

**Sinking of the U.S. Small Passenger Vessel *Panther*  
Near Everglades City, Florida  
December 30, 2002**



**Marine Accident Report**  
**NTSB/MAR-04/01**

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**PB2004-916401**  
**Notation 7539C**



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



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Adopted March 9, 2004**



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

**National Transportation Safety Board. 2004. *Sinking of the U.S. Small Passenger Vessel Panther Near Everglades City, Florida, December 30, 2002.* Marine Accident Report NTSB/MAR-04/01. Washington, DC.**

**Abstract:** This report discusses the sinking of the U.S. small passenger vessel *Panther* in the Ten Thousand Islands area of Everglades National Park, Florida, on December 30, 2002. The accident resulted in no deaths and one serious injury. Damage to the *Panther* was estimated at \$60,000.

From its investigation of the accident, the National Transportation Safety Board identified the following safety issues: company operations, company's preventive maintenance program, and lifejacket stowage.

On the basis of its findings, the Safety Board made recommendations to the National Park Service.

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## Acronyms and Abbreviations

CFR	<i>Code of Federal Regulations</i>
COI	certificate of inspection
ICAO	International Civil Aviation Organization
PVA	Passenger Vessel Association
SIP	Streamlined Inspection Program

## Executive Summary

On December 30, 2002, the U.S. small passenger vessel *Panther*, a 31-foot open wood-and-fiberglass boat operated by Everglades National Park Boat Tours, was on its third tour of the day in the Ten Thousand Islands area of Everglades National Park, Florida, with 33 passengers on board (including 5 children) plus a master. Midway through the tour, shortly after 1430, the vessel sank in about 12 feet of water in Indian Key Pass, about 3 1/2 miles from the National Park Service visitor center near Everglades City. Three nearby vessels responded to the accident and rescued all the passengers and the master from the water. The U.S. Coast Guard launched a search-and-rescue operation that involved five Coast Guard stations in south Florida; however, responders did not find any passengers in the water. No fatalities resulted from the accident, but one passenger suffered a serious injury. Damage to the *Panther* was estimated at \$60,000. The Coast Guard reported that costs of the search-and-rescue operation exceeded \$50,000.

The National Transportation Safety Board determines that the probable cause of the *Panther's* sinking was flooding through a hull breach, which resulted from an earlier grounding and which Everglades National Park Boat Tours neglected to address, instead choosing to operate the vessel with a known failure of watertight integrity and inappropriately relying on the bilge pumps to keep the vessel afloat, thus continually putting its passengers at risk.

Based on its investigation, the Safety Board identified the adequacy of the following as safety issues:

- Company operations;
- Company's preventive maintenance program; and
- Lifejacket stowage.

As a result of its investigation of this accident, the Safety Board makes two new recommendations to the National Park Service.



## Factual Information

### Synopsis

Shortly after 1430<sup>1</sup> on December 30, 2002, the U.S. small passenger vessel *Panther*, a 31-foot open wood-and-fiberglass boat operated by Everglades National Park Boat Tours (see figure 1), sank in Indian Key Pass, about 3 1/2 miles from Everglades City, a small town in Collier County, Florida (see figure 2). The *Panther* was inspected and certificated by the U.S. Coast Guard under the small passenger vessel regulations at Title 46 *Code of Federal Regulations* (CFR), parts 175-185. When it sank, the *Panther* was midway through a tour of the Ten Thousand Islands area of Everglades National Park, with 33 passengers on board plus a master. Three nearby vessels responded to the accident and rescued the master and all the passengers from the water. No fatalities resulted from the accident, but one passenger suffered a serious injury.



Figure 1. *Panther* on tour in Everglades National Park.

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<sup>1</sup> All times are eastern standard time, based on a 24-hour clock. Information about the sequence of events came from oral interviews as well as written Coast Guard situation reports. When the times stated by interviewees disagreed, or when no time was reported in either the interviews or the situation reports, the Safety Board used its best judgment to estimate when a particular event took place.

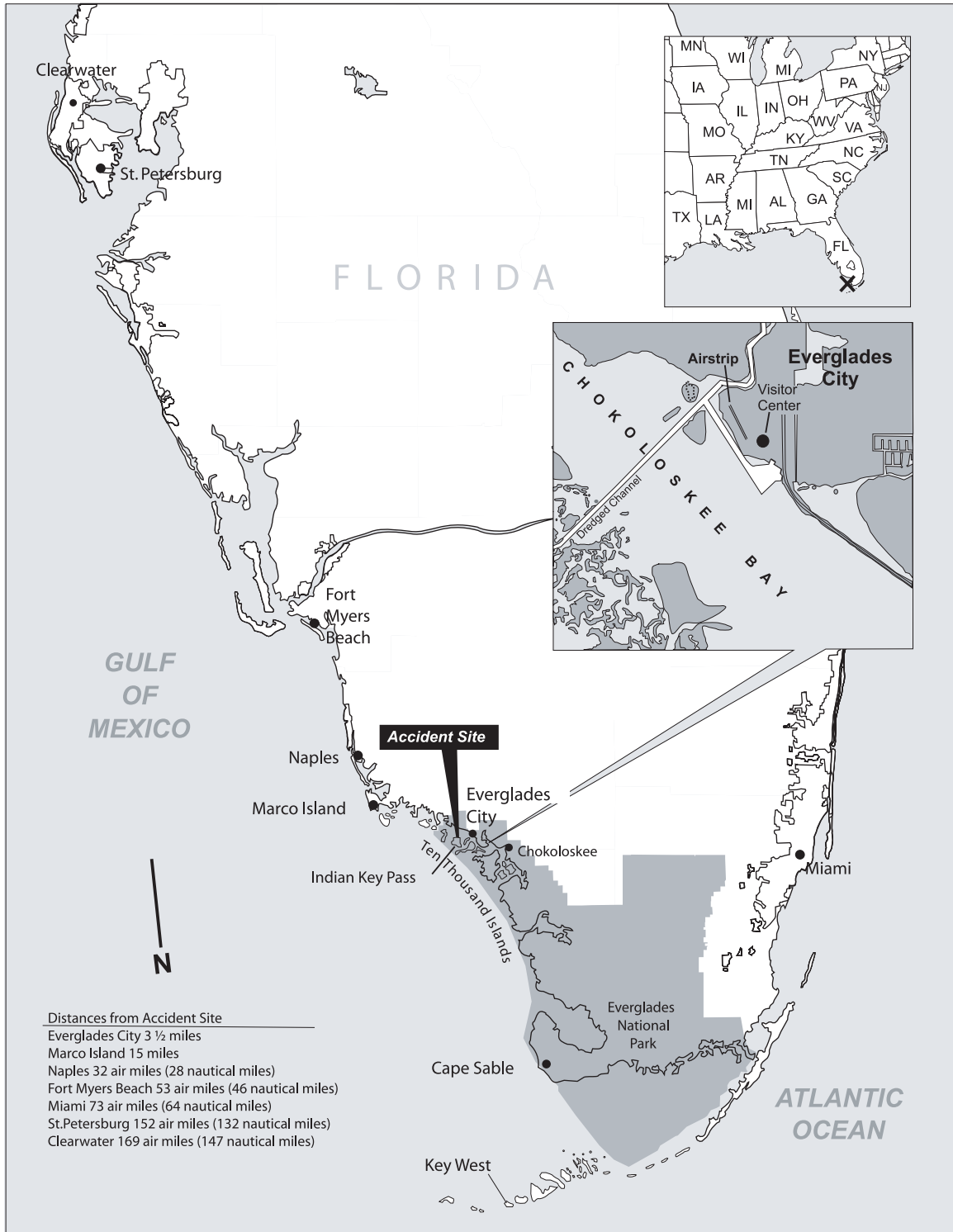


Figure 2. Accident site and other locations referenced in this report.

## Incidents Preceding the Sinking

### *Previous Grounding*

In early December 2002, the *Panther* grounded in Indian Key Pass while on a regular nature tour through the Ten Thousand Islands area of Everglades National Park. Like other tours run by Everglades National Park Boat Tours, the trips began and ended at the National Park Service visitor center near Everglades City. Two passengers and a master<sup>2</sup> were on board; it was the master's third season with the tour boat company. The company did not report the grounding to the Coast Guard and kept no maintenance records, so the Safety Board could not precisely date the incident. However, the master recalled that it had happened during the first week in December.

The master told Safety Board investigators that on his way back to the visitor center, he went outside the channel, going about half-throttle (7 knots), to show his passengers a particular bird as part of the nature tour, when the *Panther* grounded on mud and shells. He said he felt the boat "raise a little bit and then go down." As he backed the boat out of the shallows, he said he heard the propeller strike a layer of seashells that covered the bottom of the bay in the area. He noticed that once under way, the *Panther* handled differently, exhibiting a vibration consistent with a propeller that was "nicked up," and that the engine started to overheat. To prevent further damage, the master stopped the engine, anchored the boat, and called for assistance.

One of Everglades National Park Boat Tours's two maintenance men and one of the owner's two sons, both of whom worked for the company, went to the anchored vessel and cleaned sand and shells out of the *Panther*'s engine cooling water intake ("sea strainer"). The maintenance man said he found "no indication of water in the bilge." The master transferred his two passengers to another tour boat, and the *Panther* returned to the marina under its own power. The maintenance men replaced the impeller in the engine's water pump, and the boat returned to service the day after the grounding.

The vessel was not hauled out of the water to be inspected for bottom damage, and no repairs were made to the hull. The master said he did not think he had damaged the bottom of the *Panther* when he grounded it, and one of the owner's sons said the hull and bilge pumps were "fine" after the grounding. However, the master also said that the maintenance men "always" seemed to be working on the *Panther* after the grounding. He told investigators that he and another master both noticed changes in the way the *Panther* handled on trips after the grounding, specifically, that they could feel a vibration in the propeller and that the boat steered with more difficulty.

Both the owner and his sons said that the company's boats commonly grounded, mostly in soft mud, and that groundings happened when the masters were "not paying

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<sup>2</sup> The Safety Board interviewed three company masters who had been on board the *Panther* on problematic trips during December 2002. Altogether, Everglades National Park Boat Tours had engaged five licensed masters for the 2002-2003 season. It was common practice for the masters to rotate among the various boats.

attention” and went outside the dredged channel. The sons said that when a master came in after a grounding, they would lift the hatches to see whether water was coming in.<sup>3</sup> One of the maintenance men told investigators that it was the master’s responsibility to know whether water was in the bilges. However, one of the owner’s sons said that the maintenance men were responsible for checking the boats: “The captain walks on, flips a switch and that’s it. . . . We don’t let the captains check the boats.”

The owner, the sons, and the maintenance men all indicated when interviewed by Coast Guard and Safety Board investigators that they did not know that groundings were a casualty that had to be reported to the Coast Guard.<sup>4</sup>

### **Postgrounding Problems**

**Low Freeboard.** The master who operated the *Panther* on the day of the early December grounding told Safety Board investigators that he experienced a problem with the vessel riding low in the water about 2 weeks after the grounding. Again, the Safety Board could not pinpoint the date of the low-freeboard incident because the tour boat company did not keep maintenance records.

The master said he was returning to the marina with a full load of passengers, saw that he had a low freeboard, thought the vessel was taking on more water than normal, and “figured the bilge pumps were to blame.” He radioed the problem to the company’s maintenance men and after discharging his passengers, took the boat to the fuel dock. The maintenance men told the master that the bilge pumps had been checked and “all the switches were working.” The master told investigators that he assumed “maybe there was a float switch that was stuck or something.”<sup>5</sup> He also noted that for some time, in order to pump the bilges continuously, he had had to hold the switch on the manual setting with a rubber band because the automatic setting did not work.

The maintenance men did not inform the master of the cause of the reduced freeboard he experienced 2 weeks after the grounding. The master told investigators that another master had had a similar low-freeboard problem on the *Panther* a few days after his experience.

**Starboard List.** On December 29, the day before the accident, the *Panther* returned to the visitor center marina (under a different master) listing significantly to starboard. About 29 passengers were on board. One of the owner’s sons observed the list

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<sup>3</sup> The hatches were squares of wood that had been cut out of the aft part of the deck over the starboard and port bilge pumps and that could be lifted up to access the pumps; the engine cover was also called a hatch.

<sup>4</sup> An “unintended grounding” is the first item listed at 46 CFR 4.05-1 as requiring a notice of marine casualty: “(a) Immediately after the addressing of resultant safety concerns, the owner, agent, master, operator, or person in charge, shall notify the nearest Marine Safety Office, Marine Inspection Office or Coast Guard Group Office whenever a vessel is involved in a marine casualty consisting in (1) An unintended grounding . . . .”

