 8,400 acres; at low tide, about half the bottom is exposed as sand and mud flats. The city of Tillamook (population 4,350) and the towns of Garibaldi (population 935) and Bay City (population 1,150) are located on the bay (figure 1).

### Bay Entrance

As noted earlier, the entrance to Tillamook Bay is protected by jetties on the north and south (see figure 2). According to the *U.S. Coast Pilot*, the north jetty is 1,900 yards long and extends 800 yards offshore, with the last 80 yards submerged.<sup>21</sup> A lighted whistle buoy sits in water over 100 feet deep about 1 mile west of the north jetty. The bar, a curved shoal where the water is less than 30 feet deep, lies between the jetty tips and the whistle buoy. Waves break over the bar on the ebbing tide, and the area is considered unpredictable and hazardous. The Oregon State Marine Board cautions boaters trying to cross the bar not to turn around if waves are breaking over it.<sup>22</sup>

Just outside the north jetty tip is the “north hole,” a section of deep water between the shoal and another shallow area along the sandy beach that runs north of the bay. According to the Station Tillamook Bay log, the *Taki-Too* “rolled in the north hole as it exited the bar.” The *Taki-Too* ended up on the beach north of the north jetty. The waters next to the beach are marked “changeable area”<sup>23</sup> on the nautical chart for Tillamook Bay.<sup>24</sup>

The Tillamook Bay channel lies immediately south of the north jetty. The channel runs 3 miles east to Garibaldi (Miami Cove) and is marked by a directional light, buoys, and daybeacons. The U.S. Army Corps of Engineers maintains the entrance and inner channels to a depth of 18 feet. The entrance channel has no specified width, while the inner channel is 200 feet wide up to Miami Cove.<sup>25</sup> There is a turning basin at Garibaldi.

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<sup>21</sup> National Oceanic and Atmospheric Administration, National Ocean Service, *U.S. Coast Pilot*, vol. 7 (Pacific Coast: California, Oregon, Washington, and Hawaii), 2003, p. 299. According to field measurements made by the U.S. Army Corps of Engineers in June 2003, the north jetty is only 1,772 yards long and is receding more every year. See “Condition of Tillamook Bar” section for more information.

<sup>22</sup> “If you decide to cross, proceed out—but do not attempt to turn around if the bar is breaking.” Oregon State Marine Board website, “Tillamook Bay” <[www.marinebd.osmb.state.or.us/CoastalWaters/Tillamook.htm](http://www.marinebd.osmb.state.or.us/CoastalWaters/Tillamook.htm)> (accessed May 28, 2004).

<sup>23</sup> Meaning the shoreline and depths change frequently.

<sup>24</sup> *Tillamook Bay*, chart 18558, Coast Survey, United States, Oregon–West Coast, 37th ed. (Washington, DC: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, 2002).

<sup>25</sup> <[gisweb.co.tillamook.or.us/tewrc/swcd/sect905b.htm](http://gisweb.co.tillamook.or.us/tewrc/swcd/sect905b.htm)>.

According to the Oregon State Marine Board, the current runs out of the bay at 4 to 6 knots and is “very strong.”<sup>26</sup> The strong current, together with the pinched shape of the jetties, flushes sediment out the narrow entrance and helps maintain the channel at its 18-foot depth. The channel was last dredged in 1976, before the south jetty was built. According to a hydraulic engineer with the Corps of Engineers Portland District, “Since completion of the Tillamook Bay south jetty in 1979, the entrance channel at Tillamook Bay has been ‘self-maintaining’ due to tidal hydraulics.”<sup>27</sup>

Although the Tillamook Bay channel does not require dredging, the Corps of Engineers surveys the channel annually. The Corps was scheduled to survey the channel in July 2003 but moved the survey to the third week of June 2003 to assist in the investigation of the *Taki-Too* accident. As in other years, the Corps’s 2003 survey showed that the channel had remained within its authorized depth.<sup>28</sup> The *Coast Pilot* and the nautical chart for Tillamook Bay caution mariners that “the entrance channel is subject to frequent changes.”

### **Tide**

According to navigation references, the mean tide at Barview (the east end of the entrance channel to Tillamook Bay) is 3.9 feet; the higher high water level is 7.5 feet, the mean high water level is 6.8 feet, the mean low water level is 1.1 feet, and the extreme low water level is minus 3.0 feet. At 0721 on June 14, about 5 minutes after the accident, a low tide of minus 2.1 feet was recorded at Barview.

### **Water Temperature**

The average water temperature is 57° F for the period between June 1 and June 15 on the Oregon coast in the vicinity of Tillamook Bay.<sup>29</sup> Three hours after the accident, the water temperature at the site of the capsizing was 52° F, as measured from one of the two Coast Guard MLBs. For the effect of water temperatures on the human body, see the “Survival Aspects” section of this report.

### **Tillamook Bar Restrictions**

As noted earlier, Station Tillamook Bay can restrict the bar only to recreational and uninspected passenger vessels; the station does not have the authority to close the bar to inspected passenger vessels. If hazardous conditions warrant closure of the bar, the station works through its chain of command by first notifying the operations center at Group Astoria, which, in turn, notifies the Captain of the Port (COTP) Portland, the Coast Guard authority for the zone that includes Oregon. The COTP, acting under the authority of the Ports and Waterways Safety Act,<sup>30</sup> can close the bar to all vessel traffic.

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<sup>26</sup> Oregon State Marine Board, “Tillamook Bay.”

<sup>27</sup> See “Other Information” section for more information on the condition of the Tillamook bar.

<sup>28</sup> <[www.nwp.usace.army.mil/issues/tillamook/cms/home.asp](http://www.nwp.usace.army.mil/issues/tillamook/cms/home.asp)>.

<sup>29</sup> National Oceanographic Data Center, Coastal Temperature Guide <[www.nodc.noaa.gov/dsdt/wtg12.html](http://www.nodc.noaa.gov/dsdt/wtg12.html)> (accessed June 2, 2004).

<sup>30</sup> Title 33 U.S. Code 1221 et seq.

The Coast Guard officer-in-charge at Station Tillamook Bay told Safety Board investigators that in the 3 years he had been assigned at that location, the bar had never been closed. A Coast Guard marine inspector at the Marine Safety Office in Portland, who had records for the 5 years (1,825 days) before the accident, informed the Safety Board that “at no time could we find that we had requested to restrict [Tillamook bar] to commercial vessels.” He said that the logs indicated that Tillamook bar had been restricted to recreation boats and uninspected small passenger vessels 1,422 times during the previous 5 years; however, depending on the weather, bar restrictions can be enforced and lifted several times a day.

## Company Operations

Garibaldi Charters advertises itself as a family-owned business that offers deep-sea fishing, bottom fishing, diving, whalewatching, eco-tours, scenic excursions, occasional weddings, and scattering of ashes. As noted earlier, Garibaldi Charters leased the *Taki-Tooo* and the *D & D* from the previous owner. The company also owned outright the *Norwesteer*, the first vessel to depart the inlet on the day of the accident.

Garibaldi Charters’ operating season ran from March until October. According to the owner of the charter company, the weather did not permit regular trips from October to March. The *D & D* master told Safety Board investigators that the company never pressured him to take his boat out, no matter what the weather.

The husband of the couple who owned Garibaldi Charters was the usual master of the *Taki-Tooo*. However, the charter group that had reservations to fish on board the *Taki-Tooo* the day of the accident had requested the boat’s owner as the master. The charter owner said that the group paid \$70 each for the fishing trip. The master received about 30 percent of the gross from ticket sales. If a trip was canceled because of bad weather or sea conditions, the ticket money was refunded and the master received no pay.

## Meteorological Information

According to National Weather Service data, the wind in Garibaldi at the time of the accident was about 10 knots from the southeast, with no precipitation. Surface temperatures were about 56° F, and the sky was cloudy.

The National Weather Service issued small craft advisories for hazardous seas on the northern Oregon and southern Washington coasts at 1645 and 2130 on June 13 and at 0330 and 0930 on June 14. The forecast was for northwest swells of between 10 and 12 feet, with a large swell predicted to reach the coast during the day on Saturday. Actual conditions at 0650 on June 14, according to the meteorologist-in-charge at the weather forecast office in Portland, were comparable to the 0330 forecast. Winds were from the south at 5 to 15 knots, and combined seas were 12 to 13 feet.

The forecast for Tillamook issued at 0430 on June 14 by the weather forecast office in Portland called for mostly cloudy skies with a chance of showers early in the morning. A west wind of 5 to 15 mph was predicted.

## Medical and Pathological Information

### **Medical Findings**

The confirmed dead included one female and eight males, ranging in age from 46 to 70. The Tillamook County medical examiner recorded the cause of death in each case as drowning by asphyxiation and hypothermia, based on clinical on-scene observation. Autopsies were not performed on the fatally injured passengers.

An autopsy was performed on the master of the *Taki-Tooo*. As noted earlier, the master had a history of coronary artery disease, high blood pressure, insomnia, prostate cancer, kidney stones, and high cholesterol. The medical examiner's report noted evidence of previous conditions and indicated that none contributed to his death. The autopsy found no evidence of recent heart attack, a recurrence of his prostate cancer, or evidence of kidney stones. The autopsy report indicated a very small subdural hematoma (bleeding into the brain) and an abrasion to the side of the head. There was no evidence of underlying brain injury, and the hematoma was completely encapsulated. The medical report concluded that the *Taki-Tooo* master died from drowning by asphyxiation with hypothermia.

Tillamook County General Hospital treated all survivors for hypothermia. Of the eight patients, seven were released the day of the accident; one passenger was kept in the hospital overnight.

### **Toxicology Testing**

The capsizing of the *Taki-Tooo* was classified as a "serious marine incident" under Federal regulations.<sup>31</sup> As a result, drug and alcohol testing of the master was mandatory. The master's body was sent to the Oregon Health and Science University (OHSU) medical examiner in Portland, Oregon, for autopsy and toxicological analysis. The OHSU laboratory performed a routine urinalysis for five illicit drugs,<sup>32</sup> prescriptions, and over-the-counter medications and tested the master's blood for alcohol. The analyses were negative for the presence of alcohol or illicit drugs.

The Safety Board obtained autopsy specimens and sent them for toxicological examination to the Federal Aviation Administration's Civil Aerospace Medical Institute in Oklahoma City, Oklahoma. Tests for alcohol and illegal drugs were negative. The master's blood showed amounts of the prescription antidepressant amitriptyline (0.063

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<sup>31</sup> A serious marine incident is defined at 46 CFR 4.03-2 as one that results in death, injury beyond first aid, damage to property in excess of \$100,000, loss of an inspected vessel, or loss of a vessel of 100 gross tons or more.

<sup>32</sup> Marijuana, cocaine, opiates, amphetamines, and phencyclidine (PCP).

milligrams/milliliter) and its metabolite nortriptyline (0.042 milligrams/milliliter). His urinalysis also showed the presence of amitriptyline and nortriptyline.

## Survival Aspects

### *Emergency Response*

At 0716, immediately after the accident, the Coast Guard MLB at the north jetty notified Station Tillamook Bay that the *Taki-Tooo* had capsized. The MLB coxswain said he could not attempt a rescue because the *Taki-Tooo* was too close to the jetty, in shallow waters and breaking surf. In addition, the coxswain was not qualified to operate a rescue craft in surf conditions (see “Other Information” section for details).

As soon as it received news of the capsizing, Station Tillamook Bay sounded the search-and-rescue alarm and at 0718, requested search-and-rescue helicopters from Air Station Astoria, about 30 miles, or 26 minutes, from the accident scene. At 0720, Station Tillamook Bay launched another 47-foot MLB to the accident scene, with a certified surfman as coxswain.

At 0721, the Coast Guard station telephoned the Tillamook County Emergency Communications District (911) and requested ambulances for the Coast Guard station and the beach on the north side of the north jetty. The emergency communications operator then paged the volunteer fire and rescue departments of the towns of Garibaldi, Bay City, and Rockaway Beach (figure 1), as well as the emergency medical service (EMS) units for Garibaldi, Manzanita, and Tillamook County.

At 0725, the Coast Guard rescue coordination center in Seattle received an EPIRB signal from the *Taki-Tooo* and 5 minutes later, received confirmation from Station Tillamook Bay that the *Taki-Tooo* had capsized.

By 0726, the Garibaldi fire chief was en route to the accident scene. When the fire chief and one rescue truck from the Garibaldi fire and rescue department arrived on the beach 10 minutes later, the fire chief assumed command. Ambulances arrived from Garibaldi, Manzanita, and Tillamook County between 0738 and 0814. Three patrol cars from the Tillamook County sheriff’s office also arrived on scene during that time. The Rockaway Beach fire department sent its fire chief and a water rescue team. Rockaway fire and rescue brought a personal watercraft to the scene but could not deploy it because of the rough seas. An official representative of the Garibaldi fire and rescue department told Safety Board investigators that each dispatched unit had its own incident commander and participated in the unified command system.<sup>33</sup>

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<sup>33</sup> The unified command system is a way of coordinating the response to an emergency. The incident commanders of the various responding agencies work together to make consensus decisions but do not surrender their individual jurisdictional responsibilities.

### **Search and Rescue**

At 0732, the second Coast Guard 47-foot MLB arrived at the accident scene and relieved the first MLB, which stayed outside the surf zone. The crew of the second MLB spotted a man floating face down inside the surf zone, not wearing a lifejacket. The coxswain radioed Station Tillamook Bay that his crew had located a victim and was maneuvering to pick him up. No additional victims were seen in the area. At 0745, the second MLB recovered the unconscious victim (the master). The MLB crew performed CPR on the victim while bringing him to Station Tillamook Bay, from where he was transferred to Garibaldi EMS personnel. At the Coast Guard station, the officer-in-charge came on board the second MLB, which then left on its second trip to the accident site.

At 0745, while the MLB was recovering the victim, the Coast Guard HH-60J Jayhawk rescue helicopter that had been launched from Air Station Astoria arrived at the north jetty. The helicopter commander told Safety Board investigators that the *Taki-Too* had already washed ashore and that the “surf was up pretty heavy” (figure 5). He said he also saw empty lifejackets, a liferaft, clothing, logs, and other debris in the water.



**Figure 5.** Rescue personnel near *Taki-Too* in surf after capsizing.

About 0800, a second helicopter was dispatched from Air Station Astoria. Shortly after 0800, a rescue swimmer lowered from the first helicopter by cable recovered a victim, not wearing a lifejacket, from the surf. The helicopter transferred the victim to EMS personnel on the beach, then returned to the search. The second helicopter arrived about 0820 and began a parallel search of the water from the north jetty to about 1 1/2 miles north.

About the same time, the second MLB joined the first MLB at the accident scene, with the officer-in-charge on board. The officer-in-charge, a qualified surfer, told investigators that he intended to jump from the second MLB into the first one so that both MLBs would have a qualified surfer on board. However, he said, the two boats hit each other when they drew alongside, so he jumped into the water and then climbed into the

first MLB. He described that as the “safest way” for him to get from one MLB to the other under the circumstances.

An hour later, at 0915, the first helicopter recovered another victim from the water outside the surf line, about 200 yards from the tower. The victim was nonresponsive and was not wearing a lifejacket. The helicopter took the victim to the beach and transferred him to EMS personnel. The second helicopter continued to search the water for victims.

