National Transportation Safety Board
Aviation Accident Final Report

Location:	Katmai National Park, Alaska	**Accident Number:**	ANC10FA100
Date & Time:	August 21, 2010, 14:12 Local	**Registration:**	N9313Z
Aircraft:	DEHAVILLAND DHC-2	**Aircraft Damage:**	Substantial
Defining Event:	Missing aircraft	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The commercial pilot departed a remote, oceanside lagoon in a float-equipped airplane with three passengers on an on-demand air taxi flight in reduced visibility and heavy rain. When the airplane did not reach its destination, the operator reported the airplane overdue. Extensive search-and-rescue efforts along the coast and inland failed to find the wreckage.

After the search ended, small portions of the fragmented airplane washed ashore about 28 miles northeast of the departure lagoon. The remainder of wreckage has not been located despite sonar searches of the ocean near where the wreckage was found. A stowed tent and duffle bag, which were reported to be aboard the airplane, were also found ashore near the wreckage location. The tent and duffel bag exhibited evidence of exposure to a high temperature environment, such as a fire. However, there was no evidence indicating that the fire occurred in flight. The lack of soot on the undamaged areas of the items, as well as the very abrupt demarcation line between the damaged portion and the undamaged material, is consistent with these items floating in the water and being exposed to a fuel fire on the surface of the water, rather than having been exposed to a fire in the airplane's cargo compartment.

Due to the fragmentation of the recovered wreckage, it is likely that the airplane collided with ocean's surface while in flight; however, because the engine and a majority of the wreckage have not been found, the sequence of events leading to the accident could not be determined.

Probable Cause and Findings

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

Undetermined.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

HISTORY OF FLIGHT

On August 21, 2010, about 1412 Alaska daylight time, a de Havilland DHC-2 airplane, N9313Z, sustained substantial damage when it impacted ocean water near Katmai National Park, Alaska. The airplane was registered to and operated by Branch River Air Service, Anchorage, Alaska, under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135 as on-demand air taxi flight. Instrument and visual meteorological conditions prevailed throughout the general area between the point of departure and the intended destination. A company visual flight rules flight plan was active for the flight. Only fragmented portions of the airplane have been found washed up on the ocean shoreline near the presumed crash site. The commercial pilot and three passengers remain missing, and are presumed to have sustained fatal injuries. The flight originated from the Swikshak River Lagoon, Katmai National Park, Alaska, about 1352. The intended destination was King Salmon, Alaska, with an intermediate stop at Lake Brooks, Katmai National Park.

Information provided by the National Park Service (NPS) revealed that the DHC-2 was part of a flight of two airplanes that were transporting NPS employees from the Swikshak River Lagoon area back to their assigned posts. When the DHC-2 did not arrive at the Lake Brooks Camp or King Salmon, the flight was reported overdue by the operator to the Federal Aviation Administration (FAA). An Alert Notice (ALNOT) was issued by the FAA on August 21, 2010, at 1750. The United States Air Force Rescue Coordination Center (RCC), United States Coast Guard, and NPS initiated search and rescue operations on August 22, and continued through September 5, 2010. The NPS reported that over 60,000 air miles were flown by various helicopters and airplanes with no evidence of the location of N9313Z. The ALNOT was canceled by the FAA on September 13, 2010.

On September 27, 2010, debris from the airplane was found about 28 miles northeast of the departure point by an airplane flying through the local area. On September 28, 2010, the pilot of a helicopter landed in the vicinity of the debris, and verified it was that of the missing DHC-2.

During an interview with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the pilot of the second company airplane, a Cessna 206, reported that on the day of the accident, he departed with the DHC-2 on the first leg of the accident flight and remained about one mile in trail throughout the flight. The pilot said that the flight proceeded direct to Kulik Lake, Kamishak River, and towards Big River. Upon nearing the passage towards Big River, the pilot of the DHC-2 radioed the pilot of the Cessna, stating that he was turning around. The pilot of the Cessna said that he initiated a 180-degree turn and then heard the pilot of DHC-2 report that he "found a hole" and descended through it overhead of Big River. The pilot of the Cessna then continued flying along the Kamishak River to the north, and followed the coastline to the south and southeast toward the Swikshak Lagoon.

About 35 minutes later, the pilot of the Cessna arrived at the Swikshak Lagoon and saw the DHC-2 departing the area to the northeast. He recalled that the pilot of the DHC-2 asked him

about the weather along the coast. The Cessna pilot responded and said that the weather was "good" to the north, with a broken cloud layer about 500 feet above ground level (agl) with a southeasterly wind flow of about 40 knots between Cape Douglas and Kamishak Bay, with good visibility.

