Aviation Investigation Final Report

Location:	Seldovia, Alaska	**Accident Number:**	ANC19FA035
Date & Time:	July 19, 2019, 10:10 Local	**Registration:**	N68083
Aircraft:	De Havilland BEAVER DHC 2	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control on ground	**Injuries:**	1 Fatal, 1 Serious, 4 Minor, 1 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot stated that, during takeoff in the float-equipped airplane, he saw the left float begin to move into his peripheral vision from the left cockpit window and the airplane began to yaw to the left. The left wing subsequently impacted the water and the airplane nosed over, separating the right wing from the fuselage. The passengers consistently reported choppy water conditions at the time of the accident; one passenger reported that white caps were visible on the ocean waves in the distance. The passengers said that, during the takeoff, the airplane impacted a swell or wave and nosed over abruptly, and the cabin rapidly filled with water.

Examination of the float assembly revealed fractures in the left front flying wire attachment fitting and the right rear flying wire attachment strap and hole elongation in the left rear flying wire attachment fitting. Additionally, the bolts attaching the two left flying wire attachment fittings to the left float were bent, and the two flying wires that had been attached to the fractured attachment fitting and attachment strap were buckled. While some areas of corrosion were observed on the fractured left forward fitting, the total area of corrosion was a small percentage of the total cross-section, and the remainder of the fracture and associated deformation of the lug was consistent with ductile overstress fracture. Similar areas of corrosion were also observed on each of the intact flying wire attachment fittings.

Post-accident testing completed by the float manufacturer revealed that buckling of flying wires similar to that observed on the accident airplane was only reproduced at strap and fitting failure loads above 9,000 pounds force; the design specification load was 3,453 pounds of force. This indicates that the small amount of corrosion present on the fractured flying wire attachment fitting did not reduce its load-carrying capability below the design specification load of 3,453 pounds of force, and that both the flying wire attachment fitting and flying wire attachment strap fractured due to overload. Therefore, it is likely that the accident airplane floats were subject to forces that exceeded their design limitations, resulting in overload of the flying wires attached to the left float. It is also likely that, given the lack of damage on either float, the force was due to impact with an ocean wave or swell and not by striking an object.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The airplane's floats impact with an ocean wave or swell, which exceeded the design load specifications of the flying wire assemblies and resulted in a partial separation of the float assemblies.

Findings

Personnel issues	Decision making/judgment - Pilot
Environmental issues	Choppy surface - Decision related to condition
Environmental issues	Choppy surface - Effect on equipment

Factual Information

History of Flight

Takeoff	Loss of control on ground (Defining event)
Takeoff	Collision with terr/obj (non-CFIT)
Takeoff	Nose over/nose down

On July 19, 2019, about 1010 Alaska daylight time, a float-equipped de Havilland DHC-2 (Beaver) airplane, N68083, was substantially damaged when it was involved in an accident near Seldovia, Alaska. The pilot and three passengers sustained minor injuries, one passenger was fatally injured, one passenger sustained serious injuries, and one passenger was uninjured. The airplane was operated as a Title 14 *Code of Federal Regulations* (*CFR*) Part 135 on-demand commercial flight.

The purpose of the flight was to transport passengers from a remote lodge located at Tutka Bay, Alaska, to Lake Hood Seaplane Base (PALH), Anchorage, Alaska.

The pilot stated that, after loading the passengers and their baggage onboard, he started the airplane's engine and provided a passenger safety briefing. He then taxied out and initiated his takeoff. He stated that as the airplane was accelerating on the step, he saw the left float begin to move into his peripheral vision from the left cockpit window. He said that the airplane felt as if it had "lost its rigidity" on the floats and began to "yaw" to the left. In an effort to correct for the left turning tendency, he applied right aileron, to no avail. The left wing subsequently impacted the water and the airplane nosed over, separating the right wing from the fuselage. He stated that the airplane immediately began to fill with water as he struggled to exit the submerged wreckage.