At 0923, Garibaldi fire and rescue confirmed that there were eight bodies on the beach, including the two recovered from the water. By that time, six survivors had arrived at Tillamook County General Hospital by ambulance and a seventh, the deckhand, had arrived at the hospital by private automobile. At 0927, the Coast Guard cutter *Steadfast*, based in Astoria, was diverted to help in the search.

About 1030, the first helicopter returned to Air Station Astoria and the first MLB returned to Station Tillamook Bay. At 1105, Station Tillamook Bay was advised that only 17 of the 19 people on board the *Taki-Too* had been accounted for. The second helicopter continued to search the water for the two missing victims but left the accident scene about 1600 without finding anyone. The *Steadfast* arrived on scene at 1700 and assumed on-scene command. The second MLB continued to search until 2100, then returned to Station Tillamook Bay. At 2115, the *Steadfast* completed its search and was released.

At first light on June 15, one of the 47-foot MLBs from Station Tillamook Bay and an HH-60J Jayhawk helicopter from Air Station Astoria resumed the search for the missing victims. Results were negative, and the Coast Guard suspended the search at 0857.

According to the Coast Guard, the two 47-foot MLBs from Station Tillamook Bay logged a total of 26 hours in the search-and-rescue effort. One of the HH-60J Jayhawk helicopters from Air Station Astoria searched for 7 hours, the other, for 5.3 hours. An HH-65 Dolphin helicopter from the Coast Guard’s air facility at Newport, Oregon, was in the air briefly. The Coast Guard cutter *Steadfast* logged nearly 13 hours in the search.

### **Cold Water Immersion**

According to a senior Coast Guard official, the *U.S. Coast Guard Addendum to the National Search and Rescue Supplement* is being revised to address survivability in cold air and cold water environments. Until recently, the primary danger from immersion in cold water was considered to be death from hypothermia, a condition in which the body loses heat to the water (which conducts heat away from the body 25 times faster than air of the same temperature) and the core body temperature drops dangerously low. A 2003 study by Transport Canada<sup>34</sup> found, however, that hypothermia is only the third of four

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<sup>34</sup> Transport Canada, *Survival in Cold Waters: Staying Alive*, report TP13822E (Ottawa, Ontario: 2003). The report, which was requested by the Marine Safety Directorate of Transport Canada, discusses physiology of cold water immersion, research into protecting people from the dangers of sudden cold water immersion, design of immersion suits and their relation to lifejackets, and various groups needing protection. The report incorporates an earlier Transport Canada report on cold shock and swimming failure.

stages in cold water immersion at which death can occur, and that more than half the deaths related to cold-water immersion occur during the “cold shock” and swimming failure stages.

The Coast Guard search-and-rescue addendum will incorporate the Cold Exposure Survival Model developed by Canada’s Defense and Civil Institute for Environmental Medicine. This model predicts “functional time” and survival time based on the cooling of the body’s core as affected by the person’s physical characteristics and clothing and the environmental conditions.<sup>35</sup>

The Canadian research, which builds on earlier surveys conducted in the United Kingdom and other countries, found that the critical water temperature in incidents of cold water immersion is 59° F (15° C). The Canadian study states, “Entry into water below 15° C should be avoided.” The water temperature at the accident site 3 hours after the *Taki-Too* capsized measured 52° F. The various immersion stages that can cause death, as described in the Canadian study, include the following.

Stage 1, initial immersion response or cold shock, occurs during the first 2 to 3 minutes of immersion. Unless victims are mentally prepared and physically protected (with survival suits or lifejackets), they can drown immediately after entering cold water because they cannot control their breathing. The shock of the cold water causes a large gasp followed by hyperventilation (faster breathing) and a greatly increased heart rate and blood pressure. The cardiac effects can cause death, particularly in older or less healthy victims.

Stage 2, short-term immersion or swimming failure, occurs during the first 3 to 30 minutes after immersion. According to the Canadian study, “ability to swim in warm water is no indication of how well a human can swim in cold water.” Two theories are advanced to account for death at stage 2. The first is that death is caused by the respiratory and cardiovascular responses begun during stage 1. The second is that cold water causes breathing to stop, the heart rate to slow, or cardiac arrest.

In stage 3, long-term immersion or hypothermia, death can occur after 30 minutes of immersion in cold water. Even with mild hypothermia, victims can drown after becoming physically incapacitated or losing consciousness. The Coast Guard developed survival curves to predict death from hypothermia at various water temperatures, and boating safety organizations have published tables showing expected survival time in water of different temperatures. The Canadian study cautions, however, that these curves and tables are difficult to validate.

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<sup>35</sup> Functional time is the predicted number of hours after initial exposure that a person’s body core temperature decreases to the end of mild hypothermia at 34° C (93.2° F). At functional time, the person is incapacitated by hypothermia and is at the limits of self-help. Survival time is the predicted number of hours after immersion when the person’s core body temperature falls to the end of moderate hypothermia at 28° C (82.4° F). A person with a core temperature of 28° C will lose consciousness. An immersed unconscious person is unable to maintain an airway, which quickly results in drowning.



Stage 4 is postrescue collapse, in which death occurs during rescue or hours afterward. According to the Transport Canada report, a 1956 study found that 17 percent of shipwrecked survivors rescued from water of 10° C (50° F) or below died within 24 hours.<sup>36</sup>

### ***Coast Guard Safety Alert***

On June 29, 2004, the Seventeenth Coast Guard District, based in Juneau, Alaska, issued a safety alert entitled “Cold Water Immersion: It’s More Than Just Hypothermia” to area mariners. The alert stated that a review of the boating fatalities in Alaska for the previous 3 years had indicated that about 75 percent of the people who died probably succumbed to cold shock and swimming failure rather than hypothermia. The alert explained to mariners how their bodies would react when immersed in cold water and what actions to take to increase their chances of survival. The alert stressed: “Wear a lifejacket at all times when boating,” and offered the following rationale for doing so:

This [a lifejacket] keeps your head above water if you suddenly fall overboard or capsize, and gives you those precious minutes you need to get back onboard. Even if you have a lifejacket in your hands, you may not be able to put it on. If you cannot self-rescue, it may give you some hypothermia protection and can extend the time you can survive until someone else can rescue you.

## **Tests and Research**

### ***Propeller***

Technicians at the Safety Board’s materials laboratory examined the *Taki-Too*’s propeller and found that the tip of each of the four blades curled forward, and that the angle and area of the curl increased in the counterclockwise direction (looking forward). The back of the blades did not show any scoring marks or scraping damage. Laboratory personnel concluded that the curl damage was consistent with the propeller contacting the soft bottom of the ocean floor while under power.

One blade showed two dime-sized areas of local deformation in the aft direction. The laboratory found no evidence of impact from hard material in the deformed areas.

### ***Chart Plotter***

The *Taki-Too*’s Furuno model 1833C/NT radar/chart plotter (type RDP-139, S/N 4312-1096) was delivered to the recorder laboratory at the Safety Board on April 30, 2003. The plotter is designed to display navigational data acquired from an integrated onboard radar and an optional Global Positioning System/Wide Area Augmentation System (GPS/WAAS) receiver.<sup>37</sup> Recent position and track information is

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<sup>36</sup> Transport Canada, p. 16.

<sup>37</sup> WAAS is a form of GPS that enhances position accuracy by correcting received navigation data (<http://users.erols.com/dlwilson/gpswaas.htm> <accessed August 27, 2004>).

stored in memory for as long as power is applied to the device. A battery is permanently installed in the unit to maintain data integrity while the unit is disconnected from the main power.

The exterior of the device showed no evidence of structural damage, but the interior was encrusted with salt. Metallic connections between the onboard battery and the printed circuit card containing the semiconductor memory elements were found completely corroded through. The onboard battery was found to be totally discharged. The unit was sent to the manufacturer, Furuno USA, Inc., to assess the potential for data recovery, but no data were found stored in the memory elements because of the loss of electrical power.

## Other Information

### ***Coast Guard Surf Stations***

Station Tillamook Bay is a designated surf station, where the Coast Guard operates rescue boats designed to pass through heavy, breaking waves. Surf stations are established at Federally mandated navigable bars or entrances where surf greater than 8 feet occurs 10 percent or more of the time during a calendar year, averaged over at least 5 years,<sup>38</sup> and where the water is deep enough to operate surf boats. The Coast Guard has designated 20 surf stations, 5 on the East Coast and 15 on the West Coast (table 3).

The wave conditions that occur at the waterways monitored by West Coast surf stations usually differ from the wave conditions at waterways overseen by the East Coast surf stations. As noted earlier, waves are created by wind energy. Because of rotational force effects, weather patterns, and other factors, the prevailing winds on the West Coast are behind the waves, increasing their energy. The prevailing winds on the East Coast, in contrast, blow against the waves, retarding their force. The Pacific Ocean is wider than the Atlantic Ocean, which permits the wind energy to build, creating larger swells. Finally, unlike the East Coast, the West Coast has a steep continental slope and narrow continental shelf that allows the waves to enter shallow water closer to shore. As the waves encounter a rapid change in water depth, their height becomes steeper and they break, spilling, plunging, or surging in the shallows or on the beach.

The Coast Guard has identified that the sea state at coastal river bar entrances overseen by several surf stations contributes to conditions that warrant the suspension of traffic by recreational vessels and uninspected commercial boats. This is discussed further in the following section.

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<sup>38</sup> *U.S. Coast Guard Boat Operations and Training (BOAT) Manual*, vol. 1, chapter 4, “Surf Stations” (Commandant Instruction M16114.32A, January 18, 2005).

**Table 3.** Designated Coast Guard surf stations.

| Surf Station        | State          |
|---------------------|----------------|
| <b>East Coast</b>   |                |
| Merrimack River     | Massachusetts  |
| Chatham             | Massachusetts  |
| Barnegat Light      | New Jersey     |
| Oregon Inlet        | North Carolina |
| Hatteras Inlet      | North Carolina |
| <b>West Coast</b>   |                |
| Grays Harbor        | Washington     |
| Cape Disappointment | Washington     |
| Quillayute River    | Washington     |
| Tillamook Bay       | Oregon         |
| Yaquina Bay         | Oregon         |
| Depoe Bay           | Oregon         |
| Umpqua River        | Oregon         |
| Siuslaw River       | Oregon         |
| Coos Bay            | Oregon         |
| Chetco River        | Oregon         |
| Humboldt Bay        | California     |
| Noyo River          | California     |
| Bodega Bay          | California     |
| Golden Gate         | California     |
| Morro Bay           | California     |

The Coast Guard *BOAT* manual states that surf stations are required to be staffed by a two-person command cadre (usually, a commanding officer or officer-in-charge and an executive petty officer) and by from five to seven qualified surfmen. Surfmen are MLB coxswains who are specially trained to perform rescues at sea in hazardous conditions (surf and heavy, breaking seas). A surfman is required to be on board a responding MLB when the surf exceeds 8 feet.

About 160 surfmen stand duty at the 20 designated surf stations and at the surfman training center (the National Motor Lifeboat School at Cape Disappointment, Washington, near the mouth of the Columbia River<sup>39</sup>). According to the Coast Guard, since 1999, only about 50 percent of the surfman duty billets have been filled with qualified personnel. In 2003, the Coast Guard established a prospective surfman program to attract and train

<sup>39</sup> For further information, see National Motor Lifeboat School website <[www.uscg.mil/hq/g-o/nmlbs/Surfman/program.htm](http://www.uscg.mil/hq/g-o/nmlbs/Surfman/program.htm)>.

surfmen.<sup>40</sup> A prospective surfman must be previously certified as a coxswain and must meet the qualifications for MLB basic coxswain and heavy-weather coxswain<sup>41</sup> before undertaking surfman training. The training can take 2 years or more because most practical tasks require surf conditions (surf in excess of 6 feet).<sup>42</sup>

According to the Coast Guard's *BOAT* manual, Station Tillamook Bay was required to have five qualified surfmen. The Coast Guard Marine Safety Office in Portland informed Safety Board investigators that at the time of the accident, Station Tillamook Bay had only three qualified surfmen, due to the Coast Guard-wide personnel shortage noted above.

Surf stations are also required to have at least two surf-capable boats. Station Tillamook Bay had two 47-foot MLBs, the Coast Guard's newest heavy-surf rescue vessels.<sup>43</sup> The lifeboats are designed to operate in extreme conditions, including sustained winds of 50 knots, surf up to 20 feet, and 30-foot seas, and if overturned, can right themselves in 8 seconds. The 47-foot MLBs are equipped with two 450-horsepower engines and have an operating speed of over 25 knots, a range of over 200 nautical miles, and an endurance time of 12 hours. The prototype of the 47-foot MLB was tested at Cape Disappointment.

### **Coast Guard Authority Regarding Unsafe Conditions**

The Coast Guard has the authority under 33 CFR 177 to determine when unsafe conditions exist on recreational boats or uninspected passenger vessels, or on a body of water, and to require operators of those vessels to take immediate action to protect the safety of those on board.<sup>44</sup> The unsafe conditions defined in the rules include operating in a designated "regulated boating area" when wave heights are above 4 feet, when the wave height exceeds that determined by a formula related to the length and freeboard of the boat,<sup>45</sup> or when the surface current is 4 knots or greater in the regulated boating area.

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<sup>40</sup> "Prospective Surfman Program," Commandant Instruction 16114.35, July 31, 2003.

<sup>41</sup> Coxswains who undergo advanced training in operating the 47-foot MLB in heavy weather, defined by the Coast Guard as "sea, swell, and wind conditions combining to exceed 8 feet and/or winds exceeding 30 knots" (*U.S. Coast Guard Boat Crew Seamanship Manual*, Commandant Instruction M16114.5C, September 13, 2003, appendix A).

<sup>42</sup> Practical training is carried out at surf stations after trainees complete coursework at the National Motor Lifeboat School. To be certified as a surfman, an MLB coxswain must satisfy the Coast Guard's personnel qualification standard. The performance criteria include transiting a bar or inlet inbound and outbound through 8- to 15-foot surf, rescuing a person in the water in 8- to 15-foot surf, maintaining a stationary position in 8- to 15-foot surf, and other tasks (*U.S. Coast Guard BOAT Manual*, vol. 2, part 6, "Surfman Qualification"). The prospective surfman must also pass comprehensive written examinations.

<sup>43</sup> Details about the 47-foot MLB are from the websites of the Thirteenth Coast Guard District <[www.uscg.mil/d13/ipa/factsheets/47.pdf](http://www.uscg.mil/d13/ipa/factsheets/47.pdf)> and the Seventh Coast Guard District <[www.uscg.mil/d7/units/grustpete/stasandkey/page20.html](http://www.uscg.mil/d7/units/grustpete/stasandkey/page20.html)>.

<sup>44</sup> According to 33 CFR 177.05, the Coast Guard may direct operators to "correct the hazardous condition immediately; proceed to a mooring, dock, or anchorage; or suspend further use of the boat until the especially hazardous condition is corrected."