<sup>5</sup> The bilge pumps operated by built-in sensors, not float switches. See “Vessel Information” section.

and said he saw water coming through the “scupper hole.”<sup>6</sup> He told the Coast Guard that he advised the captain to discharge the passengers as soon as possible because he believed their weight in the stern was causing the problem. Even after the full load of passengers disembarked, however, the list remained.

According to the owner’s son, the master had inadvertently shut off the starboard bilge pump switch. The master, however, said that the bilge pump did not work in either automatic or manual mode. The owner’s son said he had checked the bilge pumps and that the switches worked: “I pay attention to the bilge pump.” The master told Safety Board investigators that he was not informed of what had caused the list. The next day, as described below, one of the maintenance men worked on the *Panther*’s starboard bilge pump before the vessel left on its first tour.

## Accident Narrative

### Preaccident Events

Shortly before 0900 on December 30, 2002, the master who was scheduled to operate the *Panther* that day (not the same master as on the trips described above) arrived at the visitor center for the first tour. The *Panther* was scheduled for a tour every 2 hours, beginning at 0900 and ending at 1500. The master said that he saw one of the company’s two maintenance men working on the *Panther*, doing what looked to him like electrical work. The master said the maintenance man told him, “I’ve got a bilge pump to look at.” Because of the repair work in progress, another of the company’s tour boats, the *Manatee*, took the 0900 run. The maintenance man said that he replaced the *Panther*’s engine starter switch because the accident master had told him the day before that the engine was slow to shut off, and that he also replaced the wiring to the starboard bilge pump. The maintenance man said that before the *Panther* returned to service, he tested the bilge pumps and the starter switch and that they were working properly.

The *Panther* left on its first trip of the day at 1000, following its usual route through a marked channel into Chokoloskee Bay and then into Indian Key Pass (see figure 2). The trip typically took about 1 1/2 hours, with its turnaround point 3 1/2 miles to 5 miles from the visitor center. (The distance of a trip depended on the natural sights, the weather, and other factors, at the master’s discretion.) The master said that the boat handled well and showed no indications of problems on the trip. The *Panther* left on its second trip of the day at 1200, with the same master on board. He reported that the second trip was uneventful. After the passengers disembarked, he prepared for his third trip at 1400.

Passengers for the 1400 trip waited at the dock for the master, who was taking a short break and had asked that no one board until he returned. One of the passengers, a

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<sup>6</sup> By “scupper hole,” the owner’s son was referring to one of the *Panther*’s freeing ports, which are bulwark openings close to the deck that are designed to allow water to drain overboard. See “Vessel Information” section for details of the *Panther*’s construction.

mechanical engineer, told Safety Board investigators that while he was waiting for the master to return, he heard the *Panther*'s bilge pumps cycling on and off every 30 seconds and observed a steady stream of water discharging from the vessel. The passenger estimated each discharge at 3 to 4 gallons. He also said that the *Panther* looked to be riding low in the water: ". . . like if you leaned over from the seats in the stern, you could touch the water with your elbow."

At 1340, the master returned to the boat and started boarding the passengers. He said the passengers chose their own seats, although he advised them to sit aft if they wanted to avoid the sea spray. After the passengers were seated, the master said he determined by counting the empty seats that he had 34 on board.<sup>7</sup> He did not count the number of passengers or the number of tickets or inform personnel at the company office of the number of passengers on board. When the office personnel waved for the master to leave, he hooked a chain across the boarding area, started the engine, released the mooring lines, and moved the boat away from the dock.

The master said he departed at 1355. As the *Panther* moved away from the dock, the master, who was the only crewmember, introduced himself to the passengers and, using the boat's public address system, gave them his standard safety briefing, which he had developed himself, rather than receiving it from the company. He told the passengers that lifejackets were located under the seats in front of them; he did not take any of the lifejackets out of the storage lockers or demonstrate how to put one on. He also told them that the boat had a fire-extinguishing system and a VHF radio, and that he held "a master mariner's license administered by the Coast Guard." He predicted "a very safe and stable ride."

After departing from the marina at the Everglades National Park visitor center, the master steered the *Panther* along a marked channel into Chokoloskee Bay and then entered Indian Key Pass (see "Waterway Information," below, for details of the area). The master told investigators that he noticed no problems with the boat, that the engine was working properly, and that no bilge pump indicator lights were on. He said the boat was making 3 1/2 or 4 knots during this part of the trip.

At 1400, according to the master, he began a nature narration while moving slowly through Indian Key Pass, pointing out birds to the passengers and asking them to look for dolphins. He told investigators "the vessel maneuvered properly," with no indication of problems. When the master saw a pod of about three Atlantic bottlenose dolphins, he increased the *Panther*'s speed to 8 or 10 knots and tried to pull alongside the animals to give the passengers a good view of them. He said some of the passengers stood up and moved to the railing, and that the boat "heeled just slightly to port, but nothing in any way strange." After the dolphins submerged, he turned slowly to starboard to see if the animals would surface nearby. He told investigators that he was going at half speed and that the passengers were standing. He said he still had no indication of problems with the *Panther*, but that when he "brought the throttle back" (decreased speed), he felt the "stern set a little bit more than usual," which he attributed at the time to "heavy-set" passengers seated in the stern.

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<sup>7</sup> Safety Board investigators later determined that, although the master repeatedly stated that he had 34 people on board the *Panther*, he actually had only 33.



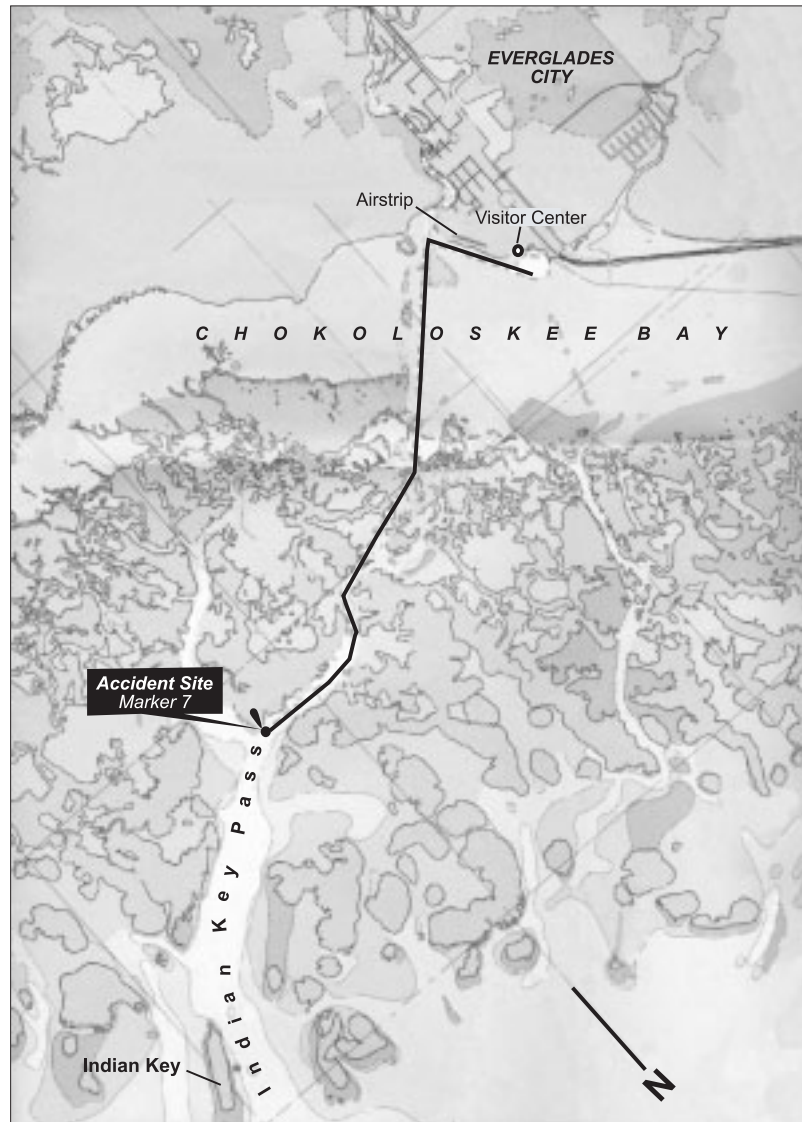
The passengers told investigators that when the master entered Indian Key Pass, he sped up until a large wake formed behind the vessel. The master told them he was trying to prompt dolphins into jumping over the wake, which other witnesses told investigators was standard practice on the tour boats. The jumping dolphins entertained the passengers and created an opportunity for them to take photographs (see figure 3). According to the passengers, the master made two or three sharp 180-degree turns into the vessel's wake and was "revving" his engine. They said that between turns, the master moved passengers to the aft seats so their extra weight would push the stern lower into the water and increase the wake.



**Figure 3.** Dolphin leaping in *Panther's* wake (photograph taken about a year before accident trip).

Passengers who sat near the stern said that while the master was taking the *Panther* through these maneuvers, water began to accumulate in the stern of the boat and that by the last turn, the water was ankle deep. One person said, "With each turn, more water would come in, first through the bottom, then over the top." Another passenger stated, "Water was constantly coming over the wall of the boat and into the passenger compartment. Five or six times during the trip water was ankle- to knee-deep where I was sitting" (at the stern).

About a half-hour into the trip, the master turned the *Panther* around near channel marker 7 in Indian Key Pass (see figure 4) to return to the visitor center (marker 7 is about 3 1/2 miles from the center). So much water began spilling over the sides of the boat at this point that the master stopped the boat. Passengers said that the master did not seem to realize the *Panther* was flooding "until it was too late" and that by the time the boat stopped, people in the stern had water up to their knees.



**Figure 4.** *Panther's* route from National Park Service visitor center to site of sinking.

About the time the *Panther* stopped, a commercial crab boat, the *Red Rock*, came into Indian Key Pass on its return to Everglades City, moving at less than 5 knots because it had broken a propeller strut earlier in the day. The three occupants of the *Red Rock*—the captain, his son, and his son's friend—saw the *Panther* ahead of them, noticed that it was low in the water, and changed course to have a closer look. Their position at the entrance to Indian Key Pass was about a mile from the *Panther's* location.

Passengers reported that the *Panther* remained stopped for between 5 and 10 minutes. The master told investigators that he noticed water on the deck and switched the bilge pumps on manually. He said that all the bilge pump lights were on (an indication that the pumps were operating), but that he “questioned whether they were pumping.” He said that the bilges often held water and “sloshed,” especially when moving through other



boats' wakes and with water leaking through the *Panther's* propeller shaft packing gland.<sup>8</sup> Because he could not see the bilge discharge from the helm, he asked a passenger to look overboard to check whether the bilge pumps were working. The passenger looked over the side and told the master that "the water was almost even with the top of the boat so he could not tell" whether water was discharging through the bilge overboard discharge line.

### **The Sinking**

**Master's Account.** According to the master, when the passenger looked over the side to check the bilge discharge, the *Panther* was hit by the wake from a passing crab boat and immediately sank stern first. The master said that he told the forward passengers to "grab a life preserver" because the water in the boat was already too deep for the passengers in the back to reach their lifejackets. He told investigators that "there was a lot of panic" and that he tried to calm the passengers. He said the engine cover (measuring about 6 feet by 4 feet) floated off and some of the passengers hung onto it. As the boat sank, about 6 to 8 feet of the bow rail on the port side remained above water, he said, "so we all started grabbing the forward rails, and everyone was holding on to one another."

At this point, the master said that he waved "frantically" to the *Red Rock*, which he said "circled the boat and approached us stern first." The master said he told the passengers to stay on the boat and that he yelled to the crab boat to "notify the Coast Guard." He said that "when the crab boat got within about 20 to 25 foot [sic] of our vessel, everyone in distress started swimming towards the crab boat." He then yelled to the crab boat captain to put the crab boat in neutral to protect the swimming passengers from the propeller. The master told investigators that "if it had not been for the crab boat . . . we would have had fatalities in that accident."

The master said he hung onto the *Panther's* exposed bow rail with an elderly couple who were poor swimmers. The master swam away from the *Panther* to look for one of the child passengers, but the child turned out already to be on the crab boat. A recreational boat (a 30-foot "Royal" cabin cruiser, the *Hoosier Daddy*) that happened to be in the area threw the master a lifejacket. The master said that he returned to the *Panther*, and that the *Hoosier Daddy* rescued him and the two elderly passengers from the railing.

