Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT

A04H0002

COLLISION WITH WATER

de HAVILLAND DHC-2 MK 1 C-GJST

GATINEAU, QUEBEC

14 JUNE 2004

Canada

Aviation Investigation Report

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Summary

The pilot and sole occupant of the DHC-2 seaplane, registration C-GJST, serial number 1368, was on his first flight of the season on the Ottawa River at Gatineau, Quebec. This training flight, conducted according to visual flight rules, was to consist of about 12 touch-and-go landings. The aircraft took off at approximately 1300 eastern daylight time, and made several upwind touch-and-go landings in a westerly direction. At approximately 1340 eastern daylight time, the aircraft was seen about 50 feet above the surface of the water proceeding downwind in an easterly direction, in a nose-down attitude of over 20 degrees. The right float then struck the water and the aircraft tumbled several times, breaking up on impact. Despite the waves and gusting wind on the river, some riverside residents who witnessed the accident attempted a rescue, but the aircraft sank before they could reach it. Even though the pilot was wearing a seat-belt, he sustained head injuries at impact and drowned.

Ce rapport est également disponible en français.

Other Factual Information

The pilot held a valid commercial pilot licence with a seaplane endorsement and instrument rating. The last entry in his pilot logbook indicates that, as of 10 October 2003, he had accumulated 1709 flying hours, including 1300 hours on seaplanes, more than 700 hours of those on two DHC-2 Beavers of which he was co-owner. He was considered by his peers to be a careful and conscientious pilot. Every year in early summer, since he had not flown a seaplane for several months, he made a solo training flight to perfect his skills. This flight consisted normally of about 12 touch-and-go landings. Based on the autopsy and toxicology testing, there was no evidence to indicate that the pilot's performance was degraded by physiological factors.

The regulations state that, to fly an aircraft as pilot-in-command, a pilot must have flown as pilot-in-command or co-pilot during the previous five years and passed a periodic training program within the previous 24 months. This pilot had made his last flight seven months previously and had renewed his instrument rating 19 months previously.

The Gatineau Airport Flight Service Station, located eight nautical miles west of the accident site, recorded the following weather conditions at 1800 Coordinated Universal Time (UTC), a few minutes after the accident: a few scattered clouds at 4500 feet and 25 000 feet above ground level (agl), visibility 15 statute miles, temperature 27°C, dew point 15°C, and winds from the west at 11 knots with gusts to 17 knots. On windy days like the day of this occurrence, the pilot sometimes used an adjoining bay to land. That way, he was more sheltered from the wind and waves.

The last flight entered in the aircraft journey log was on 12 November 2003, seven months earlier, when a pilot from the approved maintenance organization made a ferry flight after the annual inspection. The aircraft was then stored outside over the winter. In early June, the pilot tested the engine for 45 minutes to ensure that it was working properly. In the ensuing days, the aircraft was placed on the water, then on a dry dock, which kept the aircraft out of the water.

A few days before the occurrence flight, the aircraft was refuelled by the pilot from his private supply. Inspection of the refuelling system on the ground and a fuel sample taken from the system revealed no problems with the quality of the fuel. Examination of the aircraft's fuel system revealed that there was fuel on board at the time of the accident.

On the morning of the accident, the pilot appeared to be well rested. He went to the shop where he worked to assign tasks to his employees, then he planned some family activities for late that day. In the late morning, as he had been doing regularly for several years, he went to his chiropractor's for a treatment session before coming back for his flight, which he was looking forward to. The pilot did a pre-flight inspection before starting the engine and taking off in a westerly direction. He made some upwind touch-and-go landings in a westerly direction, as he was accustomed to doing. The aircraft was then observed about 50 feet above the river, two miles east of the place where the first landings were made (see Figure 1), with a tail wind and a nose-down attitude of over 20 degrees. A few feet above the surface, the aircraft banked slightly right and its nose-down attitude increased slightly. The impact with the surface of the river destroyed the aircraft, which sank within a few minutes.