<sup>45</sup> The formula is given at 33 CFR 177.07(f)(2), as follows:  $L/10 + F = W$ , where L = overall length of a boat measured in feet in a straight horizontal line along and parallel with the centerline between the intersection of this line with the vertical planes of the stem and stern profiles excluding deckhouses and equipment; F = the minimum freeboard when measured in feet from the lowest point along the upper strake edge to the surface of the water; W = maximum wave height in feet to the nearest highest whole number.

The Tillamook Bay bar is 1 of 16 river bar entrances in Oregon and Washington defined as a regulated boating area (33 CFR 177.08[f]). All 10 Coast Guard surf stations (see above) in those states are also regulated boating areas. Regulated areas without a Coast Guard station near their entrances (Coquille River, Nehalem River, Netarts Bay, Rogue River, and Siletz Bay in Oregon; Willapa Bay in Washington) are not normally restricted.<sup>46</sup>

To protect small-boat operators, the Coast Guard has placed diamond-shaped rough bar advisory signs at the bar entrances of 10 of the regulated boating areas. Two rough bar advisory signs are found at the entrance to the Tillamook Bay channel, one at the Coast Guard station and one on the observation tower (figure 6). The signs are painted white, with an international orange border, and bear the words ROUGH BAR in black capital letters. The signs have two flashing yellow lights that are activated when seas exceed 4 feet in height and are considered hazardous for small boats.<sup>47</sup>



**Figure 6.** Rough bar advisory sign on Coast Guard observation tower at Tillamook Bay.

<sup>46</sup> *Standard Operating Procedures*, Thirteenth Coast Guard District, Seattle, Washington, 2002.

<sup>47</sup> *U.S. Coast Pilot*, vol. 7, 2003, p. 299.

Vessel movement at the Tillamook Bar is monitored by a Coast Guard seaman stationed in the observation tower on the north jetty. The tower is manned during daylight from about one-half hour before sunrise and remains manned when the rough bar light is lit.

### **Coast Guard Regulations on Wearing of Lifejackets**

**Current Rules.** Federal regulations for the wearing of lifejackets on small passenger vessels are found at 46 CFR 122.508 (subchapter K) and 185.508 (subchapter T). These rules (part of the 1996 amendments to the Small Passenger Vessel Regulations) make the vessel master responsible for determining when “possible hazardous conditions exist” such that passengers should wear lifejackets:

- (a) The master of a vessel shall require passengers to don life jackets when possible hazardous conditions exist, including, but not limited to:
  - (1) When transiting hazardous bars and inlets;
  - (2) During severe weather;
  - (3) In event of flooding, fire, or other events that may possibly call for evacuation; and
  - (4) When the vessel is being towed, except a non-self-propelled vessel under normal operation conditions.
- (b) The master or crew shall assist each passenger in obtaining a life jacket and donning it, as necessary.

**Rulemaking History.** The notice of proposed rulemaking (NPRM) for this regulation was first published on January 30, 1989 (*Federal Register*, vol. 54, no. 18, p. 4412). The notice advised Congress and others that the Coast Guard was completely revising the regulations governing the inspection and certification of small passenger vessels, parts 175 through 187 of 46 CFR. The original regulations had been developed in response to the Small Passenger Vessel Act of 1956, passed by Congress as Public Law 84-519.

In its 1989 NPRM, the Coast Guard cited a number of reasons for amending the regulations, including statutory changes, increases in vessel size and capacity, and changes in the scope of operation of small passenger vessels. The Coast Guard noted that “Public Law 84-519 intended that the regulations promulgated thereunder provide a standard of safety for weekend fishermen, sightseers, and possibly small ferries,” but that “the environment in which small passenger vessels operate has changed dramatically.” For example, many no longer operate out of one port, and some engage in international voyages.

A further reason given for revising the small passenger vessel regulations was vessel casualties. The NPRM cites 11 marine casualties reported to the Coast Guard between 1973 and 1987, seven of which involved capsizings or sinkings:

- *Comet*, 1973: party fishing boat, foundered and sank off Rhode Island in 48° F water; 12 drowned, 4 missing.
- *Pearl C.*, 1976: charter fishing vessel, capsized while being towed across the Columbia River bar off Astoria, Oregon; 1 drowned, 7 missing.

- *Dixie Lee II*, 1977: charter fishing vessel, capsized during sudden, severe thunderstorm; 12 died, 1 missing.
- *Joan La Rie III*, 1982: charter fishing vessel, swamped by large wave and sank off New Jersey in 53° F water; 6 drowned, 2 missing.
- *San Mateo*, 1983: charter fishing vessel, capsized while crossing bar at Morro Bay, California, all 32 persons on board thrown into water, all rescued; 3 serious injuries, operator later died of his injuries.
- *Merry Jane*, 1986: charter fishing vessel, broached and heeled sharply to starboard approaching Bodega Bay, California, 19 of 51 aboard fell or were thrown overboard; 9 drowned.
- *Fish-n-Fool*, 1987: charter fishing vessel, capsized off Baja California Norte, Mexico, in 59° F water; 2 died, 8 missing.

The NPRM states that investigations of such casualties by the Safety Board and the Coast Guard had led to recommendations that would help prevent casualties or alleviate damages and injuries from future casualties, and that the Coast Guard considered those recommendations in proposing changes to subchapter T.

A supplemental notice of proposed rulemaking (SNPRM) was published on January 13, 1994 (*Federal Register*, vol. 59, no. 9, p. 2210). The rule in the SNPRM contained the following two paragraphs:

(b) When evaluating the need to require the donning of lifejackets, the master shall consider the size of the vessel and the location of the passengers on the vessel.

(c) Any passenger or crew member shall be permitted to voluntarily don a lifejacket whenever he or she desires.

After receiving comments on the NPRM and the SNPRM, the Coast Guard published the interim final rule for the subchapter T regulations on January 10, 1996 (*Federal Register*, vol. 61, no. 7, p. 1005). The interim final rule omits paragraphs (b) and (c) from section 185.508. The Coast Guard described its rationale for the change as follows:<sup>48</sup>

The intent of this section was to raise the sensitivity of the master with regard to donning of lifejackets, and raise the priority of donning lifejackets in certain hazardous and deteriorating operating conditions. The comments received on this section were focused on paragraph (c), which permitted passengers and crew to don lifejackets whenever desired. The Coast Guard agrees with comments received that required lifejackets are part of the vessel's emergency gear, and should not be compromised by allowing passengers to don them in other than master directed circumstances.

The final rule for 46 CFR subchapters K and T was published on September 30, 1997.<sup>49</sup> The final rule establishing the current regulations became effective on October 30, 1997.

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<sup>48</sup> *Federal Register*, vol. 61, no. 7, p. 881.

<sup>49</sup> *Federal Register*, vol. 62, no. 189, p. 51326.

**Previous Board Action—1983.** The Safety Board made the following recommendation to the Coast Guard in 1983 regarding the wearing of lifejackets by passengers in hazardous conditions:

M-83-80

Amend 46 CFR part 185 to require that children carried on board small passenger vessels wear life preservers while the vessel is departing protected waters and until such time as the operator determines that it is safe to remove them.

Safety Recommendation M-83-80 resulted from the Safety Board's investigation of the 1983 accident in which the small passenger vessel *San Mateo* capsized at the entrance to Morro Bay, California, with 23 children and 7 adult chaperones on board.<sup>50</sup> No one was wearing a lifejacket, but all those aboard were rescued, with only three serious injuries among the passengers. The operator of the vessel, however, later died of his injuries.

On February 23, 1984, the Coast Guard advised the Safety Board that it concurred with the intent of the recommendation "to the extent that passengers should wear life preservers when hazardous conditions exist or are expected to be encountered." The Coast Guard said that the operator of the *San Mateo* "should have required all passengers to put on life preservers" in accordance with the regulations but that "the decision that passengers aboard small passenger vessels wear life preservers should remain the responsibility of the operator." The Coast Guard further stated that in the *San Mateo* accident, "the hazard was not the result of leaving protective waters, but crossing a hazardous bar and standing into rough seas."

The Safety Board replied on July 5, 1984, that it regretted that the Coast Guard did not concur with the recommendation and that "unless Federal regulations are revised to 'require' rather than to 'recommend' the wearing of life preservers during or in anticipation of emergency situations, passengers of small passenger vessels will not be afforded the full protection intended by the Federal regulations requiring that the equipment be on board." The Board placed Safety Recommendation M-83-80 in "Open—Unacceptable Action" status and asked the Coast Guard to reconsider its opinion.

On November 24, 1995, the Board classified the recommendation "Open—Unacceptable Response" because of the Coast Guard's lack of timely action. On June 26, 1996, the Coast Guard requested that the Board reclassify the recommendation because it had published final rules that provided requirements for passengers to don lifejackets in possible emergency conditions. On March 12, 1997, citing the new provisions of 46 CFR parts 122.508 and 185.508, the Safety Board classified Safety Recommendation M-83-80 as "Closed—Acceptable Action."

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<sup>50</sup> *Capsizing of the Charter Passenger Vessel San Mateo, Morro Bay, California, February 16, 1983*, Marine Accident Report MAR-83/09 (Washington DC: National Transportation Safety Board, 1983).



**Previous Board Action—1986.** The Safety Board made the following recommendation to the Coast Guard in 1986 regarding the wearing of lifejackets by passengers in hazardous conditions:

M-86-113

Require that life preservers be worn by passengers of small ocean and coastwise passenger vessels up to 65 feet in length, while on open decks during the time that these vessels are leaving or entering ports which are susceptible to breaking waves similar to Bodega Bay, California.

Safety Recommendation M-86-113 resulted from the investigation of the 1986 accident in which the *Merry Jane*, a 65-foot-long charter passenger vessel, was overtaken by large waves while returning to Bodega Bay, California, after a sportfishing trip.<sup>51</sup> As the first large wave passed under the *Merry Jane*'s port quarter, the vessel suddenly raised and its bow swung to the left, forcing the vessel to become broadside to the waves. The vessel heeled to starboard and nearly capsized. The sudden large heel caused two passengers on the bow, one passenger on the flying bridge, and one crewmember near the stern to be thrown overboard. A few seconds later, the same large wave broke over the vessel's port side, flooded the afterdeck, and washed 14 of the 48 passengers overboard.

After the vessel righted, it was struck again by another large wave, which again heeled the vessel severely and also broke over the vessel. The operator succeeded in turning the vessel to the left to head into the seas. Once headed into the seas, the *Merry Jane* encountered one more large wave and one more passenger was thrown overboard. Of the 19 persons thrown into the water, 10 persons were rescued and 9 persons died. The *Merry Jane* sustained only minor damage.

On December 31, 1986, the Coast Guard responded that it concurred in part with Safety Recommendation M-86-113. The Coast Guard stated that although "the operator of a passenger vessel is responsible for the operational decisions affecting the safety of the vessel and its passengers," it would "aid and encourage operators to be more cautious." The Coast Guard further stated that it intended the local Officers in Charge, Marine Inspection, to "designate hazardous inlets on which operators of small passenger vessels will require to have passengers on open decks don life jackets prior to transiting."

On April 24, 1987, the Safety Board classified Safety Recommendation M-86-113 "Open—Acceptable Response," pending further Coast Guard action. On November 24, 1995, the Board reclassified the recommendation "Open—Unacceptable Response" because of the Coast Guard's lack of timely action. On March 12, 1997, after the Coast Guard published its new regulations at 46 CFR 122.508 and 185.508, the Board classified Safety Recommendation M-86-113 "Closed—Acceptable Action."

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<sup>51</sup> *Near Capsizing of the Charter Passenger Vessel Merry Jane, Bodega Bay, California, February 8, 1986*, Marine Accident Report NTSB/MAR-86/11 (Washington, DC: National Transportation Safety Board, 1986).

**Masters' and Passengers' View on Wearing Lifejackets.** As noted earlier, several masters of the vessels who sailed on the day of the accident indicated that if conditions were so dangerous that they would have to ask passengers to wear lifejackets, they would not, or should not, take their vessels out. The *Kerri Lin* master stated, "If I have to put lifejackets on people to go out, we don't go." The *Norwester* master told investigators, "You are already in an emergency state if you are putting lifejackets on." When investigators asked the master whether passengers might be more willing to wear lifejackets if they were lighter and not so cumbersome, possibly self-inflating, he said that it would be up to individual passengers. But he also said that whether passengers are willing to put on a lifejacket "is generally based on the comfortability of the lifejacket." (See appendix D for information about Coast Guard-approved lifejackets.)

The *Oakland Pilot* master said that requiring passengers to wear lifejackets would frighten them. The *D & D* operator also told investigators that it frightens many people when the master tells them to put on a lifejacket. But he said that if the Coast Guard had a rule that people had to wear lifejackets when crossing the bar, then they would not question it. "But for us to tell them they have to do it, it just scares the hell out of them."

### **Actions After Taki-Too Accident**

**Lifejacket Safety Alert.** On June 17, 2003, the Coast Guard issued a safety alert regarding the wearing of lifejackets. The alert reiterated the regulations at 46 CFR 185 requiring the master of a vessel to require passengers to don lifejackets when possible hazardous conditions exist. The alert noted that wearing a lifejacket in such circumstances is "similar to wearing seatbelts during aircraft take-offs and landings and periods of turbulence." The message went on to say, "The best time to don a life jacket is before it is needed—before people are in the water." The safety alert concluded as follows:

The Coast Guard has entrusted small passenger vessel masters to use their judgment to determine when to require the passengers to wear life jackets. Should Masters have questions concerning "hazardous conditions" and when life jackets should be donned, they should contact their local Coast Guard Officer in Charge, Marine Inspection for additional guidance. If there is doubt as to whether a hazardous condition exists, passengers and crew should don life jackets.

**Bar Closing.** On September 11, 2004, the COTP Portland, citing adverse weather conditions in the vicinity of Tillamook Bay, issued Order 2004-39 closing the bar to all vessel traffic. The situation report indicates that after returning about 0830 from fishing in the ocean, the *D & D* operator radioed Station Tillamook Bay of his intent to cross the bar. Station personnel advised the *D & D* operator that the existing conditions included 18- to 20-foot breakers on the north and south sides of the bar and 8- to 10-foot breakers inside the jetties and recommended that he wait for conditions to change. Station Tillamook Bay then notified Group Astoria of the existing conditions, and Astoria relayed the report to the COTP Portland. At 1215, the order was issued to hold all commercial vessel traffic from crossing the entrance to Tillamook Bay because of hazardous weather conditions. At 1353, after being advised that the bar conditions had abated, the COTP Portland rescinded the order. Two MLBs subsequently escorted the *D & D* across the bar at 1837, when tide conditions improved.

**Coast Guard Report on Small Passenger Vessel Safety.** Fourteen months after the *Taki-Too* capsized, Congress passed the Coast Guard and Maritime Transportation Act of 2004, which included a provision requiring the Coast Guard to

report to Congress regarding measures that should be taken to increase the likelihood of survival of passengers on small passenger vessels who may be in the water resulting from the capsizing of, sinking of, or other marine casualty involving the small passenger vessel. The study shall include a review of the adequacy of existing measures (1) to keep the passengers out of the water, including inflatable life rafts and other out-of-the-water survival crafts; (2) to protect individuals from hypothermia and cold shock in water having a temperature of less than 68 degrees Fahrenheit; (3) for safe egress of passengers wearing personal flotation devices; and (4) for the enforcement efforts and degree of compliance regarding the 1996 amendments to the Small Passenger Vessel Regulations (part 185 of title 46, Code of Federal Regulations) requiring the master of a small passenger vessel to require passengers to wear personal flotation devices when possible hazardous conditions exist . . .<sup>52</sup>

Congress specifically directed the Coast Guard to describe enforcement of the regulation requiring masters to have passengers don lifejackets in possibly hazardous conditions, and to include in its report “the number of vessels and masters cited for violations of those regulations for fiscal years 1998 through 2003.” Congress also required the Coast Guard to provide recommendations for “improving compliance with, and possible modifications to, those regulations.”