About 20 minutes later, the Cessna pilot departed Swikshak Lagoon and flew along the coastline to the north to McNeil Cove before following the Little Kamishak River. The flight then went along the Kulik River, across Nonvianuk Lake towards the Lagnak drainage before turning south toward King Salmon. The pilot of the Cessna said that during the flight, visibility was at or slightly greater than about 5 miles, cloud ceilings mostly broken around 700 to 1,000 feet mean sea level (msl) with some areas of an overcast layer. He stated throughout the return flight to King Salmon, he remained at a cruise altitude of about 500 feet agl. He added that he was new to the area, and it was his first trip to the coastal area from King Salmon.

Information obtained through interviews conducted by the NTSB IIC and written statements from two passengers, who were on the Cessna 206's return flight from the Swikshak river camp to King Salmon, revealed that while on the ground at the Swikshak river camp, about an hour and a half prior to the arrival of the DHC-2, weather conditions around the camp declined, with "low fog clouds creeping in" and that a downpour of rain ensued. One passenger reported that during discussions about what to do if the airplanes could not reach the camp due to the weather, they saw an airplane approaching from the Kaguyak/Big River drainage, and that visibility had increased and the rain diminished.

A passenger stated that she assisted docking the DHC-2, and during discussions with the pilot while loading the airplane, he mentioned that he "found a sucker hole that he could get through" in order to find the camp, and would not be returning to the south, as the weather did not look good. The passenger informed the pilot that she was concerned about the weather, and told him that he could stay in camp with them and wait out the weather. However, the pilot responded that he wasn't comfortable doing so, and had to return to King Salmon to fly another trip later in the day. The passenger said that when the DHC-2 departed, she estimated that the clouds were about 500 to 700 feet above the ground with heavy rain in the vicinity.

The other passenger of the Cessna, who was a commercial certificated pilot, reported that weather was progressively deteriorating throughout the day of the accident. A few minutes after the DHC-2 departed, he saw the company Cessna overfly his location from the north-northeast. At the time the DHC-2 departed, he estimated that the cloud bases were around 500 to 700 feet above the adjacent mountain ridges. He noted that during the flight to King Salmon around the Cape Douglas area, the airplane encountered moderate turbulence that only lasted a few moments. He said that as the flight continued, in-flight visibility was about 5 miles lateral and that the flight remained at an altitude of about 500 feet agl during the entire portion of the flight due to the cloud ceiling 100 to 200 feet above their altitude.

A pilot, who was flying in the vicinity of the Katmai National Park on August 21, reported that he was unable to follow the coastline due to the low cloud ceilings, which were almost to the water along his intended route to the Hallo Bay Camp, which is south of Swikshak Lagoon. The witness said that he flew an alternate course, heading to the north-northwest along the coastline to the Kamishak River, and continued upriver toward Big River. He stated that he

intended to fly down the Big River drainage to the Hallo Bay Camp, but as he approached Big River he saw two airplanes, a de havilland DHC-2, painted like that of the accident airplane, and a Cessna 206 flying in trail at an altitude of about 150 to 200 feet agl on a course toward the Hallo Bay Camp. He estimated that in this area, the bottom of the overcast cloud layer was at or below 500 feet agl. Shortly after observing the two airplanes, he decided to do a 180-degree turn, and flew down the Kamishak River drainage, toward Kamishak Bay.

Upon arriving at Kamishak Bay, the pilot/witness went along the coastline to the southeast, where he encountered improved weather conditions, and estimated the cloud base to be around 1,300 feet agl. The pilot said that he was able to land at his intended destination around 1340, after which he monitored the weather radar and took a nap before departing around 1645. He recalled that at the time of the departure, the weather had mostly moved to the north-northeast.

There are no known witnesses to the accident sequence.

PERSONNEL INFORMATION

The accident pilot, age 47, held a commercial pilot certificate with airplane single-engine land, multi-engine land, single-engine sea, and instrument airplane ratings. His second-class airman medical certificate was issued on May 25, 2010, with no limitations stated.

Review of company records revealed that as of May 28, 2010, he had a total of 4,112 hours of flight time. The pilot underwent company ground training for the accident make/model airplane on May 29 and May 30, 2010. He received recurrent aircraft specific flight and ground training for the accident make/model airplane on June 2, 2010, and completed his most recent CFR Part 135 VFR check ride in the accident make/model airplane on June 3, 2010. Company records disclosed that the pilot had flown 142.3 hours within the previous 30 days, 238.8 hours within the previous 60 days, and 330.9 hours within the previous 90 days prior to the accident.

