Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Air Transportation Safety Investigation Report A18A0053

LOSS OF CONTROL AND COLLISION WITH WATER

de Havilland DHC-2 Mk. I (Beaver), C-FCOO
Goose (Otter Creek) water aerodrome, Happy Valley-Goose Bay, Newfoundland and Labrador
11 July 2018

About the investigation

The Transportation Safety Board of Canada (TSB) conducted a limited-scope, fact-gathering investigation into this occurrence to advance transportation safety through greater awareness of potential safety issues. It is not the function of the Board to assign fault or determine civil or criminal liability.

History of the flight

On 11 July 2018, the privately operated[1] single-engine, float-equipped de Havilland DHC-2 Mk. I Beaver aircraft (registration C-FCOO, serial number 314) departed Goose (Otter Creek) water aerodrome (CCB5), Happy Valley-Goose Bay, Newfoundland and Labrador, on a visual flight rules (VFR) flight to the aircraft owner's fly-in fishing lodge to deliver supplies and drop off an employee. In addition to the employee, there were 2 licensed pilots on board: a qualified training pilot and a trainee who was working toward his seaplane rating.

On the return flight to CCB5, with only the 2 pilots on board, the trainee occupied the front left seat. This was his first training flight in a seaplane. The aircraft was equipped with a single control column, on the left side, and 1 headset, which the training pilot wore.

The winds at the time were around 5 knots from a southwesterly direction.

[1] The aircraft was registered to Minipi Aviation Ltd., which had been operating commercially under *Canadian Aviation Regulations* Subpart 703 until the spring of 2017, when the company decided to voluntarily suspend its air operating certificate. At the time of the accident, the aircraft was being operated privately.

At approximately 2050,[2] the trainee was conducting the 1st of a planned series of practice water landings. During the flare, the training pilot told the trainee to pull back on the control column, and started to reach over to assist. Before the training pilot was able to reach the control column, the nose of the left float dug into the water, causing the aircraft to pull to the left. As the aircraft veered left, the right float struck the water perpendicular to the direction of flight and the aircraft rolled right, breaking off the right wing and coming to rest inverted in the water.

The aircraft sank, but the bottom of the floats remained visible on the water surface. The trainee egressed through the broken front windscreen and swam to the surface. The training pilot was unable to open the jammed right-side door and, after unbuckling his seatbelt, ended up in the rear of the cabin.

Although the training pilot was unable to open the Alaska cargo door (see "Alaska door" section) from the inside, the trainee was able to open the Alaska door from the outside, which allowed the training pilot to exit the aircraft.

Nearby boaters witnessed the accident and rescued the 2 pilots from the water. Personal flotation devices were on board the aircraft; however, neither pilot was wearing one, nor were they required to by regulation. One pilot received minor injuries, and the other sustained more serious injuries.

Personnel information

The training pilot held a valid commercial pilot licence – aeroplane, with a single- and multi-engine land and seaplane rating, as well as a Group 1 instrument rating. He had accumulated over 9500 hours total flight time, including 1600 hours on seaplanes. He had been flying the occurrence aircraft for the owner since 2012 and had about 800 hours on type. He was qualified to conduct flight training toward the issuance of a seaplane rating.[3]

The trainee held a valid airline transport pilot licence – aeroplane, with multi-engine and Group 1 instrument ratings. He had accumulated approximately 8000 hours total flight time. Other than some water-taxiing practice on the DHC-2, he had no seaplane experience.

A review of both pilots' work–rest schedules determined that fatigue was not a factor in the accident.

Neither pilot had received egress training, nor was it required by regulation.

Seaplane rating flight training requirements

The *Canadian Aviation Regulations* Standards state that in order to obtain a seaplane rating, a pilot must "complete a total of 7 hours of seaplane training, including: (A) a minimum of 5 hours dual instruction, and (B) a minimum of 5 takeoffs and landings as sole occupant of the aeroplane [...]."[4] For a pilot to complete dual flight training, the *Canadian Aviation Regulations* Standards also state that the aircraft must have "flight controls that are easily reached and that operate in a normal manner

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[2] All times are Atlantic Daylight Time (Coordinated Universal Time minus 3 hours).