On March 31, 2005, the U.S. Department of Homeland Security delivered the Coast Guard’s “Report on Small Passenger Vessel Safety” to the Senate Committee on Commerce, Science and Transportation.<sup>53</sup> In discussing the lifejacket regulation, the report states, “At present, there have been no citations issued to vessels or masters for violations of this regulation since it became effective, and the degree of compliance is unknown.” The report describes enforcement or compliance monitoring as “problematical at best”:

Enforcement action would require either direct observation by the Coast Guard, testimony or reporting by a passenger (who are [sic] unlikely to complain about not wearing lifejackets) or crew member, or come about as a result of a casualty. Further complicating enforcement, the regulation contains little metric guidance to determine when a bar or inlet is sufficiently “hazardous,” or weather sufficiently “severe,” to trigger the requirement for a given vessel and its capabilities and the experience of its master. In the case of the TAKI TOO, the master was very familiar with the waters around the Tillamook Bar, and had 17 years of experience operating the vessel—and thus may not have perceived the same degree of risk as a less experienced operator. As noted in the preamble to the 1996 IFR [interim final rule], the intent of the requirement was to raise the sensitivity of the master, based on his/her discretion and judgment, with regard to donning of lifejackets, and to raise the priority of donning lifejackets in certain hazardous and deteriorating operating conditions.

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<sup>52</sup> Section 624, Coast Guard and Maritime Transportation Act of 2004 (Public Law 108-293). The law was passed on August 9, 2004, to authorize appropriations for the Coast Guard for fiscal year 2005.

<sup>53</sup> The Coast Guard transferred from the U.S. Department of Transportation to the Department of Homeland Security in February 2003.

In addition to the practical difficulties in enforcing the regulation, there have not at present been any specific corresponding civil penalty provisions established in connection with it (although in cases where a master shows poor discretion or judgment that rises to the level of negligence, action could be taken against the master's license).

. . . The case of the TAKI TOOO remains under investigation; however since the master is deceased and the vessel a total loss, it is unlikely that it will result in any citations.

The last section of the report discusses, as required by Congress, improving compliance with the regulations. In late 2004, the Coast Guard and the small passenger industry began chartering a Natural Working Group (NWG) to develop "guidance as to what conditions may warrant the mandatory donning of lifejackets on both inspected and uninspected small passenger vessels." The report states that "partnership with the industry is believed to be preferable to a regulatory solution," and quotes a statement by the National Marine Charter Association (NMCA) opposing the mandatory use of lifejackets on small passenger vessels:

Passengers on charter vessels have the distinct safety advantage of professional guidance from trained, licensed, and experienced operators and crew. Operators of passenger vessels are licensed by the U.S. Coast Guard and have the training and experience to know when circumstances warrant passengers donning PFDs [personal flotation devices, that is, lifejackets]. The safety briefings Captains give to passengers before being underway show where PFDs are kept and how they should be worn. A government intrusion on and regulation of this important business-customer relationship is unwarranted and unneeded, and has not been proven beneficial by any studies or empirical evidence.

The report concludes as follows:

The Coast Guard is hopeful that the work of the NWG will result in useful guidance for masters of small passenger vessels to supplement their discretion and judgment with regard to donning of lifejackets in hazardous and deteriorating operating conditions, with a view to further improvement of the already excellent safety record of the industry.

### ***Condition of Tillamook Bar***

Nearly all the charter fishing boat owners and operators at Tillamook Bay interviewed by Safety Board investigators said that the condition of the Tillamook bar had deteriorated in recent years.<sup>54</sup> The masters described passage over the bar as more dangerous than before because of increased shoaling, which has made the area "too shallow" for safe passage. Several said that the destruction of the ends of the jetties has exposed rocks at the end of the south jetty and that the erosion of the beach next to the north jetty has caused a buildup of sand at the end of the north jetty, making both jetties dangerous. One vessel master told investigators that charter boat operators had lost 20 to

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<sup>54</sup> Among those interviewed by Safety Board investigators were the masters of the four other boats that left Garibaldi marina the morning the *Taki-Tooo* capsized and both owners of Garibaldi Charters.

30 days a year because of the deteriorated conditions. One of the Garibaldi Charters owners said that the company's boats could not go out 5 or 6 days a year because of the weather and because "the bar is in bad condition."

The chief of operations for the Portland (Oregon) District of the Army Corps of Engineers told Safety Board investigators that the Tillamook Bay jetties were constructed to offset the accumulation of sand at the bar. She said that, despite local people's perception that the bar was getting worse, the Corps's survey charts showed that conditions had not changed much over the years. "The only change that I've seen from looking back through the data over the past number of years is that the wave frequency, wave heights and storm frequency had gotten worse," she said. She explained that maintenance dredging of the channel requires separate funding from maintenance of the jetties and that the Corps has not requested funding for dredging because the jetties are functioning as intended (that is, scouring the channel). The Corps's public relations manager said that he had received no "negative comments" about the state of the channel.

The chief of operations told Safety Board investigators that the Corps had received congressional funding to study the state of the Tillamook Bay jetties and to estimate the cost of work to prevent the north jetty from breaching during a storm. In December 2003, the Corps published a major maintenance report, an extensive study addressing the deterioration of the north and south jetties and exploring repair alternatives and associated costs.<sup>55</sup> The study contains a design report and an environmental assessment and includes data from field measurements of the jetties taken the week after the *Taki-Too* accident.<sup>56</sup>

**Deterioration of Jetties and Shoreline.** According to the Corps's study, both jetties at the entrance to Tillamook Bay have been damaged by exposure to "more extreme storm waves" in recent years:

- *The north jetty* is now 384 feet shorter than its authorized length of 5,700 feet. The jetty was completed in 1917 and has been extended or repaired six times since then, the last time in 1991. The study predicts that, on the basis of past recession rates (decreases in length), the north jetty will be 475 feet shorter by 2006.
- *The south jetty* is now 666 feet shorter than its authorized length of 8,025 feet. The jetty was constructed in three stages between 1969 and 1971 and has never been repaired. The south jetty is predicted to be 890 feet shorter by 2006.
- *The shoreline along the north jetty* has eroded. If wave action breaches the jetty, it could destroy the Coast Guard watchtower as well as disrupt the navigation channel.

**Changes in Bar.** The Tillamook bar (called the *ebb tidal shoal* in the report) has changed as a result of jetty construction and the deterioration of the jetty tips. Before the

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<sup>55</sup> U.S. Army Corps of Engineers, *Tillamook North and South Jetties, Garibaldi, Oregon*, Major Maintenance Report (Portland, Oregon: December 2003). The study was funded in 2002.

<sup>56</sup> Week of June 23, 2003.

south jetty was built, the shoal was evenly distributed both north and south. According to the report, a 1984 survey found that the shoal had begun to hook away from the south side of the entrance. By 2002, the hook had extended into the navigation channel. In addition, increased shoaling along the south side of the channel had concentrated the ebb current on the north side of the channel and deepened the north side.

**Navigation Concerns.** The Corps's study states that deterioration of the jetties "has caused concern for navigability of the channel":

Conditions through the south approach channel and inner channel between the jetty heads are the major concerns to navigability. Wave conditions over the ebb tidal shoal, especially during the ebb tide, have become very treacherous over the past 6 years, possibly caused by receding jetty lengths, mainly the south jetty. The wave conditions over the ebb tidal shoal are very dangerous. There is a channel located just west of the end of the south jetty that boaters use to navigate the entrance. This situation is complicated by the presence of remnant jetty stone that lies adjacent to this natural channel. This channel also forces boaters to put their vessels in a precarious position, broadside to the waves. Non-local boats that must use the entrance as a port of refuge are unaware of the particular dangers of the ebb tidal shoal and the use of the natural channel used by local boaters. According to the Coast Guard, non-locals do not navigate the entrance very well.

The study concludes that not to repair the jetties "will eventually lead to an increase in shoaling at the channel entrance. As more of the jetties deteriorate, waves will move further into the navigation channel increasing boating hazards and further destabilizing the inner portion of the jetties." The study does not discuss navigation conditions faced by vessels proceeding outbound on a northwesterly heading, as on the day of the *Taki-Tooo* capsizing, other than to note that breaking waves over submerged rocks at the end of the north jetty are "problematic."

**Proposed Work.** The study makes recommendations for partially restoring the jetties and also recommends that "further analysis and project review be conducted to establish the acceptable final length for both jetties that will provide an acceptable level of navigation conditions at the Tillamook Navigation Project." In July 2003, the Corps received \$500,000 to repair the erosion problems at the base of the north jetty. Congress appropriated additional funding in fiscal year 2004 to build a revetment, or embankment, on the north jetty. In September and October 2004, the Corps repaired the north jetty by placing earth and rock at the base and by constructing a 300-foot-long revetment perpendicular to the jetty along the shore. The revetment is intended to prevent further erosion of the sandy beach near the base of the jetty and to protect the Coast Guard watchtower. According to a Corps official, the revetment is a permanent repair and no work to restore the jetties to their original length is anticipated.

### ***National Marine Charter Association***

The NMCA is a nonprofit organization, based in Washington, D.C., that serves the interests of professional marine charter operators nationwide. The association was formed in June 2003 as an offshoot of the National Association of Charterboat Operators. The 470 NMCA members offer for-hire services such as charter fishing, sailing charters, dive charters, eco-tours, water taxis, and yacht charters. Members are kept informed about

regulatory and legislative matters and other issues by means of a website, special alerts, and a monthly Internet newsletter. The association also collects and disseminates information about marine charter companies and publishes a national directory (available at charternet.com).

Recently, the NMCA developed a voluntary program for marine charter vessels called the Accredited Vessel Inspection Program (A-VIP). The program establishes preferred industry operating practices, equipment standards, and safety measures for both uninspected and inspected charter boats. A-VIP is described on the NMCA website as “the marine charter industry’s first accreditation program.” A-VIP certification requires that vessels carry additional equipment such as navigation-fixing devices, damage-control kits, and alternative communication systems. Certified companies are required to have crews trained in emergency procedures and to keep a log of emergency drills. Companies must certify that their crews perform safety tasks before each trip, such as giving safety orientations and counting passengers. Companies must provide proof of liability insurance and crews must be enrolled in drug-testing programs that comply with Federal regulations. Operators must certify that they participate in the Maritime Domain Awareness program (Homeland Security). Operators must have a written plan for accommodating disabled passengers, and must certify that their vessels are in compliance with applicable Coast Guard requirements. The A-VIP application includes detailed guidelines for emergency drills, such as rough weather at sea, and other certification requirements.

# Analysis

## General

The analysis first identifies factors that can be eliminated as causal or contributory to the accident. It then discusses the following safety issues identified in the accident investigation:

- Decision to cross the bar
- Tillamook Bay operations
- Survivability

## Exclusions

The Safety Board examined the *Taki-Too*, its engine, and related components, to determine whether they showed deficiencies that might have been factors in this accident. Investigators found no significant defect, scratch, marking, or other evidence of the vessel's striking an object or of the boat grounding. Witnesses, including the *Taki-Too* deckhand, described hearing a reduction in engine power, potentially an indication of propulsion failure. In checking the steering and propulsion mechanisms, however, investigators found no evidence of preaccident mechanical malfunction. The engine and transmission were solidly mounted. The engine was intact, with no signs of oil leaks or signs of catastrophic failure. All fuel lines, fittings, and linkages were intact and attached. When manipulated at the lower helm station, the throttle and transmission control moved the throttle linkage throughout its range. Laboratory examination determined that the condition of the propeller blades, which were curled at the tips, was consistent with a propeller under power striking a soft ocean floor. The Safety Board, therefore, concludes that the absence of defects and the evidence of propulsive power indicate that problems with the engine, propeller, and associated boat components such as the throttle and the rudder were not causal factors in this accident.

## Decision to Cross the Bar

The charter boat operators whose trips originate at Garibaldi marina make a series of decisions in transiting the Tillamook Bay bar. They consider whether they should leave port, based on the broadcast weather conditions. Once at the bay entrance, they consider whether conditions present a go/no-go situation, that is, whether the sea state at the bar permits or precludes an attempted transit to the ocean. Finally, they decide, based on the prevailing seas and current conditions, how to maneuver their vessels so that they safely



reach the ocean. In the following discussion, the Safety Board examines personal factors that could have affected the decisions made by the *Taki-Too* master as well as factors affecting the decisions of all the charter boat operators who took vessels out on the day of the accident.

### ***Personal Factors Potentially Affecting the Taki-Too Master's Decisions***

In analyzing the *Taki-Too* master's actions, the Safety Board considered personal factors that could have influenced his decision-making, including whether his physical condition was affected by the use of alcohol or drugs (illegal and prescribed) or by a sleep deficit. The Board also considered whether financial concerns might have been a factor.

Autopsy findings showed that the cause of the master's death was drowning by asphyxiation with hypothermia and that he did not die as a result of previously noted medical conditions.

Toxicological samples from the master showed no evidence in his system of alcohol or of the five classes of illegal drugs tested for under Coast Guard rules. The toxicological analysis did show amounts of amitriptyline and its metabolite, consistent with the master's having used the prescribed sedative within 24 hours of the accident.<sup>57</sup> Available records indicate the master had been taking 20 milligrams of amitriptyline nightly to treat insomnia for at least 4 years, and he probably had been taking the sedative longer. Toxicological studies with amitriptyline have shown that any adverse effect it might have on psychomotor performance usually disappears with regular use of the drug.<sup>58</sup> While the master may have experienced some subtle effects of the medication, how such effects would have influenced his actions is unclear.

The Safety Board considered whether the master was sleep deprived on the day of the accident, which could have impaired his performance. His wife told Safety Board investigators that for some time before the accident, the master had maintained a regular routine in which he had obtained at least 7 1/2 hours of sleep each night, consistently at the same times. Because the master reportedly received 7 1/2 hours of sleep the night before the accident and a comparable amount of reported sleep each night for at least several nights before the accident, and because he maintained a constant sleep/wake schedule, he would not have sustained either an acute or a chronic sleep deficit or experienced a disruption to his body clock or circadian rhythms. Thus, he was not considered to have been sleep deprived at the time of the accident.

According to the owner of Garibaldi Charters, if the charter vessel masters elected not to leave the marina to go fishing or returned to port after examining the bar conditions, they would not receive their portion of the passengers' fees for the fishing trip. The Safety Board, therefore, considered whether the *Taki-Too* master's decision to proceed with the

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<sup>57</sup> R. C. Baselt, *Disposition of Toxic Drugs and Chemicals in Man*, 5th ed. (Foster City, California: Chemical Toxicology Institute, 2000).

