AVIATION INVESTIGATION REPORT
A00P0157

COLLISION WITH WATER

WHISTLER AIR SERVICES LTD.
CESSNA 185 FLOATPLANE C-GEJC
GREEN LAKE, BRITISH COLUMBIA
17 AUGUST 2000

Aviation Investigation Report

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Summary

Three Whistler Air Services Ltd. floatplanes were engaged in flying a group of about 60 people on 20-minute sightseeing flights of the Whistler area in British Columbia. They were operating from the company dock at the south end of Green Lake, three kilometres north of Whistler Village. The Cessna 185 floatplane (serial number 18502823) taxied out for take-off with the pilot and four adult passengers on board and, at about 1853 Pacific daylight time, lifted off. The floatplane remained low over the surface of the lake. As it approached the end of the lake, it turned right to avoid trees on the shoreline. A short time later, it turned to the right to avoid the shoreline. During the second turn, however, the floatplane dropped abruptly into the water. All five occupants escaped with minor injuries. The floatplane was substantially damaged.

Ce rapport est également disponible en français.

Other Factual Information

Green Lake is 2100 feet above sea level. The reported weather from the Whistler weather reporting station at 1800 Pacific daylight time (PDT),[1] 54 minutes before the accident, was as follows: wind from 210 degrees (°) at 6 knots, visibility 15 statute miles, a few clouds at 10 000 feet above ground level and overcast at 11 000 feet, temperature 17 degrees Celsius (°C), and dew point 9°C. The surface of the lake was nearly calm with only small waves.

Before loading the four passengers, the pilot fuelled the floatplane and pumped out a total of about 30 litres of water from the two compartments of the left float that were known to leak. Each float contains eight compartments that are pumped out individually. Although each compartment is designed to be independent, water often migrates from adjacent compartments.

After leaving the dock, the floatplane taxied northeast for about 4500 feet before turning around to begin the take-off run to the southwest. During the taxi, the pilot instructed the passengers about exiting the floatplane and the location of the life jackets. The take-off run reportedly was made with the wind about 20° left of the nose. While the accident floatplane was taxiing out, a company de Havilland DHC-3 single-turbine Otter took off to the southeast.

The Cessna's engine developed the correct manifold pressure and maximum revolutions per minute (rpm), and there were no unusual engine noises. The floatplane did not accelerate normally, and the take-off run on the water was longer than usual. Within seconds of the floatplane becoming airborne, the pilot recognized that the airspeed was lower than usual. He assessed that the floatplane would not climb over the trees on the shore at the end of the lake, so he turned the floatplane to the right to a heading about 90° to the wind direction. The floatplane was still unable to climb out. Seconds later, the pilot again turned right and nearly downwind. During the second turn, the floatplane descended into the lake, striking the water first with the right float and the right wingtip. During the brief flight, the floatplane's height above the water did not exceed 50 feet, and the stall warning horn in the cockpit sounded intermittently.

At impact, both floats broke off, and the aircraft sank rapidly in a wings-level, nose-down attitude in about 15 feet of water. The pilot opened both of the cabin doors and dived three times to assist the passengers in escaping. All the occupants escaped, although some of the passengers reported that the headset cords and their heavy clothing hindered their egress. All five occupants were rescued immediately by a boat that was already close to the accident site.

The pilot recalls that he had selected the wing flaps to 20° for take-off and that he had reduced the flaps to 10°during the flight. When the floatplane was recovered from the lake, the flap handle was found in the fully down or "flaps retracted" position, and the wing flaps were found fully retracted (0°). The floatplane's flight controls were found to operate correctly.

The floatplane supplement of the Federal Aviation Administration (FAA)-approved pilot's operating handbook (POH) for the Cessna A185F recommends that the wing flaps be selected to 20° for take-off and should not be retracted until reaching a safe altitude and airspeed. The POH also states that wing flaps may be retracted after all obstacles have been cleared.

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[1] All times are PDT (Coordinated Universal Time minus seven hours).

The pilot recalled that he had applied full throttle throughout the flight but may have adjusted the propeller control. It is common practice for a pilot to adjust the propeller control and reduce the engine rpm after a suitable flying speed has been reached.

All three propeller blades were found to be significantly and equally damaged. The inboard portion of the left float, just aft of the nose-bumper, exhibited seven parallel and vertical cuts, consistent with propeller damage. The condition of the 14 float compartments that the pilot did not pump out before taxiing out for the flight is not known. The extensive damage to the floats precluded any conclusive determination as to whether the floats contained any significant amount of water before take-off.

The occurrence floatplane was manufactured in 1975 by the Cessna Aircraft Company. At the time of the accident, the floatplane had accumulated a total time of 7900 hours since new. The Continental engine, model IO-550-D (serial number 284039-R), had accumulated a total time of 2307 hours since overhaul, and the McCauley propeller, model D3A34C401-C (hub serial number 921924), had accumulated 587 hours since overhaul. The floats, model 3000-D, were built by Canadian Aircraft Products Ltd. A 100-hour inspection had been completed 13 days before the accident. The floatplane was certificated in accordance with existing Transport Canada (TC) regulations and has a maximum gross weight of 3320 pounds.