[3] *Canadian Aviation Regulations* Standard 425.21, subsection (6), states, "A person who conducts flight training toward the issuance of a landplane class rating or a seaplane class rating shall: (a) be the holder of a Commercial Pilot Licence or an Airline Transport Pilot Licence; and (b) have experience of not less than 50 hours flight time on the class of aeroplane used for the training."

[4] Transport Canada, SOR/96-433, *Canadian Aviation Regulations*, Standard 421, clauses 421.38(1)(a)(i)(A) and (B).

from both pilot stations [...]."[5] Because this aircraft had a single control column, flight training would not be permissible.

Aircraft information

The DHC-2 was designed by de Havilland Aircraft of Canada Ltd. and produced from 1947 to 1967. Viking Air Limited owns the type certificate for the DHC-2. There are currently 382 DHC-2s registered in Canada, 223 of which are used in commercial operations.

The DHC-2 has undergone numerous modifications, and supplemental type certificates have been issued over the years to improve or adapt the original design. These modifications are generally optional unless mandated by an airworthiness directive.

Egress aircraft modifications

To address egress difficulties following previous accidents, Viking Air Limited designed modifications to replace the original recessed rotary-style door handles with ones that are more accessible and easier to operate.[6] Viking Air Limited also designed rear-passenger-door windows that incorporate a push-out feature to replace the standard fixed ones.[7] Neither of these modifications was mandated or completed on the occurrence aircraft.

Alaska door

The Alaska door modification is a supplemental type certificate available from Sealand Aviation Ltd. to enlarge the opening to the aircraft's cargo area. It consists of 2 doors mounted side by side to facilitate the loading and unloading of bulky cargo through an opening of 52 inches by 42 inches when both are open (Figure 1). The rear door can be opened independently to enable access behind the passenger seats.

Figure 1. Alaska door on the occurrence aircraft (Source: J. Cooper)

The Alaska door was designed in 1990, and approximately 185 have been installed on aircraft. The door modification did not originally include an interior door release latch because the manufacturer considered that this area would be separated from the passenger compartment by a cargo net and would therefore not be accessible from the inside. Prior to this occurrence, the manufacturer recognized that the door could

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5 Ibid., Standard 425, paragraph 425.23(2)(b).

6 Viking Air Ltd., Service Bulletin V2/0004, *Installation of an Automotive Style Cabin Door Latch System*, Revision A (18 May 2012).

7 Viking Air Ltd., Service Bulletin V2/0003, *New Cabin Door Windows that Incorporate a "Push-out" Feature*, Revision A (25 October 2010).

serve as an additional exit and is working with a design approval representative[8] to have an approved inside door latch available.

The current owner installed the Alaska door on the occurrence aircraft in 2005.

TSB recommendations for seaplanes

The TSB has issued several recommendations with respect to seaplane operations to eliminate or reduce safety deficiencies that pose significant risks. The following sections provide highlights of some of those recommendations.

Recommendation on rapid egress exits

During the investigation into an accident involving a DHC-2 aircraft departing Lyall Harbour, British Columbia, in 2009,[9] the TSB recognized the importance of having exits available from which persons inside a sinking aircraft can escape and recommended that

> the Department of Transport require that all new and existing commercial seaplanes be fitted with regular and emergency exits that allow rapid egress following a survivable collision with water.
>
> **TSB Recommendation A11-05**

In January 2017, Transport Canada (TC) responded to Recommendation A11-05 by indicating that, in 2006, it had conducted an evaluation of egress from submerged seaplanes, which included suggestions to enhance safety, but concluded that there was no readily identifiable design solution that would have a major impact on the existing level of floatplane safety. TC stated that it would therefore focus on regulatory requirements for egress training and other enhancements on floatplane safety, and would not devote further activity to Recommendation A11-05.

The TSB's March 2017 reassessment of TC's response states that the intent of the recommendation is to reduce the risk of occupants being trapped when some or all exits are jammed as a result of an accident.