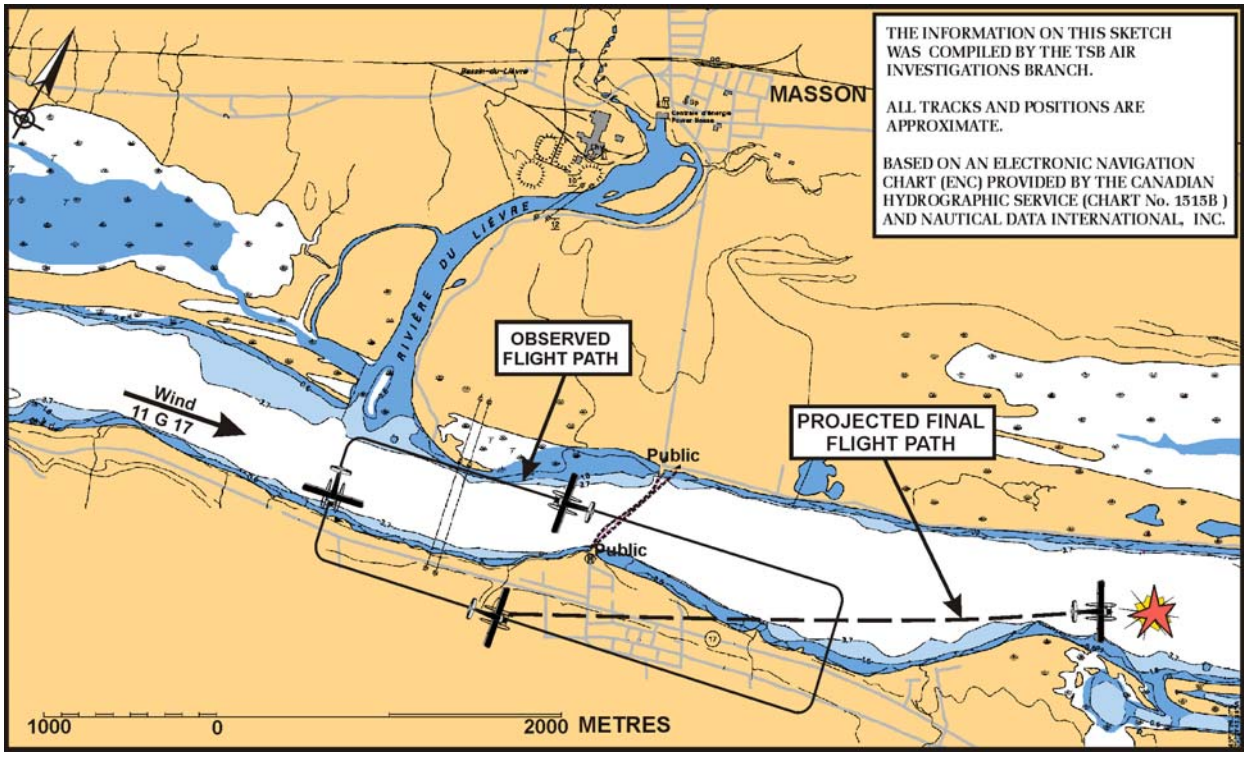

Figure 1. Aircraft flight path

The pilot was not in radio contact with air traffic services and no distress calls were received. The aircraft was equipped with a fixed, automatic emergency locator transmitter (ELT), but no distress signals were reported. Examination of the ELT in the TSB Engineering Laboratory indicated that it was probably emitting a distress signal after the impact, but once it was submerged, the water would have considerably reduced the range of the signal and it would not have been picked up. Shortly afterward, water entering the housing would have quickly caused a short circuit, neutralizing the ELT. Unless it is picked up by an aircraft flying over the accident area, a distress signal can take up to 90 minutes before being received by the SARSAT and COSPAS satellites currently in orbit.

Examination of the propeller and engine revealed that the engine was producing power at the time of impact. It was established that the weight of the aircraft was less than the maximum allowable weight and that the centre of gravity was within the prescribed limits.

Despite underwater visibility of less than two feet when the search for the wreckage was conducted, all flight control surfaces were found at the site, except the left elevator. Examination of the left elevator attachment flange indicated damages attributable to the impact. Examination of the fittings of the left wing strut, which was also missing, also indicated damages attributable to the impact. The flaps were in the retracted position at the time of impact; this was unlike the usual practice of this pilot, who always landed with flaps extended.

Examination of the aircraft technical logs indicated that the aircraft was maintained in accordance with *Canadian Aviation Regulations* (CARs) Rule 625, Appendices B and C. Accordingly, the aircraft was required to be inspected annually at intervals not exceeding 12 months. The last inspection of the aircraft was done on 04 November 2003 by the approved

maintenance organization that had been maintaining the aircraft for several years. In previous years, airworthiness directives were completed at the same time as the annual inspections and a follow-up of airworthiness directives was entered in the aircraft technical logs. Despite that follow-up, only 4 of the 10 airworthiness directives required at the time of the last inspection were completed and entered correctly as required by the CARs. The following six airworthiness directives were not entered as completed in the technical logs:

1. CF-98-38 – Bulkhead cracks at station 228 – To control cracking at station 228 and to prevent a loss of strength

2. CF-97-06 – Elevator tip ribs – To reduce the risk of flight control difficulties

3. CF-91-42 – Tailplane spar cracks – To prevent failure of the tailplane

4. CF-84-01R1 – Horizontal torque tube – To detect cracking and prevent failure of the horizontal torque tube

5. CF-80-25 – Elevator root rib – To detect elevator root rib cracks

6. CF-85-08R3 – Wing strut lower fitting – To prevent failure of the wing lift strut

It appears that the approved maintenance organization had completed five of those six airworthiness directives, but had not entered them in the technical logs. As for the sixth airworthiness directive (CF-85-08R3), that inspection had not been done.

