MARINE INVESTIGATION REPORT
M97F0027

GROUNDING

PASSENGER HYDROFOIL “KATRAN 4”
NORTH OF GRASSY ISLAND, DETROIT RIVER, U.S.A.
07 OCTOBER 1997

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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Summary

The "KATRAN 4" was proceeding down the Detroit River in the foil-borne mode. When the vessel reached Fighting Island, where the main shipping channel divides into two deep-water channels, there was indecisiveness as to which channel the vessel should take. The vessel's speed was not slackened and the "KATRAN 4" grounded in an area of shallow water between the two shipping channels. Those involved with the vessel's navigation had not been monitoring the vessel's progress and did not establish the vessel's position before the vessel ran out of the channel. There were no passengers on board at the time of the grounding.

Ce rapport est également disponible en français.

Other Factual Information

	"KATRAN 4"
Port of Registry	Panama
Flag	Panama
Official Number	25962-PEXT
Type	Passenger Hydrofoil
Gross Tons	145
Length	31.5 m
Draught	3.6 m in displacement mode 1 m in non-displacement (foil-borne) mode
Built	1995, Ukraine
Propulsion	Two MTU diesel engines (1700 brake horsepower each)
Manoeuvring characteristics	Full foil-borne speed: 35 knots Minimum foil-borne speed: 18 knots Full foil-borne speed to stop: 17 seconds over 120 m From stop to foil-borne mode: 50 seconds over 240 m Maximum helm - in displacement mode: 35° - in foil-borne mode: 10° (15° in emergency only)
Number of Crew	six persons were aboard at the time of the occurrence
Registered Owner	Canamac Cruises, Toronto

Description of the Vessel

There is evidence of the influence of aircraft design in the lay-out of the "KATRAN 4". The passenger cabin is fitted with aircraft-type seating and the interior of the navigating bridge bears a resemblance to an aeroplane cockpit. The bridge, which is located towards the forward end of the vessel, above the passenger cabin, allows a 360° view from the two control seats. Instrumentation related to the manoeuvring and navigation of the vessel is arrayed across the fore part of the bridge, below the windows. The seat on the port side is provided with an automobile-type steering wheel and the controls for vessel manoeuvring are accessible from the port seat. Immediately to the left of the seat are located the two VHF radiotelephones and below, to the left but slightly ahead, the radar display. The radar is not readily accessible to anyone other than the occupant of the port seat. The master normally occupies the port seat with the engineer occupying the seat on the starboard side. Behind the control seats is a

bench-type seat for the use of others on the bridge and which may also double as a chart table.
In the engine-room, upon commencing operations, two engineers, a chief and a second, initially monitor equipment and machinery performance during engine warm-up. Once this is achieved, under normal operating conditions, both engineers would leave the engine-room; the chief engineer would go to the bridge to continue monitoring the engine-room machinery via computer display and remote television camera.

History of the Voyage

At about 0900 on 07 October 1997, under clear skies and with good visibility, the "KATRAN 4" departed Dieppe dock, Windsor, Ontario, where she had taken on fuel, to proceed to Toronto, Ontario, via the Welland Canal, Ontario. This was a delivery/training trip prior to the completion of Canadian certification. On board the vessel were the master, the mate, a training master, two engineers, and a guest. With the exception of the two engineers, all those on board were on the bridge, the master in the port seat and the training master in the engineer's seat. The mate and the guest were seated on the bench seat. The mate was assigned the specific task of lookout and of monitoring the vessel's progress. The guest (who had a minor waters master's certificate) was assisting the mate. The chart in use was the recreational NOAA chart No. 14853 which is a series of chartlets to a larger scale than the single chart No. 14848 which covers the whole river. A conventional commercial vessel would require about 15 minutes to traverse the area covered by one chartlet; while the hydrofoil traversed four chartlets in the same time period. It was expected that the "KATRAN 4" would arrive at Port Colborne, Ontario, before nightfall, proceeding at the maximum speed of 35 knots. The speed limit in this section of the river is 10.4 knots. However, Sarnia Traffic (Vessel Traffic Centre) was aware that the vessel would proceed in the foil-borne mode either with respect to this passage or during the previous passage from Sarnia, Ontario, to Windsor.