Company flight scheduling records for the day of the accident revealed that the pilot began his duty day at 0700. The accident flight was the third of five flights scheduled for the pilot in the accident airplane for the day of the accident.

AIRCRAFT INFORMATION

The eight-seat, high-wing, float-equipped airplane, serial number (S/N) 441, was manufactured in 1952. It was powered by a Pratt and Whitney R-985 engine, rated at 450 horsepower, and equipped with a Hartzell Inc. model HC-B3R30-4B adjustable pitch propeller. The airplane was reportedly equipped with basic visual flight rules (VFR) instruments and a 121 megahertz emergency locator transmitter (ELT). The pilot reportedly had a SPOT personal locator beacon (PLB). The NPS and Branch River Air Service personnel reported that the airplane was not equipped with an AFF (automated flight following), GPS tracking unit, or a satellite phone.

Review of copies of maintenance logbook records showed that an annual inspection was

completed on April 19, 2010, at a recorded tachometer hour reading and airframe total time of 4,945.5 hours, and engine time since major overhaul of 561 hours. The most recent 100-hour inspection was on July 30, 2010, at a tachometer hour reading of 5,136.8 hours.

The engine was overhauled on June 12, 2008, with an estimated total time of 11,282 hours. The engine was installed on the airplane on July 15, 2008, at a tachometer hour reading of 4,384.1 hours.

METEOROLOGICAL INFORMATION

A National Transportation Safety Board (NTSB) staff meteorologist prepared a factual report for the area surrounding the accident site.

Review of the National Weather Service (NWS) Surface Analysis Chart that was issued at 1300, depicted a low pressure system just south of Kipnuk, Alaska, with an occluded front stretching southward across the Alaskan Peninsula. The station models near the accident site depicted general southeasterly winds of 5 to 10 knots over the region, with broken to overcast clouds.

The closest weather reporting facility to the accident site was the Augustine Island C-MAN station (AUGA2), approximately 25 miles north of the accident site. At 1430, AUGA2 reported wind from 162 degrees at 10 knots with gusts to 12 knots and a temperature of 10.5 degrees Celsius.

The closest weather reporting station to the accident site that reported ceiling and visibility measurements was at the Kodiak Airport (PADQ), Kodiak, Alaska, approximately 79 miles southeast of the accident site. At 1417, PADQ issued a special weather observation that indicated wind from 040 degrees at 4 knots, visibility of 10 miles, few clouds at 300 feet agl, scattered clouds at 1,200 feet agl, ceiling overcast at 2,900 feet agl, temperature of 12 degrees Celsius, dew point temperature of 10 degrees Celsius, altimeter setting 29.79 inches of Mercury.

The NWS Terminal Aerodrome Forecast (TAF) for PAKN that was current issued at 1332 noted that the forecast expected variable winds at 4 knots, visibility better than 6 miles, light rain, scattered clouds at 2,500 feet agl, and ceiling overcast at 3,500 feet. Temporarily between 1400 and 1600, cloud ceiling broken at 2,500 feet. From 1600, the forecast expected a variable wind at 4 knots, visibility better than 6 miles, light rain, scattered clouds at 1,500 feet agl, with a ceiling broken at 2,500 feet.

For further information, see the Meteorological Factual Report within the public docket.

WRECKAGE AND IMPACT INFORMATION

Examination by the NTSB IIC of the area where wreckage debris was revealed that all of the debris was along the high tide line of a rocky beach area about 2.4 miles southwest of Shaw Island on the northeastern edge of the Katmai National Park. The measured global positioning system (GPS) coordinates for the debris was north 58 degrees, 58 minutes, 19.02 seconds, west 153 degrees, 25 minutes, 33.09 seconds. The debris was severely fragmented and consisted of

portions of the aft section of the airplane. Fragmented portions of the aft baggage door, baggage floor structure, cabin ceiling structure, horizontal stabilizer, elevator, rudder, vertical stabilizer, and fuselage structure were located throughout the high tide line. Additional debris has been found on the same beach, consisting of portions of the instrument panel and front part of the fuselage. The majority of the fuselage has not been located. None of the wings, engine, or floats have not been found.

Between October 17 and 24, 2010, a team consisting of representatives from the Alaska State Troopers, Federal Bureau of Investigation, and National Transportation Safety Board, initiated a search for wreckage debris in the ocean waters southwest of Shaw Island utilizing side scan sonar. Due to weather conditions during the search period, no diving operations were conducted in addition to the side scan sonar mapping. No additional wreckage was discovered.

