Aviation Investigation Final Report

Location:	Georgetown, Florida	**Accident Number:**	ERA18FA092
Date & Time:	February 27, 2018, 19:25 Local	**Registration:**	N969TB
Aircraft:	QUEST AIRCRAFT COMPANY LLC KODIAC 100	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot and pilot-rated passenger were returning to the airport in night visual meteorological conditions with a cloud ceiling about 1,500 ft above ground level. Radar data indicated that the airplane overflew the airport and completed a 360° descending right turn and overflew the airport again before entering an approximate 180° left climbing turn toward and over an unlighted area within a densely-wooded national forest. The airplane continued the left turn and entered a descent to impact in a river about 1 mile from the airport. All major components of the airplane were recovered from the river except the outboard section of the left wing and the left aileron. An examination of the airframe and engine revealed no mechanical malfunctions or failures that would have precluded normal operation.

Because each of the two pilots onboard would have been capable of safely landing the airplane, it is unlikely that an acute event from either occupant's heart disease contributed to the accident.

The night conditions, which included overcast clouds that would have obscured the nearly full moon, and the pilots' maneuvering for landing over an area devoid of cultural lighting provided conditions conducive to the development of spatial disorientation. It is likely that the pilots experienced a "black hole" illusion while maneuvering to align with the runway for landing, which resulted in an uncontrolled descent and impact with water.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilots' spatial disorientation while maneuvering for landing in night conditions over unlighted terrain, which resulted in an uncontrolled descent and impact with water.

Findings

Environmental issues	Dark - Contributed to outcome
Environmental issues	Dark - Effect on personnel
Personnel issues	Spatial disorientation - Pilot
Aircraft	(general) - Not attained/maintained
Personnel issues	Use of automation - Pilot

Factual Information

History of Flight

Maneuvering	Loss of control in flight (Defining event)
Maneuvering	Collision with terr/obj (non-CFIT)

On February 27, 2018, about 1925 eastern standard time, a Quest Aircraft Company Kodiak 100 airplane, N969TB, was substantially damaged when it impacted a river near Georgetown, Florida. The private pilot and pilot-rated passenger were fatally injured. The airplane was privately owned and was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Night visual meteorological conditions prevailed, and there was no flight plan filed for the flight, which was destined for Mount Royal Airport (3FL0), Welaka, Florida.

A witness stated that the airplane departed 3FL0 about 1530 on the day of the accident. According to air traffic control data provided by the Federal Aviation Administration (FAA), a radar target identified as the accident airplane overflew 3FL0 about 975 ft mean sea level (msl) about 1911 and proceeded to make a right turn over the Ocala National Forest. It descended over the forest to 775 ft msl, continued the right turn back to the airport, which it overflew a second time about 1920, then entered a climbing left turn to an altitude of 1,200 ft msl. The airplane continued the left turn and began a descent that continued to impact with a river about 1 mile west of the airport.

A witness who saw the airplane shortly before the accident noted that it was flying "really low," and was in a 45° bank left turn; the airplane "wobbled" once and continued the turn. She stated that the lights on the airplane had "halos" around them because it was foggy, and that the engine sounded "fine."

Local law enforcement and recovery personnel reported that there were no downed tree branches or powerlines along the river shoreline in the vicinity of the accident site.

Pilot Information

Certificate:	Private	**Age:**	68,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land; Multi-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	November 27, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	3400 hours (Total, all aircraft)		

Pilot-rated passenger Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	56,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land; Multi-engine sea	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 4, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 23165 hours (Total, all aircraft)		

According to FAA records, the pilot held a private pilot certificate with ratings for airplane single-engine land, single-engine sea, multiengine land, multiengine sea, and instrument airplane. The pilot was issued a third-class medical certificate on November 27, 2016. At that time, he reported 3,400 total hours of flight experience, of which 20 hours were within the previous 6 months. The pilot's logbook was not recovered; therefore, his total flight experience and recency of experience could not be determined. The pilot previously reported hypertension and gout to the FAA. In 2005, he reported having had triple vessel coronary artery bypass surgery. By 2007, he had received a special issuance medical certificate. No significant abnormalities were noted on the most recent physical exam and a review of the information from the pilot's cardiologist from January 2017 demonstrated a recent nuclear stress test that did not identify any reversible ischemia.

According to FAA records, the pilot-rated passenger held an airline transport pilot certificate with ratings for airplane multiengine land and airplane multiengine sea. He held commercial privileges for airplane single-engine land and airplane single-engine sea. In addition, he held a flight instructor certificate with ratings for airplane multiengine and instrument airplane. His most recent second-class medical certificate was issued on October 4, 2013, and at that time, he reported 23,165 total hours of flight experience.