<sup>58</sup> R. C. Baselt, *Drug Effects on Psychomotor Performance* (Foster City, California: Biomedical Publications, 2001).

fishing trip might have been influenced by his concern about the possible loss of income. The Safety Board examined the master's financial records and dealings, including his charter company sale, lease agreements, real estate dealings, and so forth, and found no evidence that he might have been motivated by financial concerns.

Therefore, the Safety Board concludes that the following were not factors in the performance of the *Taki-Too* master: sleep deprivation, alcohol, illegal or prescribed drugs, and financial concerns.

### ***Decision of the Charter Operators to Leave Port***

Since the day before the accident, the National Weather Service had issued small craft advisories in its forecasts, which were broadcast over marine and weather radio channels and posted on Internet sites. At 1645 on June 13, the National Weather Service issued a small craft advisory predicting hazardous seas and 10-foot swells, whereupon the Coast Guard staff at Station Tillamook Bay immediately broadcast a bar restriction via VHF-FM channels 16 and 22A and on citizens band channel 9. The Coast Guard watchstanders also raised a small-craft advisory flag at the station and activated the yellow lights on the rough bar advisory signs. Safety Board investigators later observed the sign and lights from the Tillamook channel and noted no obstructions that might have affected the ability of mariners to observe these lights while transiting the channel and approaching the bar.

At 0330 on June 14, the National Weather Service updated its forecast, issuing another small craft advisory that predicted wind waves of 3 feet and northwest swells of 11 feet at 11-second intervals. Station Tillamook Bay then dispatched an MLB at first light to assess conditions at the bar, and after being advised by the coxswain of the turbulent seas at the ends of the jetties and the 8- to 10-foot swells outside the jetties, broadcast a message that the bar restriction remained in effect.

Thus, the National Weather Service made several broadcasts advising mariners of weather and ocean sea conditions outside Tillamook Bay bar, and the Coast Guard warned mariners in various ways (flag, lights, bar restriction announcements) of hazardous conditions at the bar itself. The Safety Board, therefore, concludes that before the accident, the National Weather Service and the Coast Guard effectively communicated information about the weather conditions and the rough bar to mariners, including the master of the *Taki-Too*.

The wife of the *Taki-Too* master said that he had used his home computer to check the weather forecast the night before the accident and had continued to monitor the marine radio in his home for weather announcements the following morning. She further stated that he usually continued to monitor the weather reports on a marine radio in his truck while en route to the marina.

At the marina, the actions of the master indicate that he was aware of the predicted sea state. He and the deckhand discussed abandoning the plan to set out crab pots because of the broadcast rough seas.

The decision of the *Taki-Tooo* master and the operators of the other four charter vessels to leave port and proceed to the inlet area can be considered judicious. The weather and bar conditions as described in broadcasts presented significant hazards to vessel safety. The National Weather Service reports, however, were marine forecasts for ocean-coastal zones. In the case of the coastal zone that included Tillamook, coastal waters extended 20 nautical miles from shore. Thus, the 11-foot swells predicted for coastal waters could have been greater or less by the time they reached the bar area and shore. On the morning of the accident, all the charter vessel masters who transited the bar before the *Taki-Tooo* later told investigators that once they were across, the swells they encountered in the ocean were comparatively small.

While the National Weather Service marine forecasts might not have accurately reflected conditions at the bar, the Coast Guard restriction for recreational vessels was based on an on-scene assessment conducted by an MLB crew 1 1/2 to 2 hours before any of the five charter vessels left the marina. Because various factors affect the bar conditions, notably the strong ebb tide and incoming seas and swells, the operating environment at the bar can change quickly, dramatically affecting a vessel operator's ability to make a safe transit. On the day of the accident, the ebbing tide was predicted to end about 0720, thereafter creating a slack water environment, which is the optimal time to cross the bar.

Based on their experience operating in the Tillamook Bay area, the masters of the *Taki-Tooo* and the other charter vessels were no doubt aware that the sea conditions at the bar could easily differ from the conditions described in the coastal marine forecasts. The conditions at the bar are subject to change, as evidenced by the statements of Coast Guard officials who indicated that, over the last 5 years, Station Tillamook Bay had imposed or lifted the bar restriction more than once on a given day. The *Taki-Tooo* master, with more than 15 years of experience in the area, would have known when the ebb tide was predicted to end and might have believed that conditions could improve after he arrived at the inlet. Therefore, the masters, including the master of the *Taki-Tooo*, were not imprudent to sail from the marina and proceed to the inlet to assess conditions for themselves. The Safety Board concludes that the decision of the *Taki-Tooo* master and the other charter vessel masters to leave port and proceed to the bar area to make a first-hand assessment of conditions was appropriate.

While the decision to leave the dock to assess conditions at the bar might have been prudent, it also probably subtly influenced the masters' subsequent decisions to cross the bar rather than return to the dock. By loading passengers on the vessel and taking them almost as far as the bar, the masters' decision-making ability to return to the dock without crossing the bar was diminished. To return to the dock would have meant that each master would have had to personally face and explain his decision to the passengers who had prepared for the expedition and boarded the vessel and whose anticipation for the fishing voyage no doubt had increased as they neared the bar.

For the *Taki-Tooo* master, in particular, the knowledge that the passenger group chartering his vessel had specifically requested that he serve as their master would most likely have subtly affected his decision not only to leave port but also to subsequently

cross the bar. He would have been motivated not to disappoint those passengers who had traveled some distance to engage in a fishing expedition under his command.

If, however, the charter operating companies had established go/no-go policies and operating standards for crossing the bar, the masters would have been relieved from making the decision to cross the bar. For example, the owner of the *Kerri Lin*, a charter boat 3 feet shorter than the *Taki-Too* but with a larger engine, cancelled his fishing trip on the day of the accident because he had a policy of not operating if the sea swell was 10 feet or greater. If the vessel owner/operators or the masters had such operating parameters, they either could have delegated the explanation for the decision to cancel the fishing trip to the company office manager while the vessel was at the dock, or they could have forewarned passengers when they boarded that, based on the forecast conditions, they might not be able to cross the bar, thus somewhat lowering the anticipation of the passengers. The need for charter operating companies to establish go/no-go policies and operating standards is discussed later in this analysis.

When the *Taki-Too* and the other charter vessels arrived at Tillamook Bay bar, the masters maneuvered their boats just inside the jetties and waited for conditions at the bar to permit passage. On this day, however, the sea conditions at Tillamook Bay bar were particularly hazardous. Waves and swells were 10 to 12 feet, on occasion even higher. Witnesses on shore said that the large waves were coming too close together for a boat to avoid going over at least one of them on the way out of the inlet. Moreover, the masters could not position their boats to make the transit to good seas without putting their vessels and their passengers at risk in the large waves.

Based on extensive research conducted in decision-making in dynamic environments,<sup>59</sup> the evidence suggests that each master would have made the decision to cross based on such factors as his own personal experience and abilities and the capabilities of the vessel he was operating, as well as such situationally specific factors as the size and frequency of the waves and swells. In addition, each master would have had his own personal reason for making a decision.

The master of the *Norwester*, the first vessel to cross, waited 30 to 45 minutes before making the transit attempt. Coast Guardsmen on watch at the station and on the MLB said that the charter boat rode over the first large swell; however, the large swell that immediately followed stood the 41.8-foot-long *Norwester* “straight up,” almost on its stern. Fortunately, no one on the *Norwester* was injured while the vessel crossed the bar. Even though the transit appeared to be successful, in the Safety Board’s opinion, the *Norwester* master should have recognized how quickly the large swells were coming and should not have crossed the bar when he did.

After clearing the bar, the *Norwester* master radioed the other mariners, advising them that “It wasn’t worth it to go out” and that they should wait until conditions at the bar

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<sup>59</sup> G. Klein, “Applied Decision Making,” in P.A. Hancock (ed.), *Human Performance and Ergonomics* (San Diego, California: Academic Press, 1999).

“settled down a little bit. . . .” He also advised the other boat operators that he had avoided a log, thus presenting information about additional hazards in the waterway.

Despite the broadcast admonition from the *Norwest* master, the seemingly successful transit of his vessel would have had the effect of making it more difficult for the other masters at the inlet to turn back and return to the marina. Moreover, each successful transit thereafter would have made it increasingly more difficult for those vessel masters still waiting at the bar to cancel their voyages.

After the *Norwest*'s departure, the master of the *Oakland Pilot* waited only 5 minutes before attempting to cross the bar. In preparation for making the transit, the *Oakland Pilot* master directed his passengers to sit down. Passengers later stated that the 44-foot-long *Oakland Pilot* rode over a “huge swell” and dropped 10 to 12 feet off the back of the wave. The crossing attempt reportedly resulted in the deckhand and two passengers sustaining minor injuries. Thus, the *Oakland Pilot* master's attempt to mitigate the risk to those on board of crossing the bar under the prevailing conditions was unsuccessful.

After clearing the bar, the *Oakland Pilot* master radioed the other vessel operators that logs were floating in the area. The *D & D* started over the bar next, shortly after 0700. According to a *D & D* passenger, the vessel went over two or three “good” waves, and the master turned north to maneuver around a log at the end of the jetty. The Safety Board is aware that fallen trees and logs frequently float in or along the waterways of the Pacific Northwest and present a common hazard to navigation. Still, the decision of the *D & D* master to attempt to transit a bar area made hazardous by both large waves and floating logs was ill advised.

The *Taki-Tooo* master continued to monitor the bar conditions, noting the movements of other vessels and the success of their masters' attempts to cross and listening to the radio transmissions from the vessel masters. Given the small community of charter fishing companies operating in the Tillamook Bay area and the level of interaction among the owners and masters, the *Taki-Tooo* master most likely would have been fully aware of the capabilities of each vessel waiting to cross the bar and the experience level of each master. Certainly, he was familiar with the *D & D*, a single-engine, 32-foot vessel like the *Taki-Tooo* but with a slightly less powerful engine. He owned and had operated the *D & D* and therefore would have been fully aware of the *D & D*'s capabilities relative to those of his own vessel. Possibly, the decision of the *Taki-Tooo* master to attempt to cross the bar a few minutes later was influenced by the successful transit of the *D & D*.

The master's decision could also have been influenced by his extensive operating experience in the Tillamook Bay area. Coast Guard documents support the statements of other area vessel operators that the *Taki-Tooo* master had crossed the bar more than a thousand times. In the 5 years before the accident, the Coast Guard had restricted the bar over a thousand times. No doubt the *Taki-Tooo* master had previously crossed the bar in conditions at least as rough as those encountered at the time of the accident. As a result, his confidence in his ability to cross successfully, accrued over many years, may have led him to minimize the hazards he faced.

Thus, the decision of the *Taki-Too* master to cross the bar was probably influenced by a host of factors, including the request of the passengers for his services, his observations of sea conditions comparable to those he had seen before, his previous experience making the bar transit with this vessel, and his observation of the crossings of the other vessels before him. Notwithstanding the information that argued against making the crossing, notably the weather forecasts, the bar restriction, and his own knowledge of the potential hazards of making the effort, the master made the decision to cross the bar. The tragic consequences of his attempt to transit the bar demonstrate the faultiness of his decision-making.

The Safety Board concludes that the decision of the charter boat operators, including the master of the *Taki-Too*, to transit Tillamook Bay bar in the hazardous sea conditions that prevailed on the morning of the accident jeopardized the safety of all on board.

Safely crossing a bar depends on factors within a master's control, such as his or her skill and experience and the vessel's size and power, as well as factors outside his or her control, specifically, the severity of the sea state. The Coast Guard has designated Station Tillamook Bay a surf station, meaning the surf exceeds 8 feet 10 percent or more of the time during a calendar year, averaged over 5 years. Ocean swells, usually very large, converge with waves generated by the prevailing winds in the immediate area. Navigation at the site is further complicated by the complex characteristics of the tidal currents. No master can be assured that the conditions encountered when crossing will be the same conditions as those observed when the decision to cross is made.

Witnesses reported that on the day of the accident, the *Taki-Too* traveled closer than normal to the north jetty, recognized in published documents as an "extremely dangerous" area. The deckhand said that she believed the master put the engines in reverse or astern power while they passed over the first large wave so that the vessel "didn't go flying off the other end" of the wave. After the vessel rode over the first swell, a 9- or 10-foot wave, the charter boat descended into a trough between building waves. The *Taki-Too* deckhand then heard the master say, "I didn't want to get into this." She said that she was not sure whether the master had turned the charter boat or whether the boat was still turning from sliding down the back of the wave, but somehow the *Taki-Too* twisted to the north and a "steep," 15-foot swell came from the west and capsized the charter boat.

Because the master died in the accident, the Safety Board was unable to discern what the master meant by his remarks or why the vessel turned parallel to the waves. Therefore, the Safety Board concludes that it cannot be determined whether the *Taki-Too*'s turn to a northerly heading, which placed the vessel broadside to the seas, was due to a deliberate action by the master or to a loss of control by the master.

## Tillamook Bay Operations

### ***Navigational Conditions at the Bar***

Safety Board investigators interviewed charter fishing boat owners and operators at Tillamook Bay and nearly all said that the condition of the Tillamook bar had deteriorated in recent years. They claimed that increased shoaling of the “middle grounds” had occurred, which had resulted in greater swell heights across the bar and jetties. An Army Corps of Engineers study confirms that the conditions of the bar have deteriorated over time. The Safety Board sought to determine whether the deterioration was a factor in the accident.

Although the Tillamook Bay channel does not require dredging, the Corps of Engineers surveys the channel annually. Analysis of the Corps surveys shows that channel conditions had not changed much over the years. Moreover, the Corps surveyed the channel a week after the accident to assist in the investigation of the *Taki-Too* accident and determined that the channel was within its authorized depth.

According to the 2003 Corps of Engineers study, both jetties at the entrance to Tillamook Bay have been damaged by exposure to “more extreme storm waves” in recent years and are now several hundred feet shorter than their authorized length. The shoreline along the north jetty has eroded. The Corps received funding from Congress to partially restore the jetty area, and in September and October 2004, the Corps repaired the north jetty by placing earth and rock at the base and by constructing a 300-foot-long embankment perpendicular to the jetty along the shore. The embankment is intended to prevent further erosion of the sandy beach near the base of the jetty and to protect the Coast Guard watchtower from large waves. According to a Corps official, the embankment is a permanent repair and no work to restore the jetties to their original length is anticipated.

The Corps acknowledges in its report that the deterioration “has caused concern for the navigability of the channel.” The Safety Board finds, however, that the condition of the channel and the jetties by themselves were not factors in the accident. As noted above, a postaccident survey showed that the channel was dredged to its allocated depth; thus it posed no impediment to movement of the charter fishing vessels. The jetty tips, although shorter today than when they were constructed, did not represent a danger. The greater issue on the day of the accident is that the vessel operators, all highly experienced masters with extensive knowledge of the area, disregarded the hazardous bar crossing conditions. The Safety Board, therefore, concludes that the condition of the channel and the jetties at the Tillamook Bay bar was not a factor in the accident.