During hospital interviews, the passengers consistently reported that after the engine was started, the pilot asked them to remove their headsets while he provided the passenger safety briefing. They stated that the briefing was rushed and difficult to hear due to engine noise. They reported choppy water conditions, with one passenger reporting white caps on the ocean waves visible in the distance. The passengers said that, during the takeoff, the airplane impacted a swell or wave and nosed over abruptly, and the cabin rapidly filled with water. One passenger stated that the airplane briefly became airborne before impact. A witness located near the accident site stated that the airplane appeared to accelerate slowly and struggle into the air. He reported that the airplane climbed to an altitude of about 50 to 100 ft, briefly leveled off, then began a gradual descent toward the water. The airplane impacted the water on the nose of the left float and immediately cartwheeled, coming to rest inverted in the ocean waters. He alerted emergency services and drove his boat to the submerged wreckage to assist with the rescue.

An Alaska State Trooper reported conditions at the accident site of seas less than 1 ft with a long wavelength and winds less than 10 knots. The trooper recalled that, while at the hospital, the pilot stated that he was taking off parallel to the swells when the airplane impacted a swell and became airborne, the left float broke, and the airplane cartwheeled.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	November 9, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 11, 2019
Flight Time:	2689 hours (Total, all aircraft), 150 hours (Total, this make and model), 1782 hours (Pilot In Command, all aircraft), 203 hours (Last 90 days, all aircraft), 74 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	De Havilland	**Registration:**	N68083
Model/Series:	BEAVER DHC 2	**Aircraft Category:**	Airplane
Year of Manufacture:	1958	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1254
Landing Gear Type:	Float	**Seats:**	
Date/Type of Last Inspection:	July 10, 2019 100 hour	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	29448 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	C126 installed, not activated	**Engine Model/Series:**	R-985-14B
Registered Owner:	Rust Properties LLC	**Rated Power:**	450 Horsepower
Operator:	Rusts Flying Service	**Operating Certificate(s) Held:**	On-demand air taxi (135)

The airplane was equipped with Aerocet 5850 seaplane floats in accordance with Supplemental Type Certificate (STC) No. SA01722SE.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PASO,29 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	264°
Lowest Cloud Condition:	Clear	**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	18°C / 12°C
Precipitation and Obscuration:	Moderate - None - Haze		
Departure Point:	Seldovia, AK	**Type of Flight Plan Filed:**	Company VFR
Destination:	Anchorage, AK (PALH)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal, 1 Serious, 3 Minor, 1 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious, 4 Minor, 1 None	**Latitude, Longitude:**	59.469165,-151.48916(est)

The airplane nosed over in ocean waters and came to rest inverted. All major components were recovered except for the right wing, right aileron, and right lift strut. Flight control continuity was verified from the control yoke to the right fuselage bellcrank push/pull tube, the left aileron and elevators, and from the rudder pedals to the rudder. An examination of the floats and their attachment rigging revealed that the front left flying wire attachment fitting (attached to the left float) fractured, and the associated flying wire exhibited compression buckling signatures near the upper attachment point. The right rear flying wire attachment strap (attached to the fuselage) fractured, and the associated flying wire exhibited compression buckling signatures near the lower attach point. (See Figure 1). No significant deformation was present on the underside or nose of either float.