Aircraft and Owner/Operator Information

Aircraft Make:	QUEST AIRCRAFT COMPANY LLC	**Registration:**	N969TB
Model/Series:	KODIAC 100 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2016	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	100-0173
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	7255 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	68 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	PT6A-34
Registered Owner:	PEGASUS OF MONTANA LLC	**Rated Power:**	750 Horsepower
Operator:	PEGASUS OF MONTANA LLC	**Operating Certificate(s) Held:**	None

According to FAA airworthiness records, the airplane was manufactured in 2016 and issued an airworthiness certificate in April 2016. It was equipped with a Pratt and Whitney Canada PT6A-34, 750-horsepower engine that powered a 4-bladed Hartzell constant speed propeller. A Hobbs meter located in the wreckage indicated about 68 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	28J,48 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	19:15 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Thin Overcast / 1500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 1500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.25 inches Hg	**Temperature/Dew Point:**	17°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:	Georgetown, FL (3FL0)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

The 1915 recorded weather observation at Palatka Municipal Airport – Lt. Kay Larkin Field (28J), Palatka, Florida, about 13 miles north of the accident location, included wind from 050° at 8 knots, 10 miles visibility, an overcast cloud layer at 1,500 ft above ground level, temperature 17°C, dew point 15°C, and an altimeter setting of 30.25 inches of mercury.

According to the Astronomical Applications Department at the United States Naval Observatory, the sunset was at 1824, the end of civil twilight was at 1848, and moonrise was at 1605. The phase of the moon on the day of the accident was waxing gibbous, with 93% of the moon's visible disk illuminated.

Airport Information

Airport:	MOUNT ROYAL 3FL0	**Runway Surface Type:**	Asphalt
Airport Elevation:	41 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Traffic pattern

3FL0 was a non-tower-controlled private airport located about 3 miles south of Welaka, Florida. The airport elevation was 41 ft msl. Runway 8/25 was 3,000 ft long and 50 ft wide and was equipped with medium-intensity edge lights. There were no published instrument procedures to or from the airport. The airport was bordered to the west by the Ocala National Forest, which comprised 673 square miles of densely-wooded and unlighted terrain.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	29.430555,-81.676391(est)

The airplane impacted a river and came to rest inverted in about 10 ft of water. All major components of the airplane were recovered from the river, except the outboard section of the left wing and the left aileron. The forward section of the fuselage was crushed aft. The right wing was impact separated from the fuselage and an unquantified amount of Jet A fuel drained from the wing when the wing was moved for examination. The inboard section of the left wing was impact separated from the fuselage and the left flap was separated from the left wing. The flap jackscrew corresponded to full flap extension. The empennage remained attached to the fuselage and the horizontal stabilizers and elevators were cut to facilitate recovery. The cockpit was impact damaged, and the attitude indicator was located and disassembled. Rotational scoring was noted on the gyro housing. Flight control continuity was obtained from all flight control surfaces to the cockpit through tensile overload breaks and cuts made to facilitate recovery.

The propeller remained attached to the reduction gearbox but was impact separated from the engine. All four propeller blades remained attached to the hub; one of the blades was in a feathered position. Two of the blades exhibited S-bending, the other two blades were bent aft, and leading edge gouging was noted on three of the blades.

The engine was separated from the airframe and recovered from the river. The left exhaust stack was impact crushed and the right exhaust stack received minor impact damage. The reduction gear box chip detector was examined, and no debris was noted. Continuity was confirmed between the compressor turbine and the accessory section of the engine by rotating the compressor turbine. Rotational scoring was noted on the compressor turbine. The power turbine was examined and exhibited rotational scoring on the fir tree disk, the blades, and the leading edge of the shroud tips. In addition, the power turbine shroud exhibited rotational scoring.

Medical and Pathological Information

The Office of the Medical Examiner of Florida performed the autopsy of the pilot and the pilot-rated passenger in St. Augustine, Florida. The autopsy report indicated that they both occupants died as a result of multiple blunt force injuries.

The autopsy of the pilot-rated passenger revealed that the coronary arteries were dilated with moderate to severe calcific atherosclerosis with 70-80% stenosis of the left anterior descending, as well as up to 60 -70% stenosis of the circumflex and right coronary arteries. The remainder of the cardiac exam was

unremarkable.
The FAA's Forensic Sciences Laboratory performed toxicological testing of the pilot and passenger. The pilot's fluid and tissue specimens were tested and identified 0.025 gm/dl of ethanol in muscle, but none in liver tissue, thus it was likely produced postmortem. An unspecified level of valsartan was identified in muscle and liver.

Toxicology testing of the pilot-rated passenger identified unspecified levels of valsartan, rosuvastatin, and amlodipine in cavity blood. All of these, in addition to clopidogrel, were identified in urine.

According to the FAA Forensic Toxicology Drug Information, amlodipine is a prescription medication used alone or in combination with other medications to treat high blood pressure. Clopidogrel is a prescription medication used to inhibit blood clots in coronary artery disease, peripheral vascular disease, cerebrovascular disease, and to prevent myocardial infarction (heart attack) and stroke. Rosuvastatin is a prescription medication used to reduce blood cholesterol and triglycerides levels. Valsartan is a prescription medication used alone or in combination with other medications to treat high blood pressure. None are considered to be impairing.

Additional Information

Spatial Disorientation

The FAA Pilot's Handbook of Aeronautical Knowledge, Chapter 16, "Aeromedical Factors," stated:

Under normal flight conditions, when there is a visual reference to the horizon