**Account of First Responders and Passengers.** The *Red Rock's* captain told Safety Board investigators that after being hailed by the master of the *Panther*, he turned to starboard and motored forward of the *Panther's* bow, intending to bring his boat along the other's port side. When the *Red Rock* was within 2 feet of the tour boat, the *Panther's* master told him that his boat was sinking and that the *Red Rock* would have to take his passengers. Within a few seconds of the *Red Rock's* arrival, the *Panther* sank.

One of the passengers told investigators that as the *Red Rock* approached the *Panther*, the master "yelled to the passengers that the vessel was sinking." He said the passengers "lunged to the port side," toward the *Red Rock*, which caused the boat to heel to port, which then caused the deck to go underwater and the vessel to sink quickly. The

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<sup>8</sup> The shaft packing gland is a sleeve that fits loosely around the engine's propeller shaft and presses on packing that surrounds the shaft; the purpose of the packing is to make watertight the hole through which the shaft passes.

other passengers described the *Panther* as sinking in seconds after the *Red Rock* came alongside. One passenger said, “The boat just disappeared from underneath us.” One passenger told investigators that a wave from the *Red Rock* swamped the *Panther*. The captain of the *Red Rock* confirmed that the passengers rushed to the *Panther*’s port side when he pulled alongside. Some passengers said they jumped (or passed their children) directly onto the *Red Rock*, while others swam to it.

About 1440, the captain of the *Red Rock* radioed the news of the *Panther*’s sinking to the radio operator at Everglades City Seafood (the commercial crab boats did business with that company and kept in contact with the operator). From 5 to 8 passengers remained in the water. The *Red Rock* captain said he drifted until all the swimmers were on board, then motored to pick up three passengers clinging to a life buoy. About the same time, a National Park Service ranger boat that was patrolling in Indian Key Pass radioed the Park Service visitor center that the *Panther* had sunk and that passengers were in the water. The ranger said he then rescued the two passengers who were clinging to the *Panther*’s railing, which those passengers confirmed.

About 3 feet of bow rail remained above the water when the *Panther* sank (see figure 5). According to measurements made by Safety Board investigators, the water at the accident site was 10 to 12 feet deep.



**Figure 5.** *Panther* submerged in Indian Key Pass.

### **Search and Rescue**

Once on board the *Hoosier Daddy*, the master of the *Panther* sent out a distress call over VHF-FM channel 16 that, according to the Coast Guard situation report, was picked up at 1450 by the Coast Guard Group in St. Petersburg, about 150 air miles north of the accident site (see figure 2). The Coast Guard described the transmission as “weak and broken” and lost communication shortly after receiving the call. Within minutes, the Coast Guard launched a 6-hour search-and-rescue mission that would eventually involve District 7 headquarters in

Miami, Group St. Petersburg (which took the lead role), and three other Coast Guard stations: Air Station Clearwater (169 air miles north of the accident site), which launched an HH-60 Jayhawk helicopter; Station Ft. Myers Beach (53 air miles north), which launched a 41-foot patrol boat; and Air Station Miami (73 air miles east), which diverted an HU-25 “Guardian” Falcon surveillance jet from a law-enforcement patrol to the accident scene. A Coast Guard Auxiliary twin-engine Piper Aztec was also diverted from a law-enforcement flight to the scene. The Coast Guard reported that the search-and-rescue mission cost over \$50,000.

Two boats sent by the tour boat company helped return the rescued passengers to shore. Collier County emergency medical services in Everglades City sent emergency vehicles and personnel to the National Park Service visitor center to check the passengers for injuries. All passengers were accounted for and safely returned to the visitor center.

## Injuries

Four of the passengers reported minor injuries (cuts, sprains) but did not seek medical attention. One passenger suffered a broken rib, revealed by X-rays taken the day after the accident. She believed the injury occurred when she hit the side of the crab boat after jumping from the sinking *Panther*. The injuries sustained in the accident are listed in table 1.

**Table 1.** Injuries sustained<sup>9</sup>

Injuries	Crew	Passengers	Total
Fatal	0	0	0
Serious	0	1	1
Minor	0	4	4
None	1	28	29
<b>Total</b>	1	33	34

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.

## Damage

The *Panther*'s owner did not commission a damage survey of the vessel. The Safety Board estimated the vessel damage at \$60,000. The owner salvaged the vessel and removed it from the water but has not yet repaired it (see “Wreckage” section for more information).

<sup>9</sup> Injuries are categorized according to the injury criteria of the International Civil Aviation Organization (ICAO). For uniformity, the Safety Board uses the ICAO injury criteria in all its accident reports, regardless of transportation mode.

## Personnel Information

The 46-year-old master was hired by Everglades National Park Boat Tours in January 2002 for a seasonal position (usually, December to May). He worked until July, left for a vacation, then returned to Everglades National Park Boat Tours on December 1 for the new season. He told Safety Board investigators that he normally made four trips a day during the season, sometimes five a day during high-volume periods such as Easter week. Each tour lasted about 1 1/2 hours, with a 30-minute break between.

The master had previously been employed as an operator of small tourist boats at a resort on Marco Island, Florida, 15 miles north of Everglades City (see figure 2). The master was laid off when tourism declined after the September 11, 2001, terrorist attacks. According to his résumé, the master also had recreational boating experience in the Gulf of Mexico, the eastern and western Caribbean, and the eastern Pacific. He had been a private boat owner since 1985, and had delivered yachts and operated private sailboats.

On May 15, 2000, the master received a Coast Guard license as “master of steam, motor or auxiliary sail vessels of not more than 25 gross registered tons (domestic tonnage) upon near coastal waters.” The license, due to expire on May 15, 2005, also authorized the master to engage in commercial assistance towing. The master’s license permitted him to operate all but the largest tour boat (the 55-foot *Manatee II*) owned by Everglades National Park Boat Tours. Coast Guard regulations did not require the master to receive any formal training in emergency response or crowd control, nor did he receive any.

The master reported that he had slept at least 8 hours a night during the 72 hours before the accident. He said that his overall medical condition was good and that he was not taking any prescription or over-the-counter medications.

The Coast Guard told Safety Board investigators that it had found no information to indicate that the master had ever before been involved in a marine accident. As a result of the *Panther* accident (again according to information received from the Coast Guard), in May 2003 the Coast Guard charged the master with failure to have the required number of crewmembers,<sup>10</sup> failure to have a written account of all passengers and to report that count, and failure to require the passengers to put on lifejackets after the boat began to sink. In a consent agreement, the Coast Guard suspended the master’s license for 3 months beginning June 1, 2003, and placed him on probation until September 1, 2004.

## Vessel Information

The *Panther* was an open, flat-bottomed wood-and-fiberglass boat built in 1968 in Chokoloskee, Florida (see figure 2). The owner of Everglades National Park Boat Tours had operated the *Panther* since it was built to carry passengers on tours of the Everglades. The principal characteristics of the *Panther* are listed below:

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<sup>10</sup> As noted in the “Vessel Information” section, the *Panther* was required to carry a deckhand if, as on the accident trip, the vessel had 30 or more passengers.

Length:	31 feet
Beam:	10 1/2 feet
Depth:	2 1/2 feet
Gross tonnage:	4
Crew:	1 (master, plus 1 deckhand if 30 or more passengers on board)
Passenger capacity:	37
Propulsion:	225-horsepower Perkins-Sable diesel engine

### **Construction and Equipment**

The hull of the *Panther* consisted of fir frames planked with sheets of fiberglass-covered, 1/2-inch-thick marine plywood. The deck beams were made of cypress. A continuous bulwark enclosed the boat's flat deck and extended 13 inches above it, with deck rails mounted on top of the bulwarks. At the stern, two 3-inch-diameter freeing ports, designed to allow water to run off the deck, cut through the bulwark about 6 inches above the light-load waterline. The bottoms of the freeing ports were about level with the deck. The *Panther's* freeboard was thus approximately 6 inches when no passengers were on board.

The engine was located in the center of the boat, with the steering console immediately behind it. A shaft tunnel 7 1/2 feet long ran aft along the centerline beneath the deck, reinforced by fore-and-aft timbers (stringers) along the outside. The bilges (each measuring 7 1/2 feet long, 3 feet wide, and 1 1/2 feet high, or about 34 cubic feet in volume) were on either side of the tunnel, under the main deck, and did not connect with the tunnel. The fuel line, engine exhaust hose, and bilge pump discharge lines ran through the tunnel.

The *Panther's* certificate of inspection (COI)<sup>11</sup> listed the original engine, rated at 160 horsepower. The tour boat owner had no records indicating when the new 225-horsepower engine had been installed, but he estimated that it had been done about 2 years before the accident. According to the master on the day of the accident, the vessel's normal operating speed was 5 to 6 knots, with a maximum light-load speed of 12 to 14 knots and a half-throttle speed of about 7 knots.

Federal regulations at 46 CFR 182.520 stipulate that vessels must be equipped with bilge pumps. The number of required pumps and their minimum capacity depend on the length of the vessel and the number of passengers it carries. The *Panther* was required to have two bilge pumps: one with a pumping capacity of 10 gallons per minute (600 gallons per hour) and a second with a pumping capacity of 5 gallons per minute (300 gallons per hour). The *Panther* had three bilge pumps manufactured by Rule Industries of Gloucester, Massachusetts (now part of ITT Industries). According to the Coast Guard, the bilge pumps in the starboard quarter and the engine compartment were rated at 1,500 gallons per hour, while the pump in the port

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<sup>11</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.

quarter was rated at 2,000 gallons per hour. The housings of the bilge pumps contained printed circuit boards (bases on which pathways for electrical circuits are printed and electronic components are mounted). A timer built into the circuit boards cycled the pumps on every 2 1/2 minutes. Unless the pumps sensed resistance to their impellers (from either fluids or solids such as dirt), they would shut off after operating for 1 second. If the pumps sensed resistance, they would continue to operate until the impellers moved freely again.

The printed circuit boards had three electrical leads, two going to the pump motor and one going to an indicator light. Each time a pump cycled on, the indicator light would illuminate. Thus, if the impeller encountered no resistance, the bilge pump indicator light would go off for 2 1/2 minutes, on for 1 second, and then off again.

The bilge pumps were controlled by three separate switches mounted on the steering console, each having a neutral, automatic, and manual position. In neutral position, the pumps were off. In automatic position, the pumps cycled on and off as described above. In manual position, the pumps were on continuously (as were the indicator lights). According to the Coast Guard, which was on scene immediately after the accident, each pump discharged through a separate overboard discharge line. In discussions with Safety Board investigators, however, the *Panther's* owner and maintenance men indicated that the discharge from all three bilge pumps was directed through a manifold to a single 1/2-inch (outside diameter) line that discharged on the vessel's starboard side.

The mounting plate for the steering assembly was in the tunnel near the stern. The plate was bolted through a wooden support block, through both stringers, and to the strut. The support block was made of southern yellow pine. Two spacers ran between the stringers, the upper made of plywood and the lower of bald cypress. The tunnel was covered with removable deck boards that were flush with the main deck. The boards had to be removed to inspect the tunnel.

The engine compartment was fitted with a 12-volt d.c. high-level, float-switch-type bilge alarm manufactured by the Cole Hersee Company (4112 series).<sup>12</sup> The device was designed so that when water entered the engine compartment, the float would rise and at a predetermined height of 4 inches (that is, when 4 inches of water had accumulated in the engine compartment bilge), would activate a switch that would energize an audible alarm and illuminate a red light under a plastic housing on the vessel's console. Two of the masters interviewed during the investigation, including the *Panther's* master on the day of the sinking, had no knowledge of the alarm and had never heard it sound (notwithstanding the alarm's location on the console above the steering wheel).

The alarm was submerged when the *Panther* sank. Safety Board and Coast Guard investigators examined the switch after the accident and found a disconnected wire. The alarm was sent for testing to the Safety Board's Materials Laboratory (see "Tests and Research" section for the results).

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<sup>12</sup> Vessels 26 feet or longer are required by 46 CFR 182.530 to be provided with alarms that emit visible and audible signals indicating high water levels in bilges and other unmanned spaces.

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

The Marine Safety Office in Miami was the local Coast Guard office in charge of inspecting the *Panther*. The Safety Board interviewed three Coast Guard inspectors and reviewed the inspection records for the *Panther* for the past 7 years. None of the records noted any structural defects.

The *Panther* had last been drydocked for a Coast Guard examination on December 31, 2000. According to the inspection record, the outside hull was found to be satisfactory. On May 3, 2001, the Coast Guard inspected “all voids, compartments, bulkheads, [and] stiffeners” on the *Panther* and issued a COI. The boat underwent its last Coast Guard reinspection on May 21, 2002. Nine checklist items were listed as “inspected satisfactory” (among them construction/loadline, electrical, lifesaving, and stability), and three nonstructural deficiencies were listed as “found and corrected.” Critical equipment would have been tested during the inspection, including the high-level bilge alarm. The *Panther* was scheduled for another Coast Guard drydock inspection on December 31, 2002—the day after the accident.