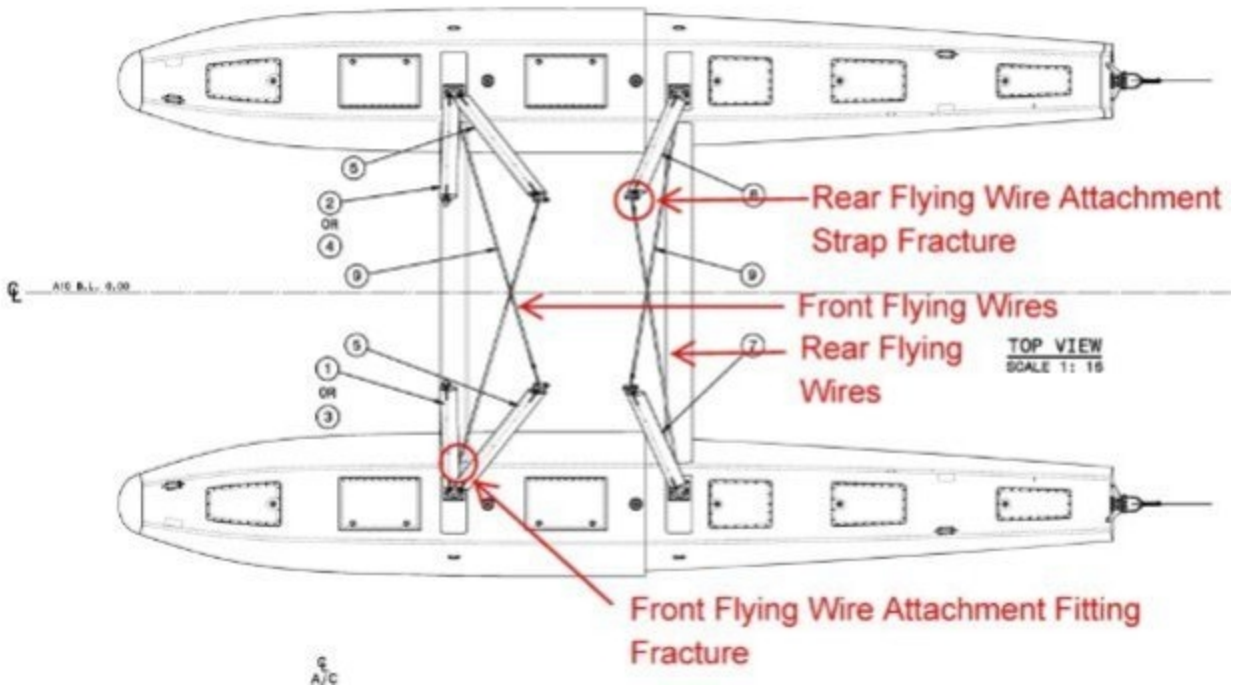

Figure 1- Float Assembly Diagram (courtesy of Aerocet)

An examination of the left float struts and flying wire attachment components was completed by the National Transportation Safety Board (NTSB) Materials Laboratory personnel. The left float struts had fracture surfaces with rough matte-gray features and deformation consistent with ductile overstress with bending or torsion loads.

An examination of the aluminum flying wire attachment fittings revealed that the bolts for attaching the two left flying wire attachment fittings to the left float were bent, and the attachment hole in the intact left rear attachment fitting was elongated. Fractures in the left front attachment fitting and right rear attachment strap were consistent with ductile overstress fracture. Small areas of corrosion were observed on the fractured left forward flying wire attachment fitting; however, the total area of corrosion was a small percentage of the total cross-section, and the remainder of the fracture and associated deformation of the lug exhibited rough matte-gray features consistent with a ductile overstress fracture. In addition, small amounts of corrosion were also observed on the three intact flying wire attachment fittings.

A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunction or failures that would have precluded normal operation.

Additional Information

On October 8, 2012 Aerocet issued Service Letter SL05-56-15145, which states in part:

Float Model Affected: Aerocet Model 5850 Twin Seaplane Float installation on DeHavilland DHC-2 "Beaver" (All)

Symptom: Reported corrosion of aluminum fitting beneath flying wire clevis in parts with extensive marine service and prolonged inspection intervals. Regular inspection at normal intervals will prevent possible failures due to corrosion-weakened fittings.

Approval: This SL reflects FAA Approved design changes and current recommended inspections, and does not require FAA approval.

Corrective Action: NONE – no required action, suggested action only.

During next regular inspection per Aerocet Service Manual, A-10034, Rev 1 or later, include partial disassembly of the lower ends of the flying wires at the Aerocet fittings for all flying wires (crossing wires). Particular attention should be focused beneath the flying wire clevises for indications of corrosion. Parts exhibiting corrosion should be replaced.

Original 56-15145 (now designated with a "-1") is easily identified as painted aluminum. Replacement part, 56-15145-2, is constructed from corrosion resistant steel (stainless), not painted.

Aerocet Test Report A-33162

The flying wires attachment design limit load was 3,453 pounds of force. Testing completed by Aerocet and documented in Test Report A-33162 revealed that buckling of flying wires was only produced at strap and fitting failure loads above 9,000 pounds of force.

Administrative Information

Investigator In Charge (IIC):	Banning, David
Additional Participating Persons:	Matt Sigfrinius; Aerocet Inc.; Priest River, ID Todd Rust; Rust's Flying Service; Anchorage, AK Colin Rust; Rust's Flying Service; Anchorage, AK Dave Swartz; Federal Aviation Administration; Anchorage, AK Kyle Weinzirl; Federal Aviation Administration; Anchorage , AK Kim McCartney; Federal Aviation Administration; Anchorage , AK
Original Publish Date:	November 19, 2020
Last Revision Date:	
Investigation Class:	Class 2
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99892