After some publicity photographs had been taken off the dock at Windsor, the "KATRAN 4" set out on the passage. At this time, Sarnia Traffic called to ask the vessel to slow down on approaching a fuel dock because of the possible effect of the wake on a vessel fuelling there. As soon as they reduced speed, the training master became agitated and loudly expressed his objections to the master slowing down the vessel. The training master indicated that the "KATRAN 4" creates more wake in the displacement mode than when up on the foils. The master had been at the controls on the previous passage from Sarnia to Windsor when there was a minor conflict as to where the "KATRAN 4" was to be docked. The training master had taken control of the vessel, resulting in some bad feelings between them. The training master, who was Russian, had a very limited knowledge of the English language and compensated for this by using hand gestures and an occasional translation by one of the engineers, who were Bulgarian.

As the "KATRAN 4" approached the fork in the channel off Fighting Island North Light, the location of calling-in-point (CIP) No. 11, the vessel was proceeding in the middle of the main channel. The master questioned the guest with respect to the vessel's location, but the guest had not been monitoring the vessel's progress, and indicated this. The master then asked that the chart be given to the training master, after which he made a VHF radio call to Sarnia Traffic which lasted approximately one minute.
None of those on the bridge could provide the master with information on the vessel's position when he asked for it. The chartlets were flipped through belatedly, to find the appropriate chart. The training master maintained that he said to go left. However, the master, mate, and guest all heard his response as being "right." Between

them, the mate and guest agreed the vessel should go to starboard because they saw a number of buoys to the right and only distant flashing red lights to the left.

At this point, the master felt unsure of himself and reached for the engine controls, but he hesitated and continued on and commenced an alteration of course to starboard. In a very short time, estimated at less than one minute, seaweed could be seen lying flat on the surface and the master realized that the vessel was running into very shallow water. The depth sounder transponder is fitted on the underside of the hull and is not functional when the vessel is in the foil-borne mode. When he saw an outcrop of rocks, the master altered course to port by turning the rudder to the maximum allowable emergency 15 degrees but maintained full speed ahead for fear of allowing the vessel to settle off the foils. A few seconds later, there were the first indications of a grounding. A rumbling noise was heard from aft as the propellers and rear foil contacted the bottom. A few seconds later, the craft came to a complete stop, resting on the foils and struts approximately 500 m north of Grassy Island. The time was 0920 and the "KATRAN 4" had travelled approximately eight miles from the dock in Windsor at which she had fuelled.

The vessel was refloated using barges and a crane, and it was found that damage to the "KATRAN 4" had been confined to the vessel's propellers, propeller shafts, foils and struts. There was some cracking at the junction of the rudder blade to the stock and the aluminum blade was distorted about two inches to port. The only injury was sustained by the chief engineer who was passing through the engine room doorway at the time of running aground and bumped his head on the metal frame, receiving a minor head injury, which did not require hospitalization or stitches.

Monitoring the Vessel's Progress

The master indicated that he had not been monitoring the radar or attempting to relate shore objects to the chart. He indicated that, because of the speed at which they were moving, he had to concentrate on what was immediately ahead to avoid possible obstructions in the water. According to the master, the radar was set on either the 1.5-mile or 3-mile range setting, but he could not recollect which.

The mate and the assisting guest had not traversed the area before and, since leaving Windsor, no attempt had been made by them to relate shore features, such as navigating marks or lights, to the chart. Reportedly, they had confidence in the master's and training master's knowledge of the area. In the previous two years, the master and the training master had both traversed the St. Clair and Detroit River sections without incident on the "SUNRISE V", another company vessel. For this reason, the chartwork did not receive the attention it would normally receive, and the charts were only occasionally glanced at by the mate and by the guest. When the master asked for information with respect to the vessel's position, neither the mate nor the guest knew

whether the land mass to their left was the Canadian shore or Fighting Island. There had been no planning of courses, no familiarization with the route of the intended trip, and the running times between prominent navigation marks had not been pre-calculated.

Those on the bridge agreed that, at the speed at which the "KATRAN 4" was moving, it was difficult to determine the colouring of the buoys and to identify them.

Certification

The "KATRAN 4" was not operating at the time of this occurrence as a certified passenger vessel but had completed most of the certification process required to be so registered. It was being operated as a Panamanian-registered training vessel at the time of the occurrence.