The Coast Guard COI permitted the *Panther* to operate not more than 1,000 feet from shore in the waters between Everglades City and Chokoloskee (see figure 2). According to the COI, the total number of persons allowed on the *Panther* was 39, including 37 passengers and 2 crewmembers. The boat was required to have a licensed master, with the additional requirement to carry a deckhand if the boat carried 30 or more passengers. If fewer than 30 passengers were on board, the COI required no deckhand.

The master told Safety Board investigators that he had never seen the COI for the *Panther* and that during his orientation as a new employee of Everglades National Park Boat Tours, other company masters had told him that the vessel had been “grandfathered” to previous regulations and that a deckhand was not required. The owner told investigators that it was the master’s responsibility to ensure that a deckhand was on board when the vessel carried 30 or more passengers. The owner also said that two people were on standby to serve as a deckhand if necessary. One of the owner’s sons, however, told Coast Guard investigators that he was not aware that the *Panther* had ever carried a deckhand.

The master who had operated the *Panther* on the day it grounded in early December 2002 stated that in his three seasons of working for the tour boat company, the owner had never told him that the vessel was supposed to carry a deckhand when it had 30 or more passengers on board. He said he had seen the *Panther*’s COI stowed in a lifejacket compartment.<sup>13</sup>

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<sup>13</sup> Title 46 CFR 176.302 requires the COI to be kept on board a vessel, either displayed where it can be seen by passengers, or in the case of an open boat, “in a watertight container readily available for use by the crew and display to passengers and others on request.”

## Wreckage

### **Salvage Operations**

The *Panther*'s owner and his sons began salvage operations immediately after the accident. Just after the *Panther* sank, one of the sons, accompanied by one of the maintenance men, left for the accident scene in one of the company's six-passenger boats. By the time they reached the site of the sinking, about 1515, a passing crab boat had towed the *Panther* to a sandbar about 300 yards away, out of the path of other vessels. The men retrieved the engine cover (which had floated free during the sinking) and one of the hatches from the *Panther* and returned to the visitor center.

After talking with the owner, the two sons returned to the accident site, accompanied by the maintenance men, intending to tow the *Panther* back to the visitor center marina. Two National Park Service employees who had arrived at the site shortly before, however, told the sons that the vessel could not be moved without the Coast Guard's permission. Everyone stayed in the area until two investigators from the Coast Guard Marine Safety Office in Miami arrived at the site about 2230. After taking photos, the Coast Guard investigators gave the sons permission to move the *Panther* farther onto the sandbar, so it would be above water at low tide the next morning. After pulling the *Panther* about 30 feet farther onto the sandbar, the sons and the maintenance men returned to shore.

At low tide, or about 0900 the next morning, the owner's sons, the maintenance men, and one of the Coast Guard investigators returned to the vessel to survey the damage. The vessel was resting on the sandbar. The sons and the maintenance men boarded the vessel and, according to their statements, found a damaged area near the strut block in the tunnel.

The two sons and the two maintenance men returned to the visitor center marina and drafted a salvage plan for submission to the Coast Guard. According to the first item in the plan, the owner was to "temporarily patch hole in tunnel caused by us beaching the vessel last night." (See "Postsalvage Examination," below.)

After the *Panther* had floated free on the incoming tide, the sons and the maintenance men returned to the vessel and used one of the company's other boats to tow the *Panther* to the visitor center marina. During the trip, three of the men rode in the *Panther*, and one of them had to maintain pressure on the damaged area to prevent water from pouring into the vessel. Water continued to enter the boat, and the men had to pump the bilges, using a portable pump, four or five times before they arrived at the marina.

### **Postsalvage Examination**

After the accident, the *Panther* was hauled out of the water and onto a marine railway owned by the tour boat company at the visitor center marina. When Safety Board investigators arrived, the vessel had already been partly dismantled and the bilge pumps disconnected. Safety Board and Coast Guard investigators examined the vessel and found a fracture in the underside of the hull, originating at the strut plate that supported the rudder post and steering assembly. The fracture was C-shaped, with each section of the C about 6 inches long (see figures 6a and 6b). The open part of the C, which surrounded the



strut plate, was pushed upward, creating an irregular opening about 2 inches long and 1 inch wide (see figure 6b). The investigators examined the plywood in the area of the C-shaped fracture in the hull bottom and found no evidence of deterioration due to wastage or rot.



**Figure 6a.** C-shaped fracture around strut plate.



**Figure 6b.** Closeup of 2-inch opening in fracture around strut plate.

Coast Guard inspectors directed the owner to remove the engine exhaust hose that ran over the starboard stringer. Once the steering gear assembly and mounting plate were removed, the support block was exposed. When the owner attempted to pry the support block free, it splintered and had to be removed in pieces. The two spacers were removed intact. Safety Board investigators sent all three items to the Board's Materials Laboratory in Washington, D.C., for examination (the "Tests and Research" section describes the results).

When the support block was removed, investigators observed that the starboard stringer was deflected upward about 1 inch from the bottom hull planking. The investigators further observed that a rag had been used to plug a hole in the stringer. The owner told the Safety Board that the rag had been inserted during the salvage operation. At the Coast Guard inspectors' request, the owner removed the seats and cut pieces out of the deck so that the entire bilge area and its associated internal structural supports and frames could be thoroughly examined. No significant damage was discovered.

## Waterway Information

Indian Key Pass, the site of the accident, is a dredged channel in Everglades National Park, off the southwest coast of Florida. The waterway runs from the Gulf of Mexico through the hundreds of low, uninhabited mangrove islands known as Ten Thousand Islands and into Chokoloskee Bay (see figure 2). The Ten Thousand Islands area covers nearly 200,000 acres along 60 miles of coastline, from Marco Island in the north to just above Cape Sable at the southwest tip of Florida. The shallow waters of the coastal estuary are brackish, a mix of freshwater flowing from the Everglades in the interior and saltwater coming from the Gulf of Mexico.<sup>14</sup>

The average low-water depth in Indian Key Pass ranges from 7 to 15 feet,<sup>15</sup> and in June 2002, the midchannel controlling (minimum) depth was 4.8 feet<sup>16</sup> (the site of the *Panther* sinking measured 10 to 12 feet deep). Outside the channel, the waters are quite shallow, in some places a foot or less deep.

The mean tidal fluctuation at Indian Key Pass is 3.4 feet.<sup>17</sup> Low tide was at 1618 the afternoon of the accident, according to National Ocean Service data. The captain of the *Red Rock* estimated that the tide was ebbing at 3 to 3 1/2 knots when he came alongside the *Panther*; the *Panther's* master estimated the current at 2 knots. An ebbing tide flows toward the Gulf of Mexico; a flooding tide flows toward the National Park Service visitor center.

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<sup>14</sup> This description of the Ten Thousand Islands area uses information from the U.S. Geological Survey <[http://sofia.usgs.gov/virtual\\_tour/tirb/](http://sofia.usgs.gov/virtual_tour/tirb/)>, the *Longstreet Highroad Guide to the Florida Keys & Everglades*, by R. Ferren <[http://sherpaguides.com/florida/western\\_everglades/ten\\_thousand\\_islands.html](http://sherpaguides.com/florida/western_everglades/ten_thousand_islands.html)>, and the Everglades National Park boating page <[www.everglades.national-park.com/boat.htm](http://www.everglades.national-park.com/boat.htm)>.

<sup>15</sup> National Oceanic and Atmospheric Administration, National Ocean Service, Coast Survey, U.S. Gulf Coast, Florida, Map 11429, *Chatham River to Clam Pass*, September 2002.

<sup>16</sup> National Oceanic and Atmospheric Administration, National Ocean Service, *United States Coast Pilot*, Vol. 5 (Atlantic Coast: Gulf of Mexico, Puerto Rico, and Virgin Islands), 2003, p. 213.

<sup>17</sup> *Coast Pilot*, p. 213.

Average monthly water temperatures in Indian Key Pass range from 66° F (January–February) to 87° F (July–August).<sup>18</sup> The water temperature at the accident site 2 days after the sinking was 62° F, as measured by Safety Board investigators from water samples collected at depths of 6 inches to 6 feet.

## Operations

### *Company Information*

**National Park Service Contract.** Everglades National Park Boat Tours was a concessionaire of the National Park Service and had the sole concession for boat tours in the Ten Thousand Islands area, departing from the National Park Service visitor center.<sup>19</sup> Since about 1958, the owner had operated a tour boat company in the Gulf Coast area of the Everglades that was added to Everglades National Park in 1960. For the first few years, the National Park Service granted the company monthly or yearly permits to operate boat tours from the visitor center. At the time of the accident, the company was operating under a 10-year contract that expired in January 1992 but that the Park Service had extended. The concessions management plan attached to the contract required the company's tour boats to be properly documented. Federal regulations required the tour boats to be inspected by the Coast Guard, which the contract also stipulated. The management plan specified responsibilities for maintaining the building used by the tour boat company but not for maintaining the tour boats.

On January 1, 2003, the National Park Service renewed the concessionaire contract of Everglades National Park Boat Tours for 6 months, or until a new contract was awarded, to avoid interrupting visitor services in the park.<sup>20</sup> Under the National Parks Omnibus Management Act of 1998, the Park Service began soliciting new bids for concession contracts throughout the national park system. As of the date of this report, no company had been awarded the contract for boat tours in Everglades National Park.

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<sup>18</sup> National Oceanographic Data Center, Coastal Temperature Guide <[www.nodc.noaa.gov/dsdt/cwtg/egof.html](http://www.nodc.noaa.gov/dsdt/cwtg/egof.html)> (January 27, 2003).

<sup>19</sup> Concessionaires are private business contractors who provide various commercial services, such as food, lodging, and transportation, to visitors in the national park system. Each concessionaire signs a binding written agreement with the director of the National Park Service, which administers over 630 such contracts <[www.nps.gov/legacy/business](http://www.nps.gov/legacy/business)>. The park concessions are regulated under 36 CFR 51 and the National Park Service Concessions Management Improvement Act of 1998. The National Park Hospitality Association (the concessionaires' trade group) reports that concessions operate in about one-third of the 386 areas in the national park system <[http://www.nphassn.org/association/financial\\_impact.htm](http://www.nphassn.org/association/financial_impact.htm)>. In addition to national parks such as Everglades, the park system includes national monuments, national preserves, national historic sites, national seashores, national lakeshores, national recreation areas, and other types of recreational, historic, or scientific sites.

<sup>20</sup> *Federal Register* Vol. 68, No. 78 (April 23, 2003), p. 20024.

**Day-to-Day Business.** Besides the *Panther*, the owner operated four other large tour boats, all of which had current Coast Guard COIs. He also had two small excursion craft, capable of carrying six people each, which did not require Coast Guard inspection. The length, maximum number of passengers, and crew requirements of each large tour boat are shown in table 2.

**Table 2.** Company's large tour boats

Boat	Length (feet)	Maximum Passengers	Required Crew
<i>Panther</i>	31	37	2*
<i>Panther II</i>	31	37	2*
<i>Skimmer</i>	31	30	2
<i>Manatee</i>	38.1	75	3*
<i>Manatee II</i>	55	104**	3
*COI allows reduced crew under certain circumstances. **On protected route, COI allows 136 passengers.			

The owner also rented canoes and kayaks and operated a small gift shop on the first floor of the Park Service ranger station. The owner, his two sons, his wife, two maintenance men, and three other employees conducted the day-to-day operations of the company. A VHF radio in the company office monitored channel 78, the communication channel used by all company boats.

Boat masters were hired seasonally and paid by the day, with no overtime or holiday pay and no vacations, according to the *Panther's* master on the day of the accident. The company's five large boats typically made four to five tours a day, ranging from 1 1/2 to 2 1/2 hours long. The tours covered the upper reaches of the Ten Thousand Islands area of Everglades National Park. The *Manatee II* provided the additional option of a sunset cruise into the Gulf of Mexico, about 6 1/2 miles from the visitor center. The boat masters were given the discretion to alter their voyages on the basis of local weather conditions.

The busy season for the company was usually from December until May. Company personnel told Safety Board investigators that the *Panther II* (sister vessel to the *Panther*) had been out of service during the month before the accident, being prepared for its next Coast Guard drydock examination. The examination was scheduled for December 30, according to the vessel's COI. Because the *Panther II* was out of service, the company was relying on the *Panther* and three other large boats to carry passengers at the beginning of its busy season.