MEDICAL AND PATHOLOGICAL INFORMATION

No autopsy or toxicology tests were performed.

SURVIVAL ASPECTS

The accident airplane was equipped with basic visual flight rules instruments and a 121.5 megahertz emergency locator transmitter (ELT). The pilot had a SPOT satellite emergency notification device (SEND). No signals from the ELT or SPOT SEND were received.

The United States Air Force Rescue Coordination Center (RCC) reported that on August 22, 2010, about 1730, an HC-130 conducted an "electronic search" within the area of the intended route of flight and obtained an "electronic" signature from an unknown source about 3 miles northwest of Mount Douglas. In addition, it was reported by RCC personnel that an aircraft flying over the coastline just east of Mount Douglas over Shaw Island heard a double beep tone on 121.5 Megahertz.

As of February 1, 2009, satellite monitoring of 121.5 MHz ELT's was terminated. The monitoring services were terminated for several reasons, including the congestion of the analog 121.5 MHz frequency and numerous associated false signals, the inherent inaccuracy of the 121.5 MHz signal, and the slow acquisition of target location in comparison to the much faster and more accurate digital 406MHz ELT's. According to the National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service, "NOAA, along with the U.S. Coast Guard, United States Air Force, and NASA (the four Federal Agencies who manage, operate, and use the SARSAT system) are strongly advising users of 121.5/243 MHz beacons to make the switch to 406." The installation of a 406 MHz ELT in lieu of a 121.5 MHz ELT has not been mandated.

The National Transportation Safety Board issued safety recommendation A-07-51, to the FAA on September 4, 2007. The recommendation requests, in part, that the FAA: "Seek authority from Congress to require the installation of Technical Standard Order C126 [406 megahertz (MHz)] emergency locator transmitters (ELTs) in all applicable aircraft at the earliest possible opportunity. Further, the Federal Aviation Administration should strongly consider establishing a compliance date for upgrading to 406-MHz ELTs on or before the date that

COSPAS-SARSAT will cease satellite processing of 121.5-MHz signals. (A-07-51)."

TESTS AND RESEARCH

A stowed tent and duffel bag were found along the high tide line on a beach to the northwest of where the aircraft wreckage debris was located. The tent and duffel bag were found to be consistent with items that were aboard the accident airplane and appeared to be thermally damaged. The tent and duffel bag were sent to the NTSB Materials Laboratory in Washington DC., for further examination.

Examination of the recovered tent and duffel bag were examined by an NTSB Fire and Explosion Investigator. The investigator noted that both the tent and duffel bag had evidence of thermal damage to their exterior surfaces. The thermal damage was limited to a particular area on both the bag and tent. The demarcation between damaged and undamaged material was abrupt with little if any gradient leading from one area to the other. Additionally, it was noted that the thermal damage looked more like melting of the tent and duffel bag material instead of the material having burned. The interior surfaces of the tent and duffel bag did not exhibit any thermal damage. The outside of the thermally damaged portions of both the tent and duffel bag exhibited no traces of soot.

History of Flight

Unknown	Missing aircraft (Defining event)

Pilot Information

Certificate:	Commercial	**Age:**	47,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 None	**Last FAA Medical Exam:**	May 22, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 3, 2010
Flight Time:	4112 hours (Total, all aircraft), 330 hours (Last 90 days, all aircraft), 238 hours (Last 30 days, all aircraft), 142 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	DEHAVILLAND	**Registration:**	N9313Z
Model/Series:	DHC-2	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	441
Landing Gear Type:	N/A; Float	**Seats:**	8
Date/Type of Last Inspection:	April 19, 2010 Annual	**Certified Max Gross Wt.:**	5100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4946 Hrs as of last inspection	**Engine Manufacturer:**	P&W
ELT:	Installed, not activated	**Engine Model/Series:**	R-985 SERIES
Registered Owner:		**Rated Power:**	450 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PKDT,78 ft msl	**Distance from Accident Site:**	79 Nautical Miles
Observation Time:	14:17 Local	**Direction from Accident Site:**	160°
Lowest Cloud Condition:	Few / 300 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 2900 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	40°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.79 inches Hg	**Temperature/Dew Point:**	12°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Swikshak River, AK	**Type of Flight Plan Filed:**	Company VFR
Destination:	King Salmon, AK	**Type of Clearance:**	None
Departure Time:	13:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	56.960952,-158.579177(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Kevin P Grenier; Federal Aviation Administration; Anchorage, AK
Original Publish Date:	March 20, 2012
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=77181