The master held a Watchkeeping Mate certificate and a Minor Waters Master's certificate, qualifications which would not permit him to serve as master on the open lakes.

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The training master held a Russian Foreign Going Master's certificate and he functioned as an instruction master because he possessed the unique technical knowledge and experience required to operate the hydrofoils being introduced into Canada by the owners.

Analysis

Bridge Ergonomics

The master was concentrating on avoiding any obstacle in the vessel's path and was leaving monitoring of the vessel's progress to others, particularly the mate and the guest. However, the location of the radar set (below line of sight, forward, and to the master's left) meant that it was not easy for others, as part of the monitoring process, to view the screen or access the radar controls in the narrow space around the left side of the master's armchair seat.

Because both the steering wheel and the radar set are located to be convenient to the person occupying the port control seat, access to a radar display at another location in the wheelhouse would be required to allow the conning/steering function and the radar monitoring function to be allocated to different members of the bridge team when this is deemed expedient.

Similarly, because of the location of the VHF radiotelephone, it was not convenient for other personnel to take over some of the communication responsibilities and ease the burden on the multi-tasked role of the occupant of the port control seat.

Bridge Resource Management (BRM) and Situational Awareness

BRM involves the effective utilization of all available support to ensure the safe conduct of the vessel; in this case, as part of that endeavour, the mate, and the assisting guest, had been detailed to monitor the vessel's progress. Being aware of the vessel's position is a fundamental component of "situational awareness," which is basically defined as "knowing what is going on around you".[1] In electing to concentrate on avoiding possible hazards in the water, to the exclusion of monitoring the vessel's progress, the master limited the extent to which he could make a full appraisal of the vessel's situation at any given moment. Although the master was generally aware of the vessel's progress he was not familiar with the geographical surroundings. He needed input with respect to the ship channel configuration. This was not forthcoming at the time of the occurrence because there was no supervision of those delegated to monitor the vessel's position. They had been nominated to the task but there was no management of their efforts. The difficulty of navigating the vessel without effective BRM back-up was exacerbated by the high speed at which the vessel was travelling.

Personality Conflict

The master's action in reaching for the controls, after passing the course alteration point at Fighting Island North Light is consistent with his feeling some apprehension and doubt when he could not obtain information with respect to the vessel's position. Factors that may have influenced him to change his mind and not pull the throttle controls back include the following:

- The training master had criticized the master on numerous occasions in the past for slowing the vessel for other than docking manoeuvres.
- The master was less experienced in this type of vessel than the training master.
- Slowing the vessel to the displacement mode earlier that morning had provoked an outburst from the training master.
- Slowing the vessel to the displacement mode usually brought the engineers on to the bridge to question the reason for the speed reduction.

Findings

1. Despite the crew's limited experience in the area, no pre-planning of the trip or familiarization with the route had taken place prior to the departure from Windsor.

2. No effective monitoring of the vessel's position, either visually or by radar, took place to correlate the vessel's progress with the chart and critical time was lost searching for the proper chartlet at the alter

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1 Geiss-Alvarado Associates, *Human Error Accident Training,* U.S. Coast Guard training manual, July 1991.

course position.

3. There was no constructive BRM regime in place in that, although personnel were assigned to monitor the vessel's progress, their effectiveness was not supervised.

4. Occupied with his multi-task responsibilities, the master had not developed the full awareness of the vessel's situation necessary to make the required course alteration decision.

5. The layout of the bridge equipment and instrumentation was such that those assigned to monitor the vessel's progress could not easily use the radar to assist in their task and no one other than the master, as occupant of the port seat, could conveniently use the VHF radiotelephone.

6. The training master's previous critical reaction to the vessel's speed being reduced likely played a part in influencing the master to continue at high speed when there was indecision with respect to the required course alteration.

7. The mate and assisting guest did not monitor the vessel's progress because they incorrectly assumed that the master and training master's previous passage through the area had made them familiar with the route.