### ***Bar Restrictions***

To accomplish its missions, the Coast Guard has a hierarchical system of stations and offices, each with its own level of authority and responsibility. To maintain safety in navigable waters where hazardous conditions are present, it has established surf stations at bars or inlets where surf greater than 8 feet occurs 10 percent of the time within a year,

averaged over 5 years. In the Pacific Northwest, all 10 surf stations, including Station Tillamook Bay, oversee designated regulated boating areas, coastal areas where the bar conditions are particularly treacherous. As the first level of Coast Guard oversight at the bay, Station Tillamook Bay is authorized to restrict the operators of recreational boats and uninspected small passenger vessels from crossing the bar. The station does not have the authority to restrict commercial traffic, such as charter fishing boats. If conditions at the bar are considered so hazardous that they endanger the passage of commercial vessels, the person in charge at the station, sometimes a senior enlisted person, must go through his command channels to the zone commander, the COTP Portland, who has the authority to order the bar closed to all vessel traffic.

On the day of this accident, Station Tillamook Bay restricted the bar to recreational and uninspected small passenger vessels, but did not consider the conditions sufficiently hazardous to recommend to its higher headquarters that the bar be closed to commercial operators. As noted earlier, Station Tillamook Bay had restricted the bar to recreational and uninspected small passenger vessels 1,422 times in the 5 years preceding the accident. In that same period, however, COTP Portland had never closed the bar to commercial vessels. Since the *Taki-Too* accident, the COTP Portland has closed Tillamook Bay bar to commercial traffic once.

The Safety Board concludes that a potentially unintended consequence of the Coast Guard's restricting Tillamook Bay bar only to recreational and uninspected vessels was to afford the passengers on those vessels a higher level of safety than the passengers on charter vessels.

The Safety Board recognizes and agrees that the Coast Guard needs to have a system of checks and balances when restricting commercial traffic and that the person at the first level of Coast Guard oversight should not be authorized to shut down a waterway. However, an improved means of safety oversight is needed to minimize the risk to people on board such commercial small passenger vessels as charter boats when they are operated in hazardous sea conditions.

Coast Guard regulations presently do not require owners/operators of small passenger vessels to identify the conditions under which their charter boats should or should not attempt bar crossings and to provide their masters with guidance containing such operating criteria. The impact of this omission was reflected in the actions of the charter vessel operators on the morning of the accident. The charter boat operators who were experienced in crossing Tillamook Bay bar reached different decisions about whether and when to attempt to transit the bar. Most attempted to cross; however, one highly experienced master interviewed said that he elected not to go because the sea conditions exceeded a personal safety standard that he had established for his operations. Given the differences among mariners in skill level, knowledge of the bar, and personal willingness to take risks, the absence of guidance to assist masters in making decisions that put passengers at great risk is unacceptable. The Safety Board, therefore, concludes that the absence of a go/no-go policy by the charter boat owners operating out of Tillamook Bay allowed the masters to exercise poor judgment in deciding to cross the bar, given the hazardous sea conditions.



By comparison, Federal Aviation Regulations require operators of commercial air transport, operating under 14 CFR part 121, to develop operating specifications that strictly delineate the conditions under which their aircraft will be allowed to operate. These go/no-go specifications, which are subject to Federal Aviation Administration acceptance, apply to all aircraft in scheduled operations that have the capability to transport 10 or more passengers.<sup>60</sup> Unless the aircraft has certain navigation and flight control equipment and the pilot has certain qualifications, passenger- and cargo-carrying commercial air transport aircraft are forbidden from taking off or landing in clearly defined conditions of restricted visibility or adverse wind.

In the Safety Board's opinion, small passenger vessel owners know best the skills of the masters they employ, the size, power, and configuration of the vessels they operate, and the conditions under which masters can safely maneuver their vessels across a hazardous bar. Owners are also familiar with other factors unique to each vessel, such as hull shape, displacement, and propulsion system configuration, that can influence the boat's ability to safely traverse the bar. In developing vessel-specific operating standards for their masters, the boat owners could be assisted by Coast Guard personnel, who have the knowledge of local conditions, in evaluating whether the go/no-go policies developed and implemented by the small passenger vessel owners are appropriate to attain a sufficient level of safety during rough bar conditions.

Therefore, the Safety Board believes that the Coast Guard should require that owners of small passenger vessels operating within Coast Guard-designated surf stations and regulated boating areas on the West Coast develop and implement written go/no-go policies, based on risk-management principles, regarding transiting bars and inlets. Recognizing that the rulemaking effort is a time-consuming process, it would be prudent for small passenger operators to voluntarily develop this safety guidance. Therefore, the Safety Board believes that the National Marine Charter Association should recommend that its member small passenger vessel owners operating within Coast Guard-designated surf stations and regulated boating areas on the West Coast develop and implement written go/no-go policies, based on risk-management principles, regarding transiting bars and inlets. Further, the owners of charter fishing vessels operating out of Tillamook Bay should develop and implement written go/no-go policies, based on risk-management principles, regarding transiting the Tillamook Bay bar.

## Survivability

No one on board the *Taki-Tooo* donned a lifejacket in preparation for transiting the hazardous bar, as stipulated in Coast Guard regulations at 46 CFR 185.508. The results of this failure to mitigate the risk associated with the crossing attempt are telling. Of the 19 people on board, 12 were not able to retrieve a lifejacket before the charter boat was

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<sup>60</sup> Title 14 CFR part 121, rules governing air transport operations, and 14 CFR part 91, general operating rules.

swamped by a large wave. Of these, only two survived. In contrast, six of the seven people who were able to retrieve lifejackets survived.

Analysis shows that the events of the accident sequence occurred so quickly that those on the deck of the *Taki-Tooo* had little or no time to take measures to protect themselves. As the vessel departed the inlet and rode over the first swell, the deckhand shouted for the passengers to hold on. The ensuing swells were larger, and within minutes, the *Taki-Tooo* was in trouble. The passengers on the open deck would have had to try to walk across the deck while the vessel was pitching and rolling to obtain lifejackets from the cabin, where the jackets were stored. They, therefore, could not have easily retrieved a lifejacket.

During the capsizing, the master and deckhand on the flying bridge and all but one passenger on the open deck were thrown or washed into the sea. One passenger was washed into the cabin, where he was able to obtain a lifejacket and subsequently escape the overturned vessel.

The cabin structure provided protection in two ways to the passengers within it. First, the cabin protected the passengers inside from being washed into the sea. More importantly, after the vessel overturned, the cabin had an air pocket until a window broke and water entered the space. The air supply provided survivors sufficient time to pull lifejackets from the storage bin and to prepare to exit the vessel. One survivor donned his lifejacket and exited via the cabin door. Five survivors elected to exit through the cabin windows; however, they could not get through the windows while wearing the lifejackets as intended, so each individual improvised, either holding onto a jacket or placing it around his arm or neck as he made his way out. One man was unable to hold onto his lifejacket; however, he was able to swim to shore. The other four men, buoyed by their lifejackets, floated to shore. One fatality victim was later found in the cabin wearing a lifejacket. According to survivors, they repeatedly exhorted their relative, who had donned a lifejacket, to leave the cabin. They said that he just sat down, however, and emitted a moan. The Safety Board was unable to determine why this passenger, a 66-year-old man, did not exit the cabin.

The chaotic scenario of the capsizing and the severity of the sea state would have made it especially difficult for those cast overboard without lifejackets to survive. The surf was over 10 feet and contained floating debris such as logs and the overturned boat itself. No autopsies were performed on anyone except the master, so the extent of injuries of the fatally injured passengers is indeterminate. However, a healthy person with even a mild head injury (with little or no visible marks on the body) could have become sufficiently disoriented in the prevailing conditions to have died without the assistance of lifejackets. Even without injury, a swimmer would have substantial difficulty remaining afloat in the heavy surf without flotation assistance. It is also likely that the accident victims suffered cold water immersion injuries in the seas, which were 52° F. Studies have shown that in the first 2 to 3 minutes of being immersed in water that is less than 59° F, a person may lose the ability to control breathing. If, as in the case of this capsizing, the accident victims are in choppy water, the wave splash contributes to the loss of breath control. Thus, unless cold water immersion victims are both mentally prepared and physically protected by

lifejackets or survival suits, they can drown immediately or suffer cardiac effects that, in turn, can cause death, particularly in older or less healthy victims. Swimming failure may occur between 3 and 30 minutes after cold water immersion, and death from hypothermia may occur after 30 minutes. In the case of this accident, the vessel itself washed ashore within 30 minutes of capsizing, and no vessel occupants were seen alive in the water by that time.

Lifejackets improve the survivability of accident victims in water a number of ways: the design of the flotation device helps keep a victim's head above water, which is particularly crucial if the person is injured; the thermal qualities of the jacket provide some insulation against the cold; and the buoyancy of the safety gear keeps the person afloat, affording more time to reach safety or be rescued. Considering the multiple hazards in the *Taki-Too* capsizing, the use of lifejackets by all people on the open deck would have benefited them in all these ways. Therefore, the Safety Board concludes that if the master of the *Taki-Too* had required passengers and crew to wear lifejackets, their chances of survival would have been better and the number of fatalities in this accident would probably have been less.

In preparation for the fishing expedition, the master of the *Taki-Too* conducted a safety briefing for his passengers, as required by Federal regulations, before the charter boat left the marina. He discussed the donning of lifejackets, pointed out where they were located, and told his passengers that they could don them if they wished. If they chose to do so, he said that he or the deckhand would assist them. None elected to do so. During the transit to the inlet area, the *Taki-Too* passed Station Tillamook Bay, where a small-craft advisory flag was raised and a rough bar advisory sign was illuminated, and the Coast Guard observation tower, where another rough bar advisory sign was illuminated. The master then witnessed the much larger *Norwester* encounter problems with the sea swells and received radio reports from other operators about the swells and waterway debris. Thus, despite receiving several indications that bar conditions were hazardous, the *Taki-Too* master did not don a lifejacket or direct the deckhand and the passengers to don lifejackets.

Coast Guard regulations at 46 CFR 185.508 stipulate that the master should require passengers to don lifejackets when *possible* [emphasis added] hazardous conditions exist, such as when "transiting hazardous bars and inlets." However, the regulation permits the master to determine whether conditions are sufficiently hazardous to require passengers to don lifejackets. In effect, the regulation puts masters in the position of acknowledging that they are exposing their passengers to hazardous conditions whenever they require them to don lifejackets, potentially increasing their perceived exposure to liability if something untoward occurs.

The regulation followed a series of accidents in which the Safety Board recommended to the Coast Guard that passengers on the open decks of vessels be required to wear lifejackets when transiting areas of rough seas.<sup>61</sup> In response, the Coast Guard began the rulemaking process to change the applicable regulation. However, the Coast

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<sup>61</sup> Safety Recommendation M-86-113.

Guard ultimately issued a rule placing exclusive responsibility on the master for passengers to don lifejackets. The Coast Guard stated that it agreed with comments made during the rulemaking process that passengers should not be permitted to don lifejackets, which are part of the emergency gear, unless so specified by the master.

After the *Taki-Too* accident, Safety Board investigators interviewed mariners who operated small passenger vessels across the Tillamook Bay bar, all of whom contended that passengers should not be compelled to don lifejackets when crossing the bar. They said that passengers found lifejackets to be uncomfortable and that requiring passengers to wear lifejackets could frighten them. Of the vessel masters who crossed the bar on the morning of the accident, none required passengers to don lifejackets. Further, none had ever been cited by the Coast Guard for not adhering to the requirements of 46 CFR 185.508 and requiring their passengers to don lifejackets before crossing the bar. Therefore, the Safety Board concludes that the Coast Guard's failure to enforce regulations at 46 CFR 185.508, which require that lifejackets be worn during possibly hazardous conditions, contributed to the loss of life in the *Taki-Too* accident.

After the *Taki-Too* capsized, Congress passed the Coast Guard and Maritime Transportation Act of 2004, which specifically directed the Coast Guard to describe enforcement of the regulation requiring masters to have passengers don lifejackets in possibly hazardous conditions, and to include in its report "the number of vessels and masters cited for violations of those regulations for fiscal years 1998 through 2003." Congress also required the Coast Guard to provide recommendations for "improving compliance with, and possible modifications to, those regulations."

On March 31, 2005, the U.S. Department of Homeland Security delivered the Coast Guard's "Report on Small Passenger Vessel Safety," which indicated that no citations had been issued to vessels or masters for violations of the lifejacket regulation since it became effective, and that enforcement or compliance monitoring was complicated by the fact that the regulation contained little metric guidance for determining when a bar or inlet is sufficiently "hazardous," or weather sufficiently "severe," to trigger the requirement for a given vessel after taking into consideration its capabilities and the experience of its master. The report cited the "excellent safety record of the industry" and stated that "partnership with the industry is believed to be preferable to a regulatory solution" to the compliance issue.

Charter boat operators should not be permitted to put themselves and their passengers at risk in hazardous conditions, and in the Safety Board's opinion, the regulatory language clearly contemplated that passengers would have been required to don lifejackets. By all reasonable standards, the Tillamook Bay bar conditions at the time of the accident were hazardous and, therefore, all passengers crossing the bar who were on open decks should have worn lifejackets. Therefore, the Safety Board concludes that the commercial vessel masters who crossed the Tillamook bar on the morning of the accident should have required passengers to wear lifejackets during the transit.

Given that the Coast Guard has taken the position that it is too complicated for its personnel to determine whether a bar or inlet is sufficiently hazardous to require those on

board small passenger vessels to wear lifejackets, a revision of existing regulations is warranted. The Safety Board recognizes that a regulatory change affecting all bars and inlets may not be warranted. The sea conditions at West Coast inlets are more severe than the sea conditions at East Coast inlets. The fetch of the incoming swells and the effects of the steep continental slope and the narrow continental shelf make the incoming seas at West Coast bar greater in height and more unpredictable. The Safety Board, therefore, believes that the Coast Guard should revise its regulations to require that small passenger vessels operating in Coast Guard-designated surf stations and regulated boating areas on the West Coast have all passengers and crew wear lifejackets while the vessels transit inlets where rough bar warnings are in effect.

Until such time as Federal regulations are revised, the Coast Guard should issue guidance for mariners operating in Coast Guard-designated surf stations and regulated boating areas on the West Coast to require passengers and crew on small passenger vessels to wear lifejackets while transiting inlets where rough bar warnings are in effect. Further, the owners and operators of small passenger vessels operating out of Tillamook Bay should require passengers and crew to wear lifejackets while transiting the Tillamook Bay bar when rough bar warnings are in effect. In addition, the Safety Board believes that the National Marine Charter Association should recommend that its member small passenger vessel owners who operate in Coast Guard-designated surf stations and regulated boating areas on the West Coast require passengers and crew to wear lifejackets while transiting inlets where rough bar warnings are in effect.

## Emergency Response

At the time of the capsizing, a Coast Guard MLB was at the north jetty, monitoring the bar conditions. Coast Guard personnel in the observation tower adjacent to the jetty informed the MLB crew of the accident. However, the MLB on patrol did not assist in the rescue because the safety of the Coast Guard personnel and the vessel would have been jeopardized.