The aircraft held a valid certificate of airworthiness, but it was not in effect at the time of the accident because of the six airworthiness directives that had not been entered in the technical logs. The owners of the aircraft were not aware that they were responsible for ensuring that the applicable airworthiness directives were completed. They thought that the approved maintenance organization would ensure that the aircraft was airworthy on each inspection.

Analysis

The investigation did not determine the reason why the aircraft struck the water. Several theories were examined to determine the most likely scenario, including the possibility that the pilot was suddenly incapacitated, a mechanical failure in the airframe, or engine failure.

Even if he was piloting mostly for pleasure, the pilot had accumulated considerable flying experience over the previous 14 years. However, his last previous flight had been over seven months before. This interval can cause a degradation of the pilot's skills and decision-making process. Although the pilot was in compliance with the regulatory requirements, his decision to make a flight after a seven-month hiatus, without making a training flight with an instructor, is questionable.

In training, the pilot was accustomed to using flaps for all take-offs and landings, a procedure that he had adopted. Also, he always landed into the wind. These two conditions help reduce the speed at which the aircraft touches the surface of the water, thereby reducing the landing

run. Compared with a wheeled aircraft landing on a runway, the reduction of the water landing speed of a seaplane in high winds is doubly important because the wind normally creates waves that make the initial contact with the water surface much more violent. An upwind approach reduces the initial impact, the length of the landing run and stresses on the aircraft structure. The crash site is in a very wide section of the river that provides no shelter from the elements.

It could not be determined why the aircraft:

- was two miles east of its original position;
- was in a section of the river that provided no protection from the elements;
- was approaching the surface of the water with a tail wind gusting to 17 knots;
- had the flaps retracted; and
- was in an excessive nose-down attitude of over 20 degrees.

All of these elements combined, which are unlike the usual practice and procedures followed by the pilot, do not seem to indicate that there was a loss of control during landing. They suggest that the aircraft was experiencing a mechanical problem or that the pilot was suffering from a sudden incapacitation. However, examination of the aircraft revealed no evidence of a pre-impact deficiency or engine or system malfunction. Since the risk of bird strike is high when flying over water at low altitude, it is possible that a bird strike occurred, causing a loss of control or sudden pilot incapacitation. No bird residue was found on the wings, propeller or on the pieces of windshield that were found, nor on the pilot; however, since the aircraft was submerged for a period of time, any bird residue might have been eliminated.

Although the pilot appeared to be in good health and the results of the autopsy and toxicology testing do not indicate that his performance was degraded by physiological factors, the possibility of a sudden incapacitation cannot be ruled out.

The aircraft sank so quickly that the signal emitted by the ELT did not have time to be picked up. In any event, the signal probably would not have been received due to the reduced range of the signal when an ELT is submerged, and the immediate damage to the circuits that water can cause.

The owners of the aircraft did not know that they were responsible for ensuring that the airworthiness directives applicable to their aircraft were completed. Notwithstanding Transport Canada's awareness campaigns, some owners mistakenly believe that an approved maintenance organization doing an annual inspection on their aircraft has to ensure that all applicable airworthiness directives are completed before the aircraft is put back in service. In the case of the occurrence aircraft, the fact that a pilot from the approved maintenance organization made a ferry flight after the annual inspection would only have reinforced the impression that the aircraft was airworthy.

There was no evidence that an emergency situation existed or that the aircraft was experiencing problems prior to impact. However, since six airworthiness directives had not been entered in the technical logs at the time of the last inspection, an examination of the components affected by these airworthiness directives was carried out. This examination ruled out the possibility of mechanical failure of the parts retrieved. Since the left elevator has not been found, the possibility was considered that it separated from the aircraft in flight, causing handling

problems. A fragment of the left elevator attachment flange, which was still attached to the elevator torque tube, was examined. The damages to this fragment are very likely attributable to the impact. However, the absence of impact marks on the components of the surrounding structure preclude a definitive conclusion that the left elevator was still in place at the time of impact.

The following laboratory reports were completed:

LP 085/2004 – Airframe Clusters Examination
LP 086/2004 – Instruments & Components Examination
LP 087/2004 – Engine and Propeller Analysis
LP 135/2004 – Side Scan Sonar Search
LP 137/2004 – Examination of Left Elevator Separation

These reports are available from the Transportation Safety Board of Canada upon request.

Finding as to Causes and Contributing Factors

1. The aircraft struck the water for undetermined reasons.

Findings as to Risk

1. The certificate of airworthiness was not in effect at the time of the accident because of the airworthiness directives that had not been completed.

2. The distress signal emitted by the fixed, automatic emergency locator transmitter (ELT) was not received because of the reduced range of the signal once the ELT was submerged, which could have increased the response time of search and rescue units if there had been no witnesses to the accident.

3. The pilot had not made a training flight with an instructor for more than 19 months, which could have resulted in a degradation of his skills and decision-making process.

Safety Action Taken

In order to rectify the situation, the approved maintenance organization installed a computer system that allows for a better follow-up of the airworthiness directives and a better planning of the inspections.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 25 April 2005.