Causes and Contributing Factors

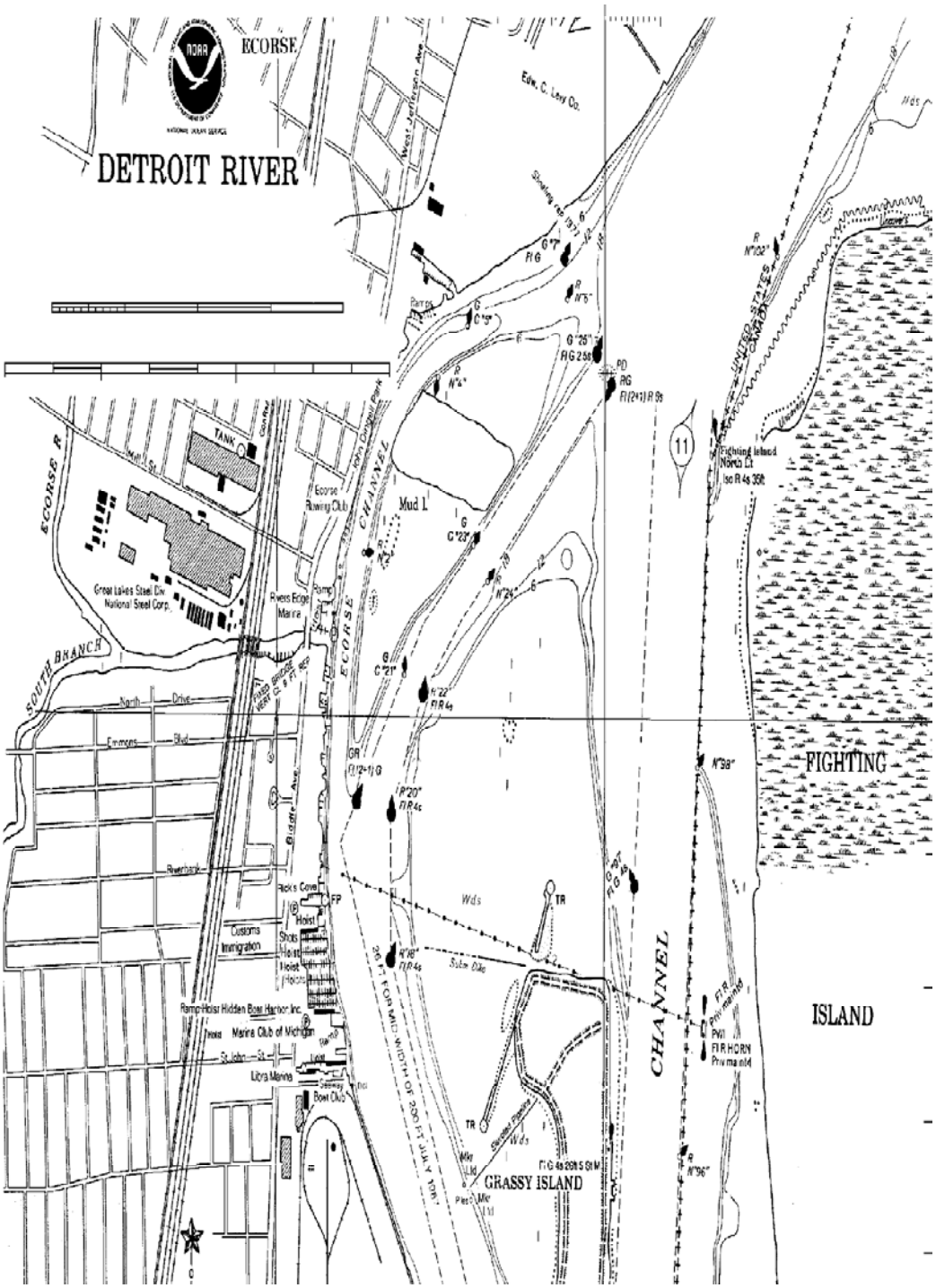
The "KATRAN 4" grounded while operating in the foil-borne mode because those in charge of monitoring of the vessel's progress could not determine her position and decide upon the necessary course alteration. Contributing factors in the occurrence were the lack of planning or route familiarization and, that with the master distracted by his multiple responsibilities, there was inadequate bridge resource management and situational awareness.

Safety Action Taken

After this occurrence, the owners developed training manuals for the operating crews of their hydrofoils. The new owners are developing, with the assistance of local Marine Safety staff, a training program which, using the manuals, will provide proper training for new mates and masters with respect to navigational conduct and requirements of bridge watchkeepers, including Bridge Resource Management, planning, and route familiarization.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 19 August 1999.

Appendix A - Sketch of Occurrence Area



Appendix B - Photographs