Several factors argued against the MLB crew participating in the rescue. The *Taki-Too* was so close to the north jetty that the proximity of the jetty rocks and the rough water would have made rescue exceedingly dangerous. Because Coast Guard requirements compel crewmembers to regard their own safety when considering attempting rescue efforts, and because of the extreme risk involved, the MLB crew's course of action was proper. Therefore, the Safety Board concludes that even if the Coast Guard MLB had had a qualified surfman on board, the *Taki-Too* capsized in a treacherous area with such heavy surf that any attempt at assistance by the MLB would have endangered its crew.

Within 5 to 6 minutes of the capsizing, Station Tillamook Bay had requested that Coast Guard rescue helicopters be dispatched to assist in the recovery efforts, launched a second MLB to the scene, and notified local responders of the accident.

The first individuals to reach the scene were civilians who had been on the beach or nearby. They assisted survivors who had swum or been washed to shore. Within 10 minutes of receiving the first 911 call reporting the accident, emergency response personnel arrived. They attended to the survivors and promptly transported them to the local hospital. All but one passenger was subsequently treated and released. The passenger who was admitted was treated for hypothermia and released the next evening.

About 0732, the second MLB, with a certified surfman as coxswain, arrived at the accident site and recovered the first victim (the master). The second MLB returned to Station Tillamook Bay, transferred the victim to rescue personnel, and returned to the accident site with the officer-in-charge on board. As a certified surfman, the officer-in-charge had routinely trained in 8- to 15-foot sea conditions and had “suited up” for this mission; therefore, he was prepared and knew how to transfer to another vessel. He jumped into the water, made his way over to the first MLB, and climbed aboard. Because both MLBs now had qualified surfmen on board, both vessels were able to patrol the heavy surf for accident victims.

The first Coast Guard helicopter arrived on scene at 0745 and eventually recovered two bodies. A second helicopter arrived soon after and assisted in the search for victims. By 0923, Garibaldi fire and rescue confirmed that eight bodies had either washed ashore, been pulled from the surf, or been recovered from the ocean. At 0927, the Coast Guard diverted the cutter *Steadfast*, based in Astoria, to help in the search. At 1105, Station Tillamook Bay was advised that only 17 of the 19 people on board the *Taki-Too* had been accounted for. The Coast Guard continued to search the area for the missing victims until 0857 on June 15, with negative results.

The Safety Board concludes that the timeliness of the Coast Guard’s search-and-rescue efforts, the quick notification and rapid response of shoreside emergency responders, and the assistance of nearby civilians resulted in an adequate response to the emergency.

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# Conclusions

## Findings

1. The absence of defects and the evidence of propulsive power indicate that problems with the engine, propeller, and associated boat components such as the throttle and the rudder were not causal factors in this accident.
2. The following were not factors in the performance of the *Taki-Tooo* master: sleep deprivation, alcohol, illegal or prescribed drugs, and financial concerns.
3. Before the accident, the National Weather Service and the Coast Guard effectively communicated information about the weather conditions and the rough bar to mariners, including the master of the *Taki-Tooo*.
4. The decision of the *Taki-Tooo* master and the other charter vessel masters to leave port and proceed to the bar area to make a first-hand assessment of conditions was appropriate.
5. The decision of the charter boat operators, including the master of the *Taki-Tooo*, to transit Tillamook Bay bar in the hazardous sea conditions that prevailed on the morning of the accident jeopardized the safety of all on board.
6. It cannot be determined whether the *Taki-Tooo*'s turn to a northerly heading, which placed the vessel broadside to the seas, was due to a deliberate action by the master or to a loss of control by the master.
7. The condition of the channel and the jetties at the Tillamook Bay bar was not a factor in the accident.
8. A potentially unintended consequence of the Coast Guard's restricting Tillamook Bay bar only to recreational and uninspected passenger vessels was to afford the passengers on those vessels a higher level of safety than the passengers on inspected passenger vessels.
9. The absence of a go/no-go policy by the charter boat owners operating out of Tillamook Bay allowed the masters to exercise poor judgment in deciding to cross the bar, given the hazardous sea conditions.
10. If the master of the *Taki-Tooo* had required passengers and crew to wear lifejackets, their chances of survival would have been better and the number of fatalities in this accident would probably have been less.

11. The Coast Guard's failure to enforce regulations at 46 CFR 185.508, which require that masters direct passengers to wear lifejackets during possibly hazardous conditions, contributed to the loss of life in the *Taki-Too* accident.
12. The commercial vessel masters who crossed the Tillamook bar on the morning of the accident should have required passengers to wear lifejackets during the transit.
13. Even if the Coast Guard motor lifeboat (MLB) had had a qualified surfman on board, the *Taki-Too* capsized in a treacherous area with such heavy surf that any attempt at assistance by the MLB would have endangered its crew.
14. The timeliness of the Coast Guard's search-and-rescue efforts, the quick notification and rapid response of shoreside emergency responders, and the assistance of nearby civilians resulted in an adequate response to the emergency.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the capsizing of the *Taki-Too* was the decision of the master to attempt to cross Tillamook Bay bar despite the hazardous sea state that existed at the time. Contributing to the severity of the accident was the failure of the *Taki-Too* master to ensure that he, the deckhand, and the passengers donned lifejackets before crossing the bar. Also contributing to the severity of the accident was the failure of the U.S. Coast Guard to enforce the regulatory requirement at 46 *Code of Federal Regulations* 185.508, which stipulates that vessel masters shall require passengers to wear lifejackets when transiting a hazardous bar.



## Recommendations

As a result of its investigation, the National Transportation Safety Board makes the following recommendations.

### **To the United States Coast Guard:**

Require that owners of small passenger vessels operating within Coast Guard-designated surf stations and regulated boating areas on the West Coast develop and implement written go/no-go policies, based on risk-management principles, regarding transiting bars and inlets. (M-05-09)

Revise your regulations to require that small passenger vessels operating in Coast Guard-designated surf stations and regulated boating areas on the West Coast have all passengers and crew wear lifejackets while the vessels transit inlets where rough bar warnings are in effect. (M-05-10)

Until such time as your regulations are revised, issue guidance for mariners operating in Coast Guard-designated surf stations and regulated boating areas on the West Coast to require passengers and crew on small passenger vessels to wear lifejackets while transiting inlets where rough bar warnings are in effect. (M-05-11)

### **To the Owners and Operators of Charter Fishing Vessels Operating Out of Tillamook Bay, Oregon:**

Develop and implement written go/no-go policies, based on risk-management principles, regarding transiting the Tillamook Bay bar. (M-05-12)

Require that passengers and crew wear lifejackets while transiting the Tillamook Bay inlet when rough bar warnings are in effect. (M-05-13)

### **To the National Marine Charter Association:**

Recommend that your member small passenger vessel owners operating within Coast Guard-designated surf stations and regulated boating areas on the West Coast develop and implement written go/no-go policies, based on risk-management principles, regarding transiting bars and inlets. (M-05-14)

Recommend that your member small passenger vessel owners who operate in Coast Guard-designated surf stations and regulated boating areas on the West Coast require passengers and crew to wear lifejackets while transiting inlets where rough bar warnings are in effect. (M-05-15)

**BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

**MARK V. ROSENKER**  
Acting Chairman

**RICHARD F. HEALING**  
Member

**ELLEN ENGLEMAN CONNERS**  
Member

**DEBORAH A. P. HERSMAN**  
Member

**Adopted: June 28, 2005**

## Appendix A

### Investigation

The U.S. Coast Guard Command Center in Washington, D.C., notified the Safety Board's communication center of the *Taki-Too* accident about 1600 on June 14, 2003. The Board elected to lead the investigation under the Safety Board–Coast Guard memorandum of understanding and immediately dispatched a team of investigators to the accident site. An investigator from the Board's Northwest regional aviation office in Seattle, Washington, arrived in Garibaldi, Oregon, about 1700 to control the accident scene until the rest of the team arrived. The team from Board headquarters, consisting of an investigator-in-charge and specialists in vessel operations, human performance, and an aviation survival factors investigator, arrived in Garibaldi about 0830 on June 15. An investigator from the Board's Alaska regional aviation office in Anchorage was dispatched to serve as group chairman for engineering.

The team documented the damage to the *Taki-Too* and interviewed survivors, witnesses, responders, and Coast Guard personnel. The Vice Chairman of the Safety Board accompanied the investigative team to Oregon, and a Board Member joined them at the scene. Also on scene were a specialist from the Board's Office of Public Affairs and two representatives from the Board's Office of Transportation Disaster Assistance. The on-scene investigation concluded on June 21, 2003.

The Safety Board investigated the accident under the authority of the Independent Safety Board act of 1974, according to Safety Board rules. The designated parties to the investigation were the U.S. Coast Guard and the Oregon State Marine Board. The owner of Garibaldi Charters declined to participate as a party in the investigation.

## Appendix B

### Accident Chronology

#### June 13, 2003

- 1645 National Weather Service issues small craft advisory, predicting heavy seas with wind waves of 4 feet and 10-foot swells.
- 1645 Coast Guard Station Tillamook Bay restricts Tillamook bar to recreational boats and uninspected passenger vessels.

#### June 14, 2003

- 0330 National Weather Service issues small craft advisory.
- 0430 *Taki-Tooo* master wakes up, listens to weather report on home VHF radio.
- 0445 Seaman mans Coast Guard watchtower on north jetty.
- 0446 Coast Guard motor lifeboat (MLB) under way for first-light bar report.
- 0500 MLB on duty at Tillamook bar.
- 0512 MLB coxswain recommends keeping bar restricted to recreational vessels; reports 6- to 8-foot sloughing and plunging seas at end of jetties [tips], 8- to 10-foot seas outside jetties, winds 14 knots, visibility 0.5 n mi.
- 0514 Coast Guard posts rough bar warnings at lower base and at watchtower; hoists small craft advisory flag at base; transmits bar restriction on VHF channels 16 and 22A, citizens band channel 09.
- ~0530 *Taki-Tooo* master leaves home for Garibaldi harbor, listens to weather report on VHF car radio.
- ~0530 *Taki-Tooo* master arrives at Garibaldi Charters office.
- 0530 Passengers check in and begin boarding *Taki-Tooo*.
- 0530 Charter fishing boat *Oakland Pilot* (44.4 feet) departs Garibaldi marina.
- 0530 Owner of charter fishing boat *Kerri Lin* (29.4 feet) cancels day's charter because of sea conditions.
- 0545 *Taki-Tooo* master gives safety briefing (no one takes lifejackets).
- 0545 *Oakland Pilot* arrives next to Coast Guard tower.
- 0600 Charter fishing boats *Norwester* (41.8 feet long) and *D & D* (32.4 feet) and uninspected fishing vessel *Amanda* (23 feet) leave marina for inlet.

- 0600 *Taki-Tooo* departs marina with 2 crew members and 17 passengers.
- 0620 Garibaldi Charters owner arrives at north jetty to watch boats cross bar.
- 0645 *Taki-Tooo* arrives at north jetty, circles awaiting lull in waves.
- 0645 *Norwester, D & D, and Amanda* arrive at tower.
- 0650 *Norwester* goes over bar, master radios back “not worth it, wait a little.”
- 0650 *Kerri Lin* owner goes to north jetty to watch boats leave inlet.
- 0655 *Oakland Pilot* leaves inlet, turns northwest, slams down on swell; deck-hand hits head on ceiling, one passenger breaks window, another passenger injures hip.
- 0658 *Oakland Pilot* clears bar.
- 0700 Shift change at Coast Guard watchtower: seaman being relieved says, “The bar is pretty rough; here is the bar report and you just missed some cowboy stuff pulled off by the *Norwester* and the *Oakland Pilot*.”
- ~0700 *D & D* crosses bar.
- ~0705 *Taki-Tooo* starts across bar.
- 0715 *Taki-Tooo* reported by Coast Guard watchtower to have capsized in north hole.
- 0716 Tower notifies MLB of capsizing.
- 0716+ MLB on way to accident scene.
- 0718 Coast Guard Station Tillamook Bay requests helicopter assistance from Air Station Astoria.
- 0720 MLB tries to help, but *Taki-Tooo* too close to jetty.
- 0720 Second MLB launches from Coast Guard Station Tillamook Bay to accident scene.
- 0721 Coast Guard calls Tillamook County Emergency Communications District (911).
- 0721 Ebb tide ends.
- 0725 Coast Guard rescue coordination center in Seattle receives EPIRB signal from *Taki-Tooo*.
- 0726 911 operator notifies Garibaldi fire chief of accident.
- 0730 Rescue coordination center receives confirmation that *Taki-Tooo* has capsized with 19 people in water.

- 0732 Second MLB arrives at accident scene and reports empty liferaft floating free; locals on beach start arriving.
- 0737 Fire chief and rescue truck from Garibaldi fire and rescue arrive at north jetty; fire chief takes command, reports five survivors on shore.
- 0740 Second MLB sees one person floating inside surf zone, radios Coast Guard station that going to pick up victim.
- 0745 Second MLB recovers unconscious victim, begins cardiopulmonary resuscitation.
- 0745 Coast Guard HH-60J Jayhawk helicopter arrives at north jetty from Astoria; aircraft commander reports *Taki-Too* already washed ashore.
- 0755 Second MLB arrives at Coast Guard station, transfers victim to Garibaldi fire and rescue.
- 0800 Second Jayhawk helicopter launches from Air Station Astoria.
- 0802 Rescue swimmer from first Coast Guard helicopter recovers one victim from surf; helicopter lands on beach and transfers victim to fire and rescue unit.
- 0804 Officer-in-charge boards second MLB at Station Tillamook Bay and leaves for accident site.
- 0810 Fire and rescue unit reports *Taki-Too* upright on beach with one victim in cabin.
- 0821 Second MLB arrives back at accident scene, officer-in-charge swims to first MLB.
- 0840 Second Jayhawk helicopter arrives at accident scene.
- 0848 Second MLB searches for victims outside surf line.
- 0908 First Jayhawk helicopter reports another victim in water off north jetty.
- 0910 Fire and rescue unit notifies Station Tillamook Bay that seven survivors are at Tillamook Hospital.
- 0915 First Jayhawk helicopter rescues second victim from water 200 yards from tower.
- 0923 First Jayhawk helicopter lands on beach and transfers victim to fire and rescue unit.
- 0927 Rescue unit advises Station Tillamook Bay that 18 people are accounted for.
- 0927 Coast Guard cutter *Steadfast* is diverted from Astoria to help in search.
- 0955 Both MLBs patrol surf line.

- 1009 Deputies advise Coast Guard that they will pull *Taki-Tooo* onto beach to look for survivors.
- 1015 Second MLB measures water temperature at 52° F.
- 1022 First Jayhawk helicopter leaves accident site, returns to Air Station Astoria.
- 1033 First MLB returns to station.
- 1105 Fire and rescue unit informs Station Tillamook Bay that only 17 people on *Taki-Tooo* are accounted for.
- 1107 Station Tillamook Bay notifies second MLB that two people are still missing.
- 1205-1213 *Norwester* and *Oakland Pilot* return safely across bar, with second MLB standing by.
- 1228 First MLB returns to accident scene and resumes search for two missing passengers.
- 1238 *D & D* returns safely across bar.
- 1254 Second MLB returns to station.
- 1340 First MLB returns to station.
- 1341 First MLB under way again, resumes search north of jetty for two missing passengers.
- 1624 Second Jayhawk helicopter ends search and returns to Air Station Astoria.
- 1700 Coast Guard cutter *Steadfast* arrives on scene, assumes command.
- 1755 Second MLB relieves first MLB, continues searching beach and surf line.
- 1818 First MLB returns to station.
- 2100 Second MLB is released from search and returns to base; Coast Guard watchtower is secured.
- 2115 Coast Guard cutter *Steadfast* completes search and is released.

