Analysis

The airline transport pilot and nine passengers departed in a float-equipped airplane in dark night, visual meteorological conditions on a 14 Code of Federal Regulations Part 91 other work use flight from a fishing lodge to a remote fishing location. The pilot reported that, before the flight departed, the front and center fuel tanks were filled, and the aft fuel tank had "residual" fuel. He did not weigh the cargo nor did he document any weight and balance calculations. When asked how he calculated the airplane's weight and balance before departure, the pilot said he "guesstimated" it.

According to a witness, after liftoff, the airplane began to climb and then descended, and the floats subsequently struck the water's surface. The airplane then became airborne again and veered right, but he lost sight of it behind an area of rising terrain. The pilot reported that he heard a noise from the left side of the airplane shortly after liftoff, which was likely the floats impacting the water. According to the automatic dependent surveillance-broadcast data, the airplane then began a gradual right turn before reaching a maximum altitude of 175 ft above the water. The airplane then descended toward the water's surface, flew low over the water and terrain, and then climbed briefly again before it impacted terrain. The pilot stated that he did not know that the airplane touched the water's surface after the initial liftoff or that the airplane then turned right.

Impact signatures were consistent with a right-wing-low attitude at impact. The entire airplane was accounted for at the wreckage site. Disassembly and examination of the engine and propeller revealed that both were operating during impact. Examination of the airframe and flight control systems found no preimpact malfunctions or failures that would have precluded normal operation.

A postaccident weight and balance study using the passenger weights, weighed cargo, and fuel load showed that the airplane exceeded its maximum gross weight of 8,367 lbs by about 508.6 lbs and that the center of gravity (CG) was 4.08 inches aft of the aft CG limit. Data from the airplane’s automatic dependent surveillance-broadcast (ADS-B) showed that the airplane was at or below the stall speeds listed in the airplane flight manual during both the initial and second climbs. The ADS-B data show that, because the pilot failed to determine the airplane’s actual preflight weight and CG and loaded and operated outside of the weight and CG limits, the airplane did not attain a proper airspeed to climb, and it experienced an aerodynamic stall.

The pilot departed during dark night conditions over water and was relying on external visual cues and not the airplane's instrumentation to control the airplane. There were insufficient external cues available to the pilot to reliably control the airplane, and he was likely experiencing spatial disorientation after takeoff and the subsequent maneuvering.
**Flight Events**

Initial climb - Loss of control in flight

**Probable Cause**

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

The pilot's decision to depart in dark night, visual meteorological conditions over water, which resulted in his subsequent spatial disorientation and loss of airplane control. Contributing to the accident was the pilot's failure to determine the airplane's actual preflight weight and balance and center of gravity (CG), which led to the airplane being loaded and operated outside of the weight and CG limits and to a subsequent aerodynamic stall.

**Findings**

Aircraft-Aircraft oper/perf/capability-Aircraft capability-CG/weight distribution-Not attained/maintained - F
Personnel issues-Action/decision-Info processing/decision/Decision making/judgment-Pilot - C
Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
Personnel issues-Psychological-Perception/orientation/illusion-Spatial disorientation-Pilot - C
Personnel issues-Task performance-Planning/preparation-Weight/balance calculations-Pilot - F
Environmental issues-Conditions/weather/phenomena-Light condition-Dark-Decision related to condition - C

**Pilot Information**

<table>
<thead>
<tr>
<th>Certificate:</th>
<th>Airline Transport; Flight Instructor; Commercial</th>
<th>Age:</th>
<th>54</th>
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<tr>
<td>Airplane Rating(s):</td>
<td>Multi-engine Land; Multi-engine Sea; Single-engine Land; Single-engine Sea</td>
<td>Instrument Rating(s):</td>
<td>Airplane</td>
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<tr>
<td>Other Aircraft Rating(s):</td>
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<td>Instructor Rating(s):</td>
<td>Airplane Multi-engine; Airplane Single-engine; Instrument Airplane</td>
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<tr>
<td>Flight Time:</td>
<td>(Estimated) 11300 hours (Total, all aircraft), 450 hours (Total, this make and model), 11100 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 70 hours (Last 30 days, all aircraft)</td>
<td></td>
<td></td>
</tr>
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</table>
Aircraft and Owner/Operator Information

Aircraft Make: DEHAVILLAND  Registration: N928RK
Model/Series: DHC 3T  Engines: 1 Turbo Prop
Operator: RAINBOW KING LODGE INC  Engine Manufacturer: Honeywell
Operating Certificate(s) Held: None  Engine Model/Series: TPE33112JR702
Flight Conducted Under: Part 91: General Aviation - Other Work Use

Meteorological Information and Flight Plan

Conditions at Accident Site: Visual Conditions  Condition of Light: Night
Observation Facility, Elevation: PAIL, 192 ft msl  Weather Information Source: Weather Observation Facility
Lowest Ceiling: Overcast / 4400 ft agl  Wind Speed/Gusts, Direction: 7 knots / , 240°
Temperature: 9°C  Visibility: 10 Miles
Precipitation and Obscuration: No Obscuration; No Precipitation
Departure Point: Iliamna, AK  Destination: Kodiak, AK

Wreckage and Impact Information

Crew Injuries: 1 Serious  Aircraft Damage: Substantial
Passenger Injuries: 3 Fatal, 4 Serious, 2 Minor  Aircraft Fire: None
Ground Injuries: N/A  Aircraft Explosion: None
Latitude, Longitude: 59.777778, -154.917778

Administrative Information

Investigator In Charge (IIC): Millicent M Hill  Adopted Date: 08/09/2017
Note: The NTSB traveled to the scene of this accident.
Investigation Docket: http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=91981

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.