Emergency door release mechanisms, better door handles, and push-out windows have been developed for certain types of floatplanes. Some floatplane operators have installed these modifications, but many have not.

Regulatory requirements for mandatory egress training for commercial floatplane pilots may result in some improvement in emergency egress from commercial seaplanes. However, if the regulator does not mandate or promote voluntary modifications to normal exits, seaplanes will continue to operate with exits that could become unusable following an impact, diminishing the chance occupants have to exit the aircraft following a survivable accident.

Therefore, the response to Recommendation A11-05 was last assessed as **Satisfactory in Part**.

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[8] A design approval representative is "any person authorized pursuant to subsection 4.3(1) of the *Aeronautics Act* to perform functions on behalf of the Minister subject to the conditions specified in [Airworthiness Manual Subchapter 505C]." Source: Transport Canada, SOR/96-433, *Canadian Aviation Regulations*, Part V – Airworthiness Manual Chapter 505, Subchapter C, section 505.201(b)(4).

[9] TSB Aviation Investigation Report A09P0397.

Recommendation on personal flotation devices and egress training

Following the Lyall Harbour accident in 2009, the TSB also recognized that if a personal flotation device is not worn, and in the absence of other rescue capabilities, there is a higher risk that survivors of water impact will drown.

The TSB recommended that

> the Department of Transport require that occupants of commercial seaplanes wear a device that provides personal flotation following emergency egress.
>
> **TSB Recommendation A11-06**

In addition, the TSB has recognized, after many seaplane accidents, that pilots who receive underwater egress training have a greater chance of escaping the aircraft and surviving an accident. Those pilots can then help passengers to safety. In 2013, following a DHC-2 floatplane accident in Lillabelle Lake, Ontario,[10] the TSB recommended that

> the Department of Transport require underwater egress training for all flight crews engaged in commercial seaplane operations.
>
> **TSB Recommendation A13-02**

Both of these recommendations (A11-06 and A13-02) have led to proposed regulatory changes that were published in the *Canada Gazette*, Part I, on 21 May 2016. With regard to Recommendation A11-06, the regulations would require all commercial seaplane occupants to wear a flotation device while boarding the seaplane and while it is operated on or above water. The regulatory changes would also introduce mandatory underwater egress training for pilots of commercially operated seaplanes, with recurrent training every 3 years, which addresses Recommendation A13-02.

While TC had initially indicated that the proposed regulatory changes would be published in the *Canada Gazette*, Part II, in 2017, TC's latest response states that it anticipates the changes to be published in Part II in fall 2018. The Board is concerned about the additional delay of the publication of these amendments in the *Canada Gazette*, Part II. Although these amendments will, if published as currently proposed, substantially reduce or eliminate the safety deficiency identified in recommendations A11-06 and A13-02, until they are fully implemented, the risks to transportation safety remain.

Therefore, the responses to recommendations A11-06 and A13-02 were assessed as showing **Satisfactory Intent**.

Safety messages

The occurrence aircraft was equipped with 1 headset and was operated with a single control column. Regulations require that dual flight controls be available during flight training. A proper means of communication and of taking control of an aircraft is essential to ensuring safe and thorough training.

Aircraft manufacturers have designed modifications that may assist in exiting an aircraft following an accident, such as changes to the door latches and the passenger push-out windows. The manufacturer of the Alaska door has recognized the benefits of having an inside door latch, as this modification would provide an extra egress point.

[10] TSB Aviation Investigation Report A12O0071.

The TSB has previously identified safety deficiencies surrounding float operations and has subsequently issued recommendations. These recommendations focus on increasing the chances of survival by requiring that all occupants on commercial seaplanes wear personal flotation devices, and that pilots operating commercial seaplanes complete underwater egress training.

Although the TSB's recommendations focus on commercial operators, all seaplane pilots may benefit from implementing these recommendations in their flying activities.

This concludes the TSB's limited-scope investigation into this occurrence. The Board authorized the release of this investigation report on 15 November 2018. It was officially released on 20 November 2018.

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