### **Vessel Maintenance**

Everglades National Park Boat Tours employed two maintenance men. One of the maintenance men had worked for the company since 1977 on a seasonal schedule, coming from his home in Ohio every winter and returning in the spring after the high season. He had been service manager for a farm equipment firm in Ohio for 15 years, where he attended manufacturer-sponsored maintenance schools and worked with manufacturers' representatives on the equipment in the field. He had worked on vessel maintenance for 20

years, doing mostly minor repairs to engines and bilge pumps. At the time of the accident, he was working part time.

The other maintenance man had worked for the company since 1997, doing “everything”—cleaning boats, repairing boats, captaining boats. He told investigators that he had been around boats all his life, that he held a captain’s license to operate vessels of 25 gross tons, and that he had captained commercial crab boats.

One of the owner’s sons also regularly helped maintain the company’s boats. Both of the sons told Safety Board investigators that the company dry-docked its boats every year to have the sides and bottoms painted. One of the masters told investigators that bottom painting was done by a commercial boatyard. The sons said they would “get underneath there and . . . see if we’ve got any problems.” They said they would check the driveshaft structure, including the strut bearings and the supporting shoe under the strut. If the shoe was thin, they said, it would be replaced. They also said they replaced rotten wood, and generally made the boat “look pretty for the winter.”

Engine servicing was mainly a matter of maintaining fluid levels and changing the filters; neither of the sons recalled following any specific manufacturer’s instructions. The maintenance men normally checked the oil, the transmission, and the hoses in the morning before the boats left on tour, according to the sons. The masters did not check the boats for maintenance purposes or before getting under way with passengers. One of the maintenance men told Safety Board investigators that when boats malfunctioned or needed repairs, the masters would report the problem to the maintenance men, who would fix it. The wiring frequently needed repairing because of the saltwater, he said. He did not recall making any major repairs to the fiberglass on the *Panther*’s hull, except for sanding in spots. The owner of the company told Safety Board investigators that he did not maintain written maintenance and repair records for any of his boats.

## Meteorological Information

Data from the National Weather Service in Key West, Florida, show that at the time of the accident, the air temperature was about 75° F. The sky was mostly cloudy, with winds from the southeast at 15 mph and a visibility of 10 miles. Rainfall in the area totaled less than half an inch for the month of December 2002. Sunset was at 1744 on December 30.

## Toxicological Testing

If the sinking had been classified as a “serious marine incident,”<sup>21</sup> testing the master for drugs and alcohol would have been mandatory. In the case of other accidents,

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<sup>21</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.

the regulations allow law enforcement officers or employers to require testing whenever they have “reasonable cause.”<sup>22</sup> The Coast Guard advised the Safety Board that, after the accident, the Park Service law enforcement rangers contacted the Marine Safety Office in Miami to discuss toxicological testing of the master. The rangers reportedly advised the Marine Safety Office’s chief of investigations that the *Panther* master did not exhibit any behavior after the accident that appeared to warrant alcohol testing. None of the passengers reported any signs of alcohol use on the master’s part, and one passenger explicitly stated that the master “did not seem to be intoxicated at all.” The rangers and the Coast Guard official mutually agreed that the master should not be required to provide samples to be analyzed for alcohol.

The master submitted a urine specimen for a postaccident drug screen on December 31, 2002. The laboratory report does not indicate at what time the specimen was submitted. The results were negative.

## Survival Aspects

### *Lifesaving Equipment*

The *Panther* had lifesaving equipment on board for 39 people. The equipment included the following:

Adult lifejackets	39
Child lifejackets	4
Ring buoys	1 (light and line attached)

The lifejackets were stowed in labeled lockers under the boat’s seats, except for the bench seat in the stern. Passengers’ lifejackets were located in the seat in front of them (see figure 7), or in the case of the two small forward seats, under the bow bulwark. Access to the lifejackets was through openings in the backs of the seats, protected by covers with two barrel-bolt latches at the bottom, one on each side, and hinges at the top. To retrieve their lifejackets, passengers would have had to unlatch the bolts and swing the covers toward themselves; to open the covers completely, passengers would have had to lift their feet out of the way.<sup>23</sup> The company’s owner said that the Coast Guard marine inspectors had advised him to install the covers. However, the Coast Guard could find no indication of “any deficiency in our inspection reports requiring that installation,” and the owner could not document his statement.

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<sup>22</sup> According to 33 CFR 95.035, reasonable cause exists when an individual is directly involved in a marine casualty, defined as any incident that results in material damage affecting the efficiency of a vessel.

<sup>23</sup> According to 46 CFR 180.78, “life jackets must be stored in convenient places distributed throughout accommodation spaces,” and “each stowage container for life jackets must not be capable of being locked. If practicable, the container must be designed to allow the life jackets to float free.” Further, “each life jacket kept in a stowage container must be readily available.”



**Figure 7** Lifejacket locker on *Panther*.

The *Panther*'s 33 passengers ranged in age from 10 to 85. Five of the passengers were 17 or under, and two of those could not swim. Three of the adult passengers were also nonswimmers. None of the passengers was able to don a lifejacket before the *Panther* sank. The passengers told investigators that the master gave them no instructions about donning lifejackets and did not tell them to prepare to abandon ship.

The master told Safety Board investigators that when the *Panther* started sinking, the passengers could not see or reach the latches to the lifejacket lockers because the lockers were underwater. One passenger reported that she dived into the water, but the poor visibility (less than 1 foot) hampered her from finding the latches on the lockers, though she finally managed to retrieve a lifejacket and hand it to one of the nonswimming passengers who was hanging onto the *Panther*'s bow rail. None of the lifejackets floated free after the accident.

### **Firefighting Equipment**

The *Panther*'s firefighting equipment consisted of three fire extinguishers (1 class B-I and 2 class B-II<sup>24</sup>) and a fixed, 10-pound-capacity halon fire-extinguishing system protecting the engine compartment.

<sup>24</sup> Class B extinguishers are for fires involving flammable liquid, grease, or gas. B-I extinguishers hold 2.5 pounds of dry chemical; B-II extinguishers, 10 pounds of dry chemical.

### **Communication Devices**

A VHF-FM radiotelephone and public address system, wired together, were mounted in the *Panther's* steering console. A small door gave access to the equipment. The 12-volt battery that powered the radiotelephone and public address system were housed below deck, on the engine's port side. The same microphone was used for both systems. The master carried a portable VHF-FM radio in his personal effects as backup, but he said that he always kept it turned off. He told investigators that he did not have time to retrieve his radio during the sinking.

## **Tests and Research**

### **High-Level Bilge Alarm**

Safety Board investigators removed the Cole Hersee 4112 series high-level bilge alarm from the *Panther* and shipped it to the Board's Materials Laboratory for examination. The laboratory found a heavily corroded screw and cable connector on one of the alarm's terminals. The manufacturer's specification sheet for the 4112 series of alarms stated that it operated on 12 volts d.c. A suitable supply was connected to the terminals of the alarm and the circuit was switched on. The alarm light illuminated and the buzzer sounded, indicating that the alarm was functioning.

### **Bilge Pump**

One of the tour boat company's mechanics removed the *Panther's* starboard bilge pump and gave it to Safety Board investigators, who shipped it to the Board's Materials Laboratory for testing. The laboratory found that the pump's impeller rotated freely in its housing and that the housing contained no debris or projections to impede water flow. When the pump was tested by applying power to the conductors in the electrical cord at the top of the pump, the pump did not operate. The laboratory removed the upper cap to reveal the printed circuit board that controlled the pump. All three electrical conductors in the electrical cord were firmly attached to the circuit board. Two other conductors also attached to the circuit board continued into the pump body. When a power supply was connected to those conductors, the pump motor operated. The impeller continued to spin, as if the pump switch were on the manual setting (that is, set for continuous pumping).

Examination of the surface of the circuit board showed that it was dry and showed no signs of immersion. Rule, the pump's manufacturer, was contacted but could not supply a formal testing procedure for the printed circuit board.

### **Wooden Support Block and Spacers**

The wooden support block and the two wooden spacers from the *Panther* were sent to the Safety Board's Materials Laboratory for analysis, then forwarded to the USDA Forest Products Laboratory, which confirmed that all three pieces were affected by brown rot decay. Decay occurs when wood is moist or alternately wet and dry. The Materials Laboratory



concluded that “decay to [the observed] extent probably occurred over a number of years.” The lightest decay was found on the lower spacer, which was made of bald cypress, a wood that is naturally resistant to decay. The upper spacer and the support block were more severely decayed, to the extent that the woods composing the plywood spacer could not be identified. The wood in the support block was identified as southern yellow pine.

In analyzing the support block and spacers, the Materials Laboratory found evidence of “temporary repairs over the years as the decay was progressing.” The evidence included hard plastic material used to fill holes and edges, elastomeric materials (materials resembling rubber) used to fill gaps and holes, and paint covering the fill material.

## Other Information

### ***Enforcement Jurisdiction***

Designated National Park Service rangers have the responsibility for maintaining law and order in the waters of Everglades National Park, allowing them to enforce any Federal law or regulation inside the park.<sup>25</sup> The National Park Service signed a memorandum of understanding with the Coast Guard and the Florida Fish and Wildlife Conservation Commission granting concurrent jurisdiction to those agencies for enforcing laws and regulations in the park.

### ***Actions Taken Since the Accident***

**Coast Guard.** As a result of its investigation of a previous accident in the Coast Guard’s Miami district involving the small passenger vessel *Bayside Blaster*,<sup>26</sup> the Safety Board issued the following Safety Recommendation to the Coast Guard on December 30, 2002:

M-02-28

Evaluate the adequacy of the marine safety inspection program in the Miami area to ensure that small passenger vessels are in compliance with applicable regulations, including the requirements for lifejacket stowage, navigation lights, and manning.

On May 9, 2003, the Coast Guard replied that it concurred with the recommendation and that it had provided its marine inspectors with additional training related to the recommendation. Further, the Coast Guard said it would “continue to verify compliance with the relevant regulations during scheduled inspections and other

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<sup>25</sup> As authorized by Title 16 United States Code chapter I, subchapter 1, section 1a-6, “Law enforcement personnel within National Park System.”

<sup>26</sup> National Transportation Safety Board, *Collision Between the U.S. Coast Guard Patrol Boat CG242513 and the U.S. Small Passenger Vessel Bayside Blaster, Biscayne Bay, Florida, January 12, 2002*, Marine Accident Report NTSB/MAR-02/05 (Washington, DC: NTSB, 2003).

boardings.” The Safety Board classified Safety Recommendation M-02-28 “Closed—Acceptable Action” on November 21, 2003.

After the *Panther* accident, the Coast Guard informed the Safety Board that it had increased unannounced spot checks of small passenger vessels operating in and around Everglades National Park. An example is a joint operation conducted in August 2003 by the Coast Guard’s Marine Safety Office in Miami, Coast Guard Station Ft. Myers, the Park Service, and the Collier County Sheriff’s Department. During the operation, 21 small passenger vessels near Everglades City were boarded and five trips were terminated because of safety issues. Three Coast Guard–documented small passenger vessels were also boarded at the dock. Two of the vessels had their COIs canceled and were required to undergo complete reinspections because of safety deficiencies.

**National Park Service.** Within 2 weeks of the *Panther* accident, the Park Service withdrew its prospectus for the tour boat concession at Everglades National Park “to consider safety issues related to park concession tour boat operations.” A revised prospectus was issued later in the year, which included explicit requirements for vessel maintenance. Specifically, successful bidders for the tour boat concession will be required to put in place a computerized preventive maintenance program to track scheduled and nonscheduled maintenance items “with the intention of providing the safest and most dependable service possible.” The concessionaire will also be required to maintain a computerized fleet management program that includes, among several items, all preventive maintenance inspection reports, daily vessel inspection reports, and equipment breakdown logs. Further, the concessionaire’s vessels must have a drydock survey at least once a year, conducted off site by the Coast Guard or an accredited marine surveyor.

In the bidder qualification section of the prospectus, questions were added asking bidders to describe their experience in operating an effective preventive maintenance program. Bidders were also asked to indicate how they proposed to ensure that operations would be conducted safely, including the kind of safety training staff would receive.

**Safety Board.** While investigating the *Panther* sinking, the Safety Board learned that Everglades National Boat Tours frequently transported large groups of children on its vessels—for example, during school tours of the Ten Thousand Islands area—but that the tour boats did not always have enough child-size lifejackets for every child on board, as required by 46 CFR 117.71 and 180.71.<sup>27</sup> Out of concern that the same situation might exist in other parts of the national park system and to address the issue immediately, in April 2003, the Safety Board issued the following advance Safety Recommendation to the National Park Service:

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<sup>27</sup> The regulations state: “An adult life jacket must be provided for each person carried on board a vessel . . . . In addition, a number of child-size life jackets equal to at least 10 percent of the number of persons permitted on board must be provided, or such greater number as necessary to provide a life jacket for each person being carried that is smaller than the lower size limit of the adult life jackets provided to meet this section.”