The POH states that at 2000 feet pressure altitude, 20°C, and no wind, a float-equipped Cessna 185F, at 3320 pounds take-off weight and with 20° wing flaps extended, would require 2930 feet to take off and clear a 50-foot obstacle.

The weight and balance of the aeroplane at take-off was calculated based on the actual weight of the pilot and the passengers and an estimation of the fuel on board. There was no baggage. The passengers reported that the fuel gauges in the cockpit indicated about half-full, that is, 22 US gallons per wing, for a total of 44 US gallons. Assuming that the floats did not contain any significant amount of water, the floatplane weighed about 3280 pounds when it departed the company dock, 40 pounds below the maximum gross weight. The centre of gravity was calculated to have been 45.0 inches aft of the datum; the allowable range is 41.9 to 46.5 inches.

According to the POH, for the floatplane at this estimated weight and balance, using 20° of wing flap and 0° angle of bank, the stall speed would be 50 knots indicated airspeed (KIAS); with the flaps set at 0°, the stall speed would be 55 KIAS. If the floatplane was then banked to 30°, the stall speed would rise to 59 KIAS.

The pilot held an Airline Transport Pilot Licence—Aeroplane with a seaplane rating, issued by TC, and a valid medical certificate. He had been employed part-time by the operator for about four weeks before the accident and had accumulated a total of 23.2 hours' flying time during that period. The bulk of the pilot's flight experience was on larger, multi-engine jet aircraft; he had flown a total of about 41 hours for another employer on those types of aircraft in the 30 days preceding the accident. He had about 1500 hours in float-equipped aeroplanes, of which about 400 hours were on Cessna 185 and Cessna 206 floatplanes. The accident flight was his fourth flight of the day in that aircraft; he had also completed four flights earlier that day in the company de Havilland DHC-2 Beaver. The pilot's flying time complied with Whistler Air Services Ltd.'s flight and duty time requirements.

Analysis

The engine apparently had been developing the correct manifold pressure and full rpm. The damage to the propeller blades and one of the floats is consistent with the engine developing significant power. No pre-existing abnormalities were found. It is, therefore, unlikely that the engine itself was a contributing factor to this accident.

It is possible that the pilot adjusted the propeller control during the flight; however, this would likely have exacerbated the deteriorating situation. While it is common practice for a pilot to adjust the propeller control after reaching sufficient flying speed, it is unlikely that sufficient flying speed was reached in this accident. This was demonstrated by the poor acceleration and aerodynamic performance and the inability of the floatplane to climb. As well, the intermittent stall warning indicates that the aircraft was being flown very close to its stall speed throughout the short flight.

The speed at which a wing stalls is dependant on several factors, including wing loading, which varies with an aeroplane's weight and acceleration (g), and use of high-lift devices. Increasing an aeroplane's weight or increasing its angle of bank in a level turn will increase the stall speed. Use of high-lift devices, such as flaps, will lower the stall speed.

The accident aircraft was loaded to within 40 pounds of its maximum allowable weight. It taxied for about 13 minutes with the floats low in the water then began a longer-than-normal take-off run of several thousand feet before the brief accident flight. During a long taxi, it is common for the floats of heavily loaded aircraft to take on water through the hatch covers and others areas of the float not normally submerged, particularly in the aft sections. It is a certainty that water leaked into the floats during this time because at least two compartments were known to leak. More water than usual likely entered the floats during this time because of the heavy load and the long taxi. Depending on the rate of leakage of the floats, the weight of the on-board water could have been significant. The aircraft balance could also have been adversely affected, depending on which compartments contained water. These two factors would have degraded the take-off and flight performance of the floatplane.

Based on the floatplane's weight and balance, the stall speed of the floatplane with 0° of wing flap and 30° angle of bank is 9 knots faster than the floatplane with 20° flap and 0° bank. Since the wing flaps were found to be fully retracted, it is likely that the pilot reduced the flaps to 0° during the flight, thereby increasing the stall speed and reducing the margin available before entering a stalled condition.

Because stall speed for an aeroplane increases as angle of bank in a coordinated turn increases, the two right turns would have aggravated an already marginal flight condition. When the floatplane turned downwind, the closing speed with the shore would have increased. This closure rate might have prompted the pilot to bank the floatplane more steeply. The second turn was evidently steep enough to precipitate an aerodynamic stall.

The stall occurred while the pilot was manoeuvring at a height too low above the water to allow a recovery and prevent the aircraft from striking the surface of the lake.

Findings as to Causes and Contributing Factors

1. The take-off was attempted with the floatplane near its maximum allowable weight and balance and with a flap setting that adversely affected its take-off performance.

2. The performance of the floatplane was insufficient for it to climb and clear obstacles in the flight path, particularly after the floatplane turned downwind and the closing speed with the shoreline increased.

3. The floatplane was at or near the stall speed throughout the flight and, during the second turn, the stall speed increased to equal the airspeed. The resulting stall occurred at a height too low above the water to allow recovery.

Findings as to Risk

1. The company was operating an aircraft with floats that leaked, which increased the likelihood that the aircraft's performance would be adversely affected.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 31 October 2001.