**June 15, 2003**

- 0450 First MLB under way from Station Tillamook Bay to accident scene.
- 0521 Second MLB under way from Station Tillamook Bay to accident scene, begins to patrol surf line north and south of north jetty.
- 0550 First MLB returns to base.
- 0557 Jayhawk helicopter launches from Air Station Astoria.

- 0611 Jayhawk helicopter arrives on scene and begins hover-search of shoreline.
- 0730 Jayhawk helicopter completes search with negative results and returns to base.
- 0735 Second MLB completes search with negative results and returns to base.
- 0857 Thirteenth Coast Guard District calls off search for two missing passengers.



## **Appendix C**

### **Boating Safety Pamphlet**

## HAZARDS

### Crossing the Bar

The bar is the area where the deep waters of the Pacific Ocean meet with the shallower waters near the mouth of a river.

Most accidents and deaths that occur on coastal bars are from capsizing.

Improper loading and/or overloading are major causes of capsizings. Improperly/overloaded boats have less stability and less freeboard, which can allow seas to break into the vessel, causing the boat to become even less stable.

Boats are more likely to capsize when crossing the bar from the ocean because the seas are on the stern and the boater may have less control over the vessel.

Boaters must make sure the bar is safe prior to crossing. Check with other boaters or the Coast Guard to find out the condition of the bar.

If you are caught on a rough bar running in...

- Make sure everybody aboard is wearing a personal flotation device.

- Keep the boat square before the seas.
- Keep the boat on the back of the swell. Ride the swell and stay clear of the following wave.

Avoid sudden weight shifts from passengers or gear moving around in the boat. If possible, have passengers lie down as near the centerline of the boat as possible.

Do not allow the waves to catch your boat on the side (beam). This condition is called broaching, and can easily result in capsizing.

### Rough Bar Advisory Signs

Be aware of the location and status of rough bar advisory signs. These signs are 6ft by 6ft white, diamond shaped daymarks, with the words "ROUGH BAR" in black letters. Two alternating amber lights on the signs are activated when observed seas on the bar exceed 4 feet in height and are considered dangerous.

#### DO NOT CROSS THE BAR WHEN THE LIGHTS ARE FLASHING!

Do not cross until you call Station Tillamook Bay on Ch16 to see if the restriction applies to vessels your size.

If the lights are not flashing, there is no guarantee that sea conditions are favorable.

Coastal bars may be closed to recreational boats when conditions on the bar create a hazardous condition. Failure to comply with the closure may result in voyage termination, and civil and/or criminal penalties. The regulations are enforced by Coast Guard boarding teams.

### Tides

Tides are the vertical rise and fall of the water and tidal current is the horizontal flow of the water.

There are roughly two tides each day in the Pacific Northwest.

Tidal movement toward the shore or upstream is the flood current. Movement away from shore or downstream is the ebb current. The period between is known as slack water.

Tidal currents may gain tremendous velocity, particularly when the ebb current is augmented by river runoff.

**It is extremely dangerous to get caught on the bar during a strong ebb current.** Even on days that are calm, a fast moving ebb can create bar conditions that are too rough for small craft.

**Always know the stage of the tide!**

**Avoid crossing the bar during an ebb tide.**

It is best to cross the bar during slack water or on a flood tide, when the seas are normally calmer.

### Commercial and Recreational Diving in Tillamook Bay

Commercial and recreational diving is popular in Tillamook Bay. Boaters and divers should exercise extra caution to ensure their safety on the water.

A rigid replica of the alpha flag must be displayed on boats engaged in diving operations whenever these boats are restricted in their ability to maneuver by the diving operation. The flag should be at least one meter high and be visible all around the horizon. The "diver's flag," a red flag with a diagonal white stripe, is a recognizable sign that a diver is operating in the area, but its display is not required by law.

Boaters who see either the alpha flag or the divers flag should be aware that a diver is in the area and should avoid that area or operate with extreme caution. If you must approach an area where a diver is operating, turn off motor if possible or slow down to idle speed and proceed cautiously.

Likewise, people engaged in diving do not have authority to block the channel or restrict navigation. Please dive responsibly.

### EMERGENCIES

VHF-FM Radio: Channel 16

If in distress (threatened by grave and imminent danger):

1. Make sure radio is on
2. Select Channel 16
3. Press/hold the transmit button
4. Speak slowly and clearly say:
  - MAYDAY, MAYDAY, MAYDAY**
5. Give the following information
  - Vessel Name and/or Description
  - Nature of Emergency
  - Position and/or Location
  - Number of People Aboard
6. Release the Transmit Button
7. Wait for 10 seconds – If no response, repeat "Mayday" call

If not in immediate danger, follow the same steps as above, except do not use the word "MAYDAY."

#### Make Sure Everybody is Wearing a Life Jacket!

Telephone: 911

Tell the operator that you have a marine emergency. Be ready to provide the same information required in item number 5 of the mayday call.

#### Coast Guard Stations

**Tillamook Bay**  
(Garibaldi, OR  
503) 322-3531

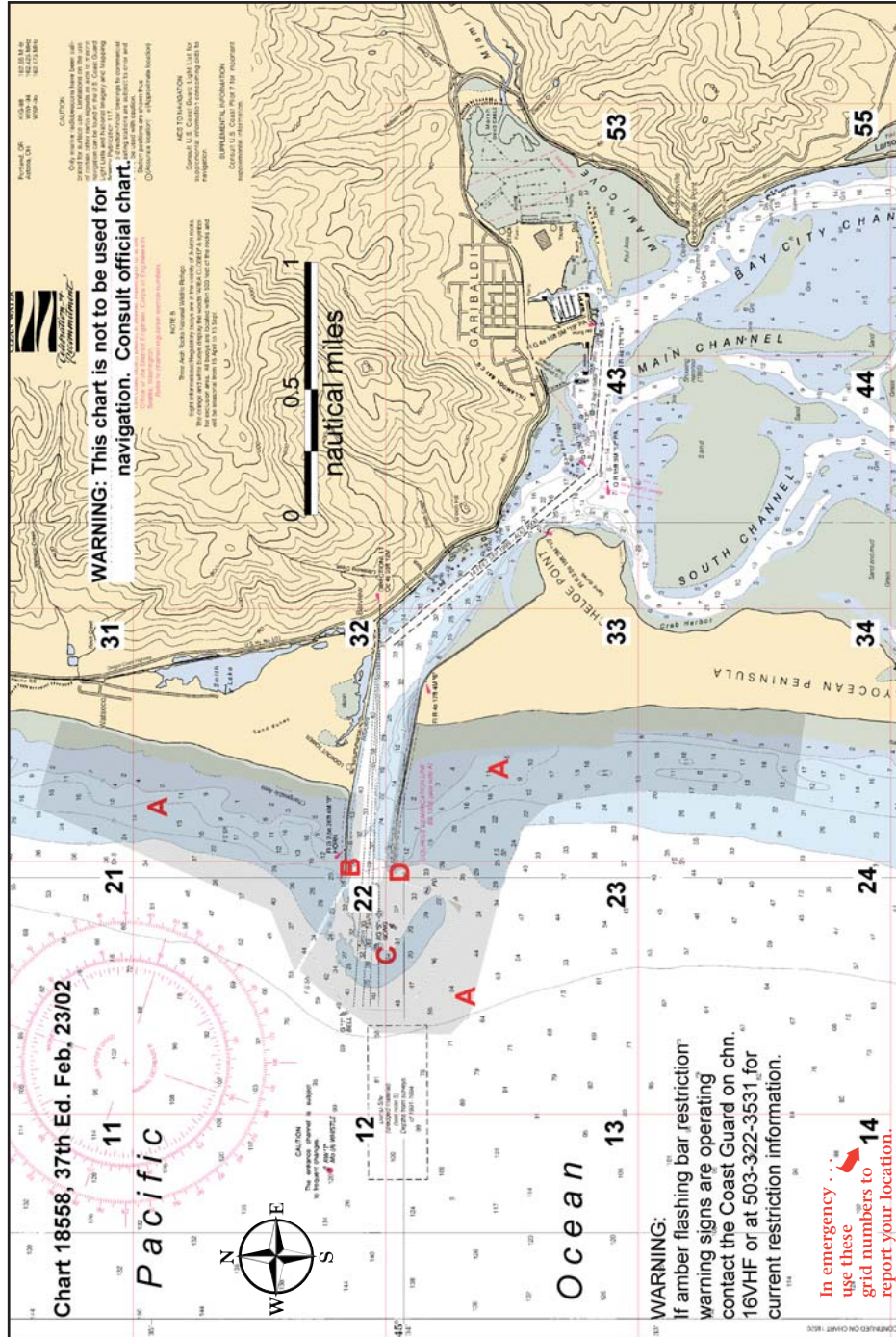
### Boating Safety Tips

- ✓ Check Weather, Tide, and Bar Conditions
- ✓ File a Float Plan With Friends/Relatives
- ✓ Don't Overload Your Boat
- ✓ Wear Your Life Jacket
- ✓ Carry Flares and a VHF-FM Radio
- ✓ Check Weather and Tides Before Departing
- ✓ Have Anchor with Adequate Line
- ✓ Boat Sober

**CROSSING THE TILLAMOOK BAY BAR**

For Additional Boating Safety Information [www.uscboating.org](http://www.uscboating.org) [www.boatoregon.com](http://www.boatoregon.com)  
For Boating Class and Vessel Safety Check Information: [www.usgaux.org/~130/](http://www.usgaux.org/~130/) [www.usps.org](http://www.usps.org)  
1-800-336-BOAT (2628) (class information only)

# TILLAMOOK BAY BAR DANGER AREAS



**A. Bar area.** The entire area between the beach and the 20-foot curve is bar area and breaks on the ebbing tide. The water runs out from four to six knots on the average and is very strong. Proceed on and stop in the channel and carefully evaluate the bar between November and April all vessels should avoid the area around Bell Buoy 1. This is extremely hazardous. The bar area is consistently changing.

**B. North jetty.** Approximately 100 yards of the seaward end of the north jetty is submerged. This, and all areas immediately adjacent to the jetty are extremely dangerous and should be avoided. About the last 150 yards of the outer tip of the North jetty is curving towards the Tillamook Bay Channel. Do not proceed north or south until you are well clear of the submerged jetty (approximately 200 yards seaward of the jetty tips).

**C. Middle grounds.** Shoaling makes this area unpredictable and hazardous it should be avoided.

**D. South jetty.** About 100 yards of the outer end of the south jetty is submerged. Extreme caution must be exercised when transiting the area. Junction Gong Buoy "S" has been established until the tip of the south jetty is repaired. Since this buoy sits adjacent to a shoal surf conditions may be experienced in the immediate area surrounding the buoy and westward of it.

**Tillamook Bay Channel**  
 Tillamook Bay Channel lies just south of the north jetty. Boaters are urged to navigate with extreme caution as this channel changes constantly. The Sector Light marks the correct location of the navigable channel only when between the jetties. The sector light should not be used to make an approach to the Tillamook Bay Bar since the bar directly across the channel of the jetty is very shallow. Most mariners prefer to transit in and out of Tillamook Bay by following the "south hole" which is the deep water area that runs north and south, just west of the end of the submerged rocks on the south jetty.

**Rough Bar Warning sign**  
 A small boat rough bar warning sign is located at the end of the Coast Guard Station. The second sign is located on the Coast Guard Tower which is located on the North Jetty. If the yellow lights on these signs are flashing, a restriction has been placed on recreational boats crossing the bar. To see if this restriction affects your vessel, please contact Coast Guard Station Tillamook Bay on VHF-FM channel 16 or call (503) 322-3531.

**Bar Condition Reports**  
 Bar condition and weather reports for Tillamook Bay can be obtained by contacting Coast Guard Station Tillamook Bay on VHF-FM channel 16. KTL (104.1 FM) reports are only given in the morning (once per day) and only in the summer time. With conditions changing frequently on the bar this morning radio report is only pertinent for the period the report is given.

## Appendix D

### Coast Guard–Approved Lifejackets

Only Type I lifejackets are approved for use on small passenger vessels.<sup>1</sup> Type I lifejackets are intended for offshore use, in open or coastal waters, and are designed for extended survival in rough, open water. Type I lifejackets have 22 pounds of buoyancy and will turn most unconscious wearers face up in the water.<sup>2</sup>

The Coast Guard has approved three varieties of Type I lifejackets for commercial vessels. The first is the *inherently buoyant lifejacket*, made of material that is capable of floating (kapok [requirements at 46 CFR 160.002], fibrous glass [requirements at 46 CFR 160.005], or plastic foam [requirements at 46 CFR 160.055]). These lifejackets are the most effective type of life preserver in rough water, according to the Coast Guard.<sup>3</sup> The lifejackets are reversible, come in sizes to fit children and adults, and are suitable for nonswimmers. Disadvantages are that they are bulky, can be uncomfortable if worn over long periods, and may not fit extremely large or extremely small passengers.

The second type of Coast Guard-approved Type I lifejacket is the *inflatable lifejacket*. The lifejackets are approved only in the adult size. They are worn uninflated and so can be worn continuously and in hot weather. When the lifejacket is submerged, a carbon dioxide cartridge automatically inflates two separate chambers. Inflatable models also have an oral backup system that requires the wearer to blow air into the device through a tube. Disadvantages are that the lifejackets are available only in one universal adult size (for adults over 80 pounds), are not suitable for nonswimmers, and do not provide flotation without being inflated. They also need regular inspection and maintenance, including rearming of the carbon dioxide cartridge.

The third variety of approved Type I lifejacket is the *hybrid inflatable lifejacket*. The Coast Guard calls this type the “best for open, rough or remote water, where rescue may be slow in coming.” The hybrid inflatable lifejacket is approved only in child and youth sizes. It will turn most unconscious wearers face up in the water and is the only inflatable lifejacket approved for weak swimmers, nonswimmers, and children. A hybrid inflatable contains a small amount of built-in flotation material and an inflatable chamber. The carbon dioxide cartridges need to be tested regularly and replaced if expended.

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<sup>1</sup> U.S. Coast Guard, Small Passenger Vessel Information Package, section C, “Life Saving Equipment Requirements” <[www.uscg.mil/d9/sault/mso/smallpassenger/tblifesaving.htm](http://www.uscg.mil/d9/sault/mso/smallpassenger/tblifesaving.htm)>.

<sup>2</sup> Most adults need an extra 7 to 12 pounds of buoyancy to keep their heads above water <[www.boatwashington.org/lifejacket.htm](http://www.boatwashington.org/lifejacket.htm)> (accessed April 18, 2005).

<sup>3</sup> “Lifesaving and Fire Safety Standards for Commercial Ships and Recreational Boats,” U.S. Coast Guard <[www.uscg.mil/hq/gm/mse4/pfseldata/htm](http://www.uscg.mil/hq/gm/mse4/pfseldata/htm)> (accessed April 18, 2005).