M-03-1

Establish oversight procedures to verify, on a regular basis, that tour boat concessionaires who operate in the national park system carry an appropriately sized lifejacket for every child on board.

On July 25, 2003, the Park Service responded that it concurred with Safety Recommendation M-03-1 and that it had directed its regional directors to establish procedures and to task personnel with carrying out the recommendation. The Park Service also asked the directors to convey information about the Federal requirements for child-size lifejackets on small passenger vessels to concessionaires in their regions who operate tour boats. The Safety Board has classified Safety Recommendation M-03-1 as “Open—Acceptable Response.”

***Passenger Vessel Association***

The Passenger Vessel Association (PVA) serves the interests and concerns of more than 350 vessel owners and operators in the domestic passenger vessel industry, which represents about 65 percent of the industry nationwide. Association members operate more than 1,100 passenger vessels in the United States, carrying up to 200 million passengers annually. PVA members offer services including dinner cruises, tour and excursion services, car and passenger ferries, private charters, whale-watching trips, overnight cruises, and riverboat gaming. At the time of the *Panther* sinking, Everglades National Park Boat Tours was not a PVA member company.

The PVA has a safety and loss-control committee responsible for reviewing, developing, and implementing programs to encourage enhanced training and safety among its members. The programs are designed to improve the loss record for the industry. The PVA has published risk management and training manuals to help its member companies improve the safety of their passenger vessel operations. The risk management manual includes a safety audit guide that contains inspection checklists for identifying hazardous conditions that could lead to slips, trips, falls, and other injuries to passengers or crewmembers. The manual contains the information that engineroom safety and deck equipment inspection logs are useful for conducting proper maintenance, but does not contain any guidance for developing and implementing preventive maintenance programs for systems that affect the safe operation of a vessel. The association also publishes maintenance checklists on its website ([www.passengervessel.com](http://www.passengervessel.com)).

# Analysis

## General

The analysis first identifies factors that can be readily eliminated as causal or contributory to the accident. The report then discusses the sinking of the *Panther*, followed by a discussion of the major safety issues discussed in the report: the adequacy of company operations, the adequacy of the company's preventive maintenance program, and lifejacket stowage.

## Exclusions

Data from the National Weather Service in Key West, Florida, show that at the time of the accident, the weather was mild, with light to moderate winds and good visibility. The vessel was operating in protected waters that had no significant wave development. In addition, the *Panther's* main engine operated throughout the accident voyage without difficulty and had no effect on the flooding of the vessel. Consequently, the Safety Board concludes that the weather and sea conditions and the condition of the vessel's engine were not factors in this accident.

The master was a normally healthy individual who was not taking any prescription or nonprescription medications at the time of the accident. Further, the master reported that he was well rested in the 72 hours preceding the accident and had worked only about 5 hours up to the time of the sinking. The National Park Service enforcement rangers, trained law enforcement officers who interacted directly with the master after the sinking, stated that the master did not exhibit any obvious signs of alcohol use when they interviewed him after the accident and decided with the Coast Guard that there was no need to subject him to an alcohol test.<sup>28</sup> Further, none of the passengers reported that the master showed any signs of alcohol use.

The Safety Board considers improving postaccident drug and alcohol testing in the marine industry so important that it has placed the issue on its "Most Wanted" list of transportation safety improvements. The "Most Wanted" list is intended to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. While the Safety Board cannot definitively rule out alcohol use by the master because he was not tested, the circumstantial evidence indicates that he was not under the influence of alcohol on the day of the accident. The master underwent a postaccident drug screening the day after the accident, with negative results. Consequently, the Safety Board concludes that none of the following were factors in this

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<sup>28</sup> Under Federal regulations, both drug and alcohol testing would have been mandatory if the accident had resulted in death.

accident: the master's health, the use of prescription or nonprescription medications, fatigue, alcohol, or illicit drugs.

## The Sinking

The *Panther*, with 33 passengers and one master on board, sank while on a tour of the Ten Thousand Islands area of Everglades National Park. The vessel was on its third tour of the day; the two previous tours had been completed without incident. Some passengers on the accident trip noted that the *Panther* had a low freeboard and that the bilge pumps were working even before they boarded. During the trip, the master took the *Panther* through its accustomed maneuvers, designed to attract dolphins to the boat's wake. Near the halfway point of the tour, in Indian Key Pass about 3 1/2 miles from the National Park Service visitor center, the master stopped the boat because he noticed water spilling over the sides of the boat. Shortly thereafter, the *Panther* suddenly sank. A nearby crab boat rescued many of the passengers, but a few were left in the water. The rest of the passengers were rescued by a passing recreational boat and a Park Service ranger boat that was on patrol in the area. One passenger suffered a serious injury. None of the passengers was able to retrieve or don a lifejacket before the *Panther* sank.

To determine the probable cause of the sinking, the Safety Board investigated the *Panther's* recent history, examined the integrity of the vessel's hull, and interviewed company representatives and passengers.

## Vessel History

In early December, one of the company's masters reported that he had run the *Panther* aground during a passenger tour. The grounding was reported to the company's owner, who had to send another boat to return the passengers to shore and to retrieve the *Panther*. After the grounding, the owner's sons and the company maintenance workers found that the vessel had grounded hard enough to clog the cooling water intake (sea strainer) with sand and shells from the bottom of the bay. The vessel was not taken out of the water after the grounding for a thorough examination. Nor was the grounding reported to the Coast Guard, as required by Federal regulations (46 CFR 4.05-1). In their examination of the *Panther* after it sank, Safety Board investigators discovered a C-shaped fracture in the hull at the propeller strut connection and a displaced stringer near the centerline.

The master's description of the grounding, as well as the report of the sand and shells that clogged the engine coolant intake, indicates that the impact with the sea bottom was more than incidental and could have been substantial enough to damage the hull. The master stated that after the December grounding, he and another master noticed that the handling characteristics of the *Panther* had changed. A change in the vessel's handling characteristics could indicate propeller damage or damage to the propeller's supporting bracket, or strut. Any grounding that was severe enough to cause the handling characteristics of a vessel to change was severe enough to justify hauling the vessel out of the water to examine it closely for damage.

Touching bottom, or grounding, in soft mud was common for the tour boats, according to both masters and owner. The masters were given considerable leeway in the routes they followed. For example, on the day of the grounding in early December, the master told investigators he had gone outside the dredged channel to show tourists a particular bird. On either side of the channel are hundreds of low-lying mangrove islands, surrounded by water less than a foot to only a few feet deep. The owner's sons said that they repeatedly told the masters to stay in the channel, but that the boats ran aground "every day." Repeated admonitions clearly were ineffective in preventing the masters from operating their vessels outside the dredged channel, where they were susceptible to grounding in the shallow waters around the mangrove islands. Therefore, the Safety Board concludes that the owner was aware that his masters frequently took their vessels where they were susceptible to grounding, but the owner failed to prevent this practice.

In mid-December, the same master who grounded the vessel in early December returned to the marina with a full load of passengers. During the voyage, he noticed what he thought was significantly less freeboard than usual. The master believed that the vessel's bilge pumps were not operating properly and reported the problem to the two company maintenance men. According to the master, the maintenance men told him that all the bilge pumps were operating properly. Neither maintenance man made any attempt to determine the cause of the reduced freeboard. Low freeboard was an obvious indication that the vessel was taking on water that was accumulating in the bilges. Servicing or checking the bilge pumps, as the mechanics did on receiving a report of the problem, would not have stopped the ingress of water. The proper course of action would have been to identify the source of the flooding and to take remedial action to stop the leak, or to repair the problem. The master told investigators that another master had had a similar low-freeboard problem a few days afterward. It was, therefore, apparent that the problem persisted and that the masters and owner's representatives were aware of it.

The day before the *Panther* sank, another master was returning to the marina when the boat developed a significant starboard list. He notified the maintenance men of the condition. According to the owner's son, the list was caused by the master inadvertently shutting off the starboard bilge pump. If the vessel was taking on water in the starboard bilge area and the starboard bilge pump was not engaged, the weight of the flooding water in the starboard side of the vessel would explain why the vessel developed a starboard list.<sup>29</sup> Although activating the bilge pump to remove this water might have corrected the list, it would not have addressed the source of the water in the bilges.

Bilge pumps are intended for the purpose of removing incidental accumulations of water, such as rainwater. During the month before the sinking, the accident area received less than a half-inch of rainfall. The water in the *Panther's* bilges could not, therefore, have been attributable to rainfall. Thus, the incidents of low freeboard reported by the masters during December should have indicated that the vessel was taking on water and that its watertight integrity had been compromised. Yet after every incident, the masters

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<sup>29</sup> The bilge area on the starboard side of the tunnel was a space of about 34 cubic feet. With a cubic foot of water weighing 62 pounds, there was a potential for over 2,000 pounds of water in the starboard bilge.

and owner's representatives focused on the bilge pumps. That is, they attributed the problems to the bilge pumps either not working or not being turned on. Bilge pumps are not intended to compensate for a lack of watertight integrity and should not be relied on for that purpose. Therefore, the Safety Board concludes that the owner, maintenance men, and masters knew that the *Panther* was operating with a less-than-normal freeboard for about 2 weeks before the sinking and were aware that the vessel was continually taking on water but took no action to identify and eliminate the source; instead, they incorrectly relied on the bilge pumps to dewater the vessel, which placed the passengers at risk.

### **Hull Damage**

The incidents in mid-December and on December 29 should have alerted the owner and the maintenance men that the *Panther* was taking on unusual amounts of water in the bilges. The incidents should have prompted a comprehensive examination of the vessel that, if conducted, should have discovered the C-shaped fracture in the boat's bottom at the strut connection. The company had its own marine railway on site that could have been used at any time to haul the boat out of the water for a hull inspection.

After the sinking, the owner's sons and the company maintenance men towed the *Panther* back to the marina. To pump out the vessel and allow it to be towed, the bottom of the vessel beside the strut support plate had to be plugged to stop the ingress of water. Throughout the tow, one of the men had to apply pressure to the plugged area to prevent incoming water from pushing out the plug. At the postaccident examination of the hull, Safety Board investigators did not find any other damaged sections of the hull. That indicates that there could not have been any other source of water leakage than the damaged area at the boat's shaft.

To determine the cause of the sinking, the Safety Board investigators explored whether the damage to the hull occurred during the early December grounding or at the postaccident beaching. Before the vessel departed on the trip during which it sank, passengers reported hearing the bilge pumps cycling on and off and observing discharges of 3 or 4 gallons through the overboard bilge discharge lines. The *Panther*'s low freeboard and the discharging of water by the bilge pumps while still at the dock indicate that the vessel was taking on water before the vessel departed on the accident voyage.

Although the vessel exhibited signs of flooding at the dock, the master did not check the bilges before departing on the trip. Either the master did not notice the signs of flooding, or the signs had been present for some time and had become routine operating conditions that he ignored. In either case, the master did not act correctly. On boarding the vessel and before loading passengers, a competent and careful master would have quickly examined his vessel to ensure that it was safe to operate. Finding a problem as serious as flooded bilges would have prompted such a master to cancel the voyage. The Safety Board, therefore, concludes that had the master acted correctly by ensuring that his vessel was safe to operate, he would not have taken the *Panther* on the voyage during which it sank.

On two separate occasions with two different masters, the vessel returned to the marina with reduced freeboard or a starboard list, both of which indicate an excessive accumulation of water in the bilges. Because the only source of flooding found during the postaccident examination of the hull was the C-shaped fracture in the bottom of the boat, the fracture must have been present before the vessel left the marina on the day of the sinking. However, if the fracture had been present for a while before the accident, the Safety Board had to consider why the vessel did not sink earlier than it did.

One possible explanation is that the fracture in the bottom of the boat was small in the beginning but became larger over time as the vessel was operated aggressively. As the fracture enlarged, the flooding rate would have increased until it exceeded the capacity of the bilge pumps, making the vessel vulnerable to sinking. The investigation of the accident revealed that the vessel was routinely operated in an aggressive manner. The masters regularly moved passengers aft and ran the boat at full speed over its own wake to prompt dolphins to jump out of the water for the passengers' enjoyment. Such operations would have caused the bottom of the boat to slam as it crossed its wake. The resulting flexing of the bottom could have caused the fracture to gradually enlarge until the flooding rate reached a critical level.

Safety Board investigators estimated that the fracture in the *Panther's* bottom would have permitted the vessel to flood at a rate of approximately 135 gallons a minute, or 8,100 gallons an hour.<sup>30</sup> That flooding rate would easily have overwhelmed the bilge pumps' capacity. The maximum pumping rate of the three bilge pumps together (two rated at 1,500 gallons per hour and one at 2,000 gallons per hour) would have been 5,000 gallons an hour. The actual pumping rate would have been lower, especially if all three pumps shared a common, small-diameter discharge line, as described to Safety Board investigators. The Safety Board, therefore, concludes that the grounding in early December 2002 caused a fracture in the *Panther's* hull at the strut connection that eventually sank the vessel.

On the morning of the accident, one of the company's maintenance men replaced the wiring to the starboard bilge pump. He said he tested the pumps and that they were operating properly. If the starboard bilge pump was not operating on the day of the accident, however, the vessel's capacity to pump water out of the bilges would not have been more than 3,500 gallons per hour.

Safety Board investigators had the *Panther's* starboard bilge pump shipped to the Board's Materials Laboratory for testing. The tests found that the pump did not work with the leads connected to the printed circuit board, but that when the leads were placed directly on the motor, the pump began operating. The Safety Board could obtain no diagnostic tests for the printed circuit board, and could not determine whether the circuit board problem originated before the accident or after the vessel sank. Therefore, the

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<sup>30</sup> The Safety Board's estimate of the flooding rate assumed an area of approximately 5 square inches for the fracture; a head, or distance from the fracture to the water surface, of 2 feet; and a flow efficiency factor of 0.75 (optimal flow efficiency would be 1.0, but the irregular nature of the fracture would have slowed the flow of water through it).



Safety Board cannot determine whether the *Panther*'s starboard bilge pump was operating at the time of the accident.

Based on passenger statements that the *Panther*'s freeboard was noticeably low and that its bilge pumps were cycling continuously when they boarded it at the marina, the vessel's bilges had already taken on water when the trip began. The added weight of this water would have made the boat ride lower, thereby reducing its freeboard. When the master, following normal procedures, directed the passengers to the stern and began operating the boat at full speed, the freeboard reduced even further, to the point where water began flooding onto the boat's deck through the freeing ports.<sup>31</sup> The master appeared to be unaware of the excessive water on the deck until he stopped the *Panther* shortly before it sank.

Although the master told investigators that during the voyage he was aware of "a bilge problem," he was apparently unaware of the severity of the problem of water in the *Panther*'s bilges and did not modify his standard way of operating the boat to attract dolphins for the benefit of tourists. The *Panther* had gone through the same maneuvers hundreds, if not thousands, of times during its 34 years of service, without accident, and had completed two previous trips the day of the sinking. Therefore, the Safety Board concludes that while the master's maneuvering of the *Panther* was in accordance with its normal operation and may have been acceptable if the vessel's hull had not been breached, his failure to notice that his vessel had a dangerously reduced freeboard and was taking on water through the freeing ports shows that he was inattentive to the safety of his passengers.

### **High-Level Bilge Alarm**

The master did not notice the flooding until it was too late for him to take effective action. The *Panther* was fitted with a high-level bilge alarm that should have warned the master that the vessel was flooding, but for some reason, the alarm did not prompt the master as intended. The master told investigators that he did not know the vessel had such a warning device. However, because the alarm was located on the steering console, it seems unlikely that the master would not have known of its existence.

The alarm was submerged when the *Panther* sank. Safety Board and Coast Guard investigators examined the alarm switch after the accident and found a disconnected wire at the console. Safety Board investigators removed the high-level bilge alarm from the *Panther* and shipped it to the Board's Materials Laboratory for examination.

The laboratory found a heavily corroded screw and cable connector on one of the alarm's terminals, but when a suitable supply was connected to the terminals of the alarm and the circuit was switched on, the alarm's light illuminated and the buzzer sounded, indicating that the alarm was functional. Investigators could not determine whether the alarm terminals were connected to a power source at the time of the accident. During the

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<sup>31</sup> As explained in the "Vessel Information" section, the freeing ports were openings at the *Panther*'s stern designed to allow water to run off the deck. Normally, the freeing ports were above water level.

weeks after the grounding, the ingress of water through the breach in the hull would have caused continuous flooding, making it likely that the high-level bilge alarm activated frequently and created a nuisance that led to the alarm's being disconnected. The Safety Board, therefore, concludes that it is likely that the *Panther's* high-level bilge alarm was not connected at the time of the accident.

## Preventive Maintenance Programs

### *Company*

Everglades National Park Boat Tours did not have a comprehensive preventive maintenance program, nor did it have any maintenance and repair policy. After the sinking, Safety Board investigators examined the interior of the *Panther* and found deterioration in the wooden support block and spacers under the steering assembly. The extent of the deterioration indicated to the Safety Board's Materials Laboratory that the damage had occurred over a number of years. The laboratory found evidence of temporary repairs, which indicates that the owner was aware of the deterioration. However, the repairs he made were improper, because rotten wood should be replaced. The Safety Board, therefore, concludes that the wood rot discovered during the postaccident examination of the *Panther* indicates that the owner failed to maintain the material condition of the vessel.

An effective maintenance and repair policy should include, as a minimum, a routine maintenance schedule, as well as actions to be taken in the event of a casualty, such as the *Panther's* early December grounding. After a grounding, in addition to reporting the incident to the Coast Guard, a vessel owner should perform a thorough hull inspection and assess whether a drydock inspection is necessary. The *Panther's* owner did not perform a thorough inspection after the grounding. To perform a thorough internal inspection of the *Panther*, the seats would have had to be removed to see the hull's structural members. To conduct a thorough inspection of the starboard stringer, the engine exhaust hose would have had to be removed. Neither action was taken.

The Safety Board's investigation of the *Panther* accident indicated serious deficiencies in the vessel's maintenance. The investigation revealed interior wood rot and raised questions regarding the operational status of the starboard bilge pump and the high-level bilge alarm, in addition to uncovering the hull damage that allowed the vessel to flood and ultimately sink. A maintenance and repair program should include, among other things, actions a company should take if flooding is indicated. Two separate incidents in December indicated that the *Panther* was flooding. The maintenance procedures after those incidents centered on bilge pump repair and not on finding and eliminating the source of the flooding.

If the owner could not identify the source of the flooding while the *Panther* was waterborne, the vessel should have been drydocked. As noted earlier, the company had an on-site marine railway and could have hauled the boat out of the water at any time. Such

an examination would have taken place if the company had reported the grounding to the Coast Guard, as required by Federal regulations. The Coast Guard would have required the underwater part of the hull to be examined before allowing the *Panther* to return to service. The Safety Board, therefore, concludes that had Everglades National Park Boat Tours had a comprehensive maintenance and repair program in place that included, but was not limited to, drydocking the vessel after a grounding, and had the company followed such a program, the vessel would have been drydocked, the fracture in the bottom would have been discovered and repaired, and the accident would have been avoided.

### **National Park Service**

Everglades National Park Boat Tours was a concessionaire of the National Park Service, and was one of at least 30 private contractors that operate tour boat concessions in the national park system. At the time of this accident, the Park Service did not place any requirement on Everglades National Park Boat Tours or other concessionaires to demonstrate that they had and followed a comprehensive maintenance and repair program for their vessels. After the accident, the National Park Service inserted a provision in its request for proposals for the Gulf Coast tour boat concession at Everglades National Park, stipulating that the successful bidder must implement a computerized preventive maintenance program to track and schedule maintenance items. Bidders were also asked about their experience in operating effective preventive maintenance programs for their vessels, and how they proposed to ensure that their operations are conducted safely.<sup>32</sup>

In the Safety Board's opinion, if this action were extended to all tour boat concessions in the national park system, it would increase the safety of passenger vessels operating from National Park Service facilities. The Safety Board, therefore, believes that the National Park Service should require that concessionaire companies operating passenger vessels in its jurisdictions develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems.

Further, the National Park Service needs to ensure that such preventive maintenance programs adequately provide for public safety. The Safety Board, therefore, believes that the National Park Service should establish oversight procedures to verify, on a regular basis, that concessionaires who operate passenger vessels in the national park system have adequate preventive maintenance and safety programs.

### **Coast Guard**

Any action taken by the National Park Service would affect only contracting concessionaires and would not affect other small passenger vessel operators. Such operators must meet Coast Guard regulations, which contain requirements for vessel construction and arrangement, vessel stability, firefighting equipment, lifesaving

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<sup>32</sup> Other provisions include a requirement to maintain a computerized fleet management program and to conduct a yearly off-site drydock survey.

equipment, and vessel operations. The regulations do not require small passenger vessel owners to have preventive maintenance programs, which thus are not checked as part of Coast Guard vessel inspections.

The Safety Board addressed this issue in its investigation of the November 2000 fire on board the U.S. small passenger vessel *Port Imperial Manhattan*. In its report, the Safety Board stated<sup>33</sup>:

The Coast Guard does not have specific regulations requiring a preventive maintenance program for small passenger vessels. The Federal regulators of other transportation modes recognize the importance of preventive maintenance to the safety of operations and require that operators have a systematic program for performing inspections and maintenance. The Federal Aviation Administration has promulgated for all airplane operators comprehensive maintenance requirements, which include provisions for inspections, repairs, and preventive maintenance. The Federal Motor Carrier Safety Administration requires that every motor carrier systematically inspect, repair, and maintain, or cause to be systematically inspected, repaired, and maintained, all motor vehicles subject to its control. In addition, the Federal Railroad Administration has extensive inspection and maintenance requirements for locomotives, train cars, crossing signals, and tracks.

Because no authority other than the Coast Guard exercises oversight over domestic small passenger vessels, the Safety Board believes that the Coast Guard should require that companies operating domestic passenger vessels develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and the mechanical and electrical systems.

Consequently, on July 3, 2002, the Safety Board issued the following Safety Recommendation to the Coast Guard:

M-02-5

Require that companies operating domestic passenger vessels develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems.

In response to Safety Recommendation M-02-5, the Coast Guard Commandant stated on November 21, 2003:

We do not concur with this recommendation. Small passenger vessels are subject to a comprehensive set of regulations that are designed to promote vessel safety. The operators of these vessels are responsible for maintaining the vessel in compliance with all applicable regulations at all times. Additionally, the Coast

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<sup>33</sup> National Transportation Safety Board, *Fire On Board the Small Passenger Vessel Port Imperial Manhattan, Hudson River, New York, New York, November 17, 2000*, Marine Accident Report NTSB/MAR-02/02 (Washington, DC: NTSB, 2002), pp. 27-28.

Guard allows vessel operators to participate in the Streamlined Inspection Program<sup>34</sup> (SIP) that enables the owners to more effectively manage the oversight of inspection requirements. We believe that the recommended requirements would be unnecessarily burdensome and duplicative of existing requirements. We intend to take no further action on this recommendation and request that it be closed.

While in general agreement with the Coast Guard that small passenger vessels are subject to “a comprehensive set of regulations,” the Safety Board does not believe that the regulations are as comprehensive as they ought to be because they do not address vessel maintenance and contain no maintenance oversight requirements. The Coast Guard response states that vessel operators are “responsible for maintaining the vessel in compliance with all applicable regulations at all times.” However, those regulations do not address preventive or periodic maintenance of a vessel or its critical systems. It is, therefore, difficult to understand how the recommended action could be considered “duplicative of existing requirements.”

Preventive or periodic maintenance programs should be an integral part of any well-run vessel operation. A requirement to develop and implement such programs should not be “burdensome” to vessel operators who already have them in place. Only substandard operators would not have such programs in place. Without an ongoing preventive maintenance program, substandard operators can continue to operate substandard vessels and in so doing, place the public at risk.

The Commandant’s reply states that the Coast Guard’s participation in the SIP “enables the [vessel] owners to more effectively manage the oversight of inspection requirements.” Under the SIP, the vessel owner or operator works with a Coast Guard representative to develop a company action plan and a vessel action plan. The development and approval procedures for those plans (46 CFR 8.530) specifically require a description of the company’s safety program, environmental protection program, and training infrastructure, but they do not require a description of the company’s preventive maintenance program. Although it is not clear how participation in the SIP will ensure that proper preventive maintenance is carried out on critical vessel systems, the outcome of the overall program could offer an equivalent level of safety for participants. However, according to the Coast Guard, only 29 small passenger vessels had enrolled in the SIP as of October 2003 (representing 0.29 percent of the 10,125 small passenger vessels the Coast Guard inspects). The Safety Board plans to meet with the Coast Guard to discuss its response in more detail.

### ***Passenger Vessel Association***

Although the PVA does not encompass the entire domestic small passenger vessel fleet, its members represent a large enough part of the industry (65 percent) that safety improvements enacted by the PVA can significantly improve the level of small passenger

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<sup>34</sup> The SIP is a program set up by the Coast Guard that allows certain vessel operators to inspect their own vessels. Because the owner of the *Panther* was not operating under the SIP, the program is not an issue in this accident.

vessel safety. The PVA has published both a risk management manual that includes checklists for inspecting vessels for hazardous conditions and a training manual for instructing deckhands in engine room safety and other areas; it also publishes checklists for preventive maintenance on its website. However, those materials do not give companies adequate guidance for establishing preventive maintenance programs. The Safety Board discussed this issue in its report on the November 2000 *Port Imperial Manhattan* fire<sup>35</sup>:

While the PVA's voluntary guidelines cover several areas of passenger and vessel safety, they do not provide adequate guidance to companies for establishing preventive maintenance programs for the hull and the machinery and electrical systems. In addition to operational checks, PVA guidelines should stress the importance of vessel maintenance and list machinery, electrical, and hull items that require periodic inspection and maintenance by a company's maintenance staff. The guidelines for preventive maintenance should describe, for example, procedures for reporting maintenance and repair needs, for ensuring good interaction between vessel-operating personnel and shoreside maintenance staff, for conducting vessel inspections and repairs, for verifying and testing repair work, for retaining and reviewing maintenance and repair records, and overseeing the maintenance and repair process for its fleet. Given the large number of passengers that are carried on small passenger vessels and ferries today and the commensurate safety risks, preventive maintenance should be performed on a regular basis.

Recognizing that rulemaking by the Coast Guard to require preventive maintenance programs on small passenger vessels would take time, the Safety Board issued the following Safety Recommendation to the PVA on July 3, 2002:

M-02-16

Provide your members with guidelines for developing a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and the mechanical and electrical systems.

In its response to Safety Recommendation M-02-16 on August 23, 2002, the PVA stated that it would review the Safety Board's accident report and recommendation during the association's Board of Directors Meeting and Safety and Security Committee meeting, both scheduled for October 2002. In followup correspondence, the Safety Board informed the PVA that it would appreciate receiving information regarding the outcome of those meetings and whether Safety Recommendation M-02-16 would be implemented. The recommendation was then classified "Open—Initial Response Received."

On January 20, 2004, the Safety Board received the PVA's response to Safety Recommendation M-02-16. The association's response is now under review.

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<sup>35</sup> NTSB/MAR-02/02, p. 28.

## Owner's Operational Practices

According to the terms of the *Panther's* COI, the vessel was required to carry a deckhand whenever the number of passengers exceeded 30. Thus, because 33 passengers were on board the day of the accident, the *Panther* should have carried a deckhand. The owner of the *Panther* stated that it was the master's responsibility to ensure that a deckhand was on board when necessary. But the master stated that he had never seen the COI and understood that a deckhand was not required.

In the Safety Board's opinion, the owner shares the responsibility to see that his vessels are properly manned in accordance with their COIs, and the owner cannot escape his responsibility by attempting to lay blame on the master. While the master cannot be excused for not knowing the manning requirements of his vessel, the owner should have had a program in place to ensure that his vessels were properly manned in accordance with their COIs. In this instance, he did not.

The deckhand provides a second set of eyes and ears as to what is going on board a vessel when it is under way. He can help monitor vessel conditions while the master is involved in operating the boat and, in the *Panther's* case, also narrating a tour. Had a deckhand been on the accident voyage, he might have noticed the flooding earlier, with the possible result that the master might have been able to take corrective action before the flooding became critical. A deckhand might also have been able to help passengers retrieve lifejackets from the sinking vessel (see below). Alternatively, with earlier warning, the master might have been able to return the vessel to the marina before it sank.

The lack of a deckhand had a detrimental impact on the safe operation of the *Panther*. That shortcoming was, however, only one in a series of safety deficiencies. The owner failed to report the *Panther's* early December grounding to the Coast Guard, as required; failed to pull the vessel out of the water for a thorough examination after the grounding; and failed to prevent his vessel masters from regularly operating outside the dredged channel, where they were in danger of grounding. Furthermore, the owner, maintenance men, and masters knew that the *Panther* was operating with low freeboard in the weeks before the accident, but they did not correct the problem. The masters were unaware that the vessels were equipped with high-level bilge alarms, and they repeatedly operated the *Panther* when it had an uncorrected flooding problem. It is likely that the high-level bilge alarm was not connected at the time of the accident, and it is uncertain whether the vessel's starboard bilge pump was operating. The wood rot discovered when the *Panther* was examined after the accident indicates the owner's failure to properly maintain his vessel. Any company, no matter how safe its operation, can experience occasional safety problems. But for Everglades National Park Boat Tours, the deficiencies were chronic. Considering all the deficiencies together, the Safety Board concludes that Everglades National Park Boat Tours operated its vessels in a substandard manner.

## Lifejacket Stowage

The *Panther* was properly equipped with lifejackets for its intended voyage. The lifejackets were stowed in lockers under 14 of the boat's 16 seats (not counting the bench seat at the stern). The lockers were fitted with covers that had two barrel-bolt latches at the bottom, one on each side, and a piano hinge at the top. To open the lockers to retrieve the lifejackets, passengers had to bend down and swing the locker cover toward themselves. However, the space between the seats and the lockers was where the passengers' feet and legs would be located and was insufficient to allow the cover to swing completely open, unless passengers lifted their legs onto the seat.

Such an arrangement made it awkward and difficult for passengers to retrieve lifejackets, especially if the boat had a full load of passengers. It is no wonder that none of the passengers on the *Panther* could retrieve a lifejacket before the vessel sank. The Safety Board, therefore, concludes that the lifejacket stowage arrangement on board the *Panther* prevented the passengers from retrieving lifejackets.

After the *Panther* accident, the owner had all the lifejacket locker covers removed from the vessel and from the other vessels in his fleet that had similar lifejacket stowage arrangements. The Safety Board is satisfied that removing the lids from the stowage lockers will permit lifejackets to be immediately available to passengers in the future and proposes no further action regarding this issue to Everglades National Park Boat Tours.

Lifejacket stowage was identified as a problem in two other accidents recently investigated by the Safety Board. As a result of its investigation of a fire aboard the small passenger vessel *Port Imperial Manhattan*,<sup>36</sup> the Safety Board issued the following Safety Recommendation to the Coast Guard on July 3, 2002:

### M-02-13

Issue a directive to small passenger vessel operators to review the distribution of lifejackets on board their vessels and to ensure that the lifejackets are accessible and segregated.

On November 19, 2002, the Coast Guard responded, stating that it "will issue a Safety Alert reminding small passenger vessel operators of the requirements and suggest that they review the stowage arrangements on their vessels to ensure compliance with the regulations." The safety alert was issued on December 12, 2003. Accordingly, Safety Recommendation M-02-13 is classified "Closed—Acceptable Action."

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<sup>36</sup> NTSB/MAR-02/02.



## Emergency Response

The first responders to the *Panther's* sinking were a commercial crab fishing boat (the *Red Rock*), a pleasure craft (the *Hoosier Daddy*), and a National Park Service boat operated by a park ranger, all of which happened to be operating in the area at the time of the sinking. The *Red Rock* was nearly alongside the *Panther* when it sank and was, therefore, immediately available to render assistance. Some of the *Panther's* passengers climbed directly onto the *Red Rock* from the *Panther* without even entering the water.

The happenstance that these vessels were all close to the *Panther* when it sank is probably the main reason the accident caused no fatalities or more than one serious injury. Five passengers on board the *Panther* could not swim. Had the first responding vessels not been in the immediate area when the *Panther* sank, especially if the *Panther* had sunk completely so that the nonswimmers had nothing to support them in the water, it is likely that the accident could have resulted in multiple fatalities.

The ebbing tidal current was estimated at 2 to 3 1/2 knots, and Safety Board investigators measured the water temperature at about 62° F 2 days after the accident. Since water temperatures do not change rapidly, it is reasonable to assume that the water temperature at the time of the sinking was approximately the same. Without timely rescue from the water, the strong ebbing current and the relatively cold water may have made survival problematic, even for the passengers who could swim, especially since they did not have lifejackets to support them in the water. The Safety Board, therefore, concludes that the timely arrival of other vessels to the scene of the *Panther* sinking prevented loss of life in this accident.

# Conclusions

## Findings

1. The weather and sea conditions and the condition of the vessel's engine were not factors in this accident.
2. None of the following were factors in this accident: the master's health, the use of prescription or nonprescription medications, fatigue, alcohol, or illicit drugs.
3. The owner was aware that his masters frequently took their vessels where they were susceptible to grounding, but the owner failed to prevent this practice.
4. The grounding in early December 2002 caused a fracture in the *Panther's* hull at the strut connection that eventually sank the vessel.
5. The owner, maintenance men, and masters knew that the *Panther* was operating with a less-than-normal freeboard for about 2 weeks before the sinking and were aware that the vessel was continually taking on water but took no action to identify and eliminate the source; instead, they incorrectly relied on the bilge pumps to dewater the vessel, which placed the passengers at risk.
6. Had the master acted correctly by ensuring that his vessel was safe to operate, he would not have taken the *Panther* on the voyage during which it sank.
7. The Safety Board cannot determine whether the *Panther's* starboard bilge pump was operating at the time of the accident.
8. It is likely that the *Panther's* high-level bilge alarm was not connected at the time of the accident.
9. While the master's maneuvering of the *Panther* was in accordance with its normal operation and may have been acceptable if the vessel's hull had not been breached, his failure to notice that his vessel had a dangerously reduced freeboard and was taking on water through the freeing ports shows that he was inattentive to the safety of his passengers.
10. The wood rot discovered during the postaccident examination of the *Panther* indicates that the owner failed to maintain the material condition of the vessel.
11. Had Everglades National Park Boat Tours had a comprehensive maintenance and repair program in place that included, but was not limited to, drydocking the vessel after a grounding, and had the company followed such a program, the vessel would have been drydocked, the fracture in the bottom would have been discovered and repaired, and the accident would have been avoided.

12. Everglades National Park Boat Tours operated its vessels in a substandard manner.
13. The lifejacket stowage arrangement on board the *Panther* prevented the passengers from retrieving lifejackets.
14. The timely arrival of other vessels to the scene of the *Panther* sinking prevented loss of life in this accident.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the *Panther*'s sinking was flooding through a hull breach, which resulted from an earlier grounding and which Everglades National Park Boat Tours neglected to address, instead choosing to operate the vessel with a known failure of watertight integrity and inappropriately relying on the bilge pumps to keep the vessel afloat, thus continually putting its passengers at risk.

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# Recommendations

## New Recommendations

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

### To the National Park Service:

Require that concessionaire companies operating passenger vessels in your jurisdictions develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems. (M-04-01)

Establish oversight procedures to verify, on a regular basis, that concessionaires who operate passenger vessels in the national park system have adequate preventive maintenance and safety programs. (M-04-02)

## Previously Issued Recommendation Resulting from This Accident Investigation

### To the National Park Service:

Establish oversight procedures to verify, on a regular basis, that tour boat concessionaires who operate in the national park system carry an appropriately sized lifejacket for every child on board. (M-03-1)

Safety Recommendation M-03-1 is discussed in the “Actions Taken Since the Accident” section of this report. The Safety Board has classified Safety Recommendation M-03-1 as “Open—Acceptable Response.”

## Previously Issued Recommendation Classified in This Report

### To the U.S. Coast Guard:

Issue a directive to small passenger vessel operators to review the distribution of lifejackets on board their vessels and to ensure that the lifejackets are accessible and segregated. (M-02-13)

Safety Recommendation M-02-13 (previously classified “Open—Acceptable Response”) is classified “Closed—Acceptable Action” in the “Lifejacket Stowage” section of this report.

## **BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

**Ellen Engleman Conners**  
Chairman

**Mark V. Rosenker**  
Vice Chairman

**Carol J. Carmody**  
Member

**Richard F. Healing**  
Member

**Adopted: March 9, 2004**

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**Member John J. Goglia** did not participate in the adoption of this report.



# Appendix A

## Investigation

The Safety Board learned of the *Panther* sinking at 0730 on December 31, 2002, when the Safety Board Communications Center discovered an Internet news item concerning the accident. A two-person investigative team arrived in Everglades City the next day (January 1, 2003) and began the investigation. The investigative team documented the damage to the *Panther* and interviewed company employees, National Park Service rangers, U.S. Coast Guard personnel, and passengers. The on-scene investigation was completed on January 12, 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 National Park Service, the U.S. Coast Guard, and Everglades National Park Boat Tours, the owner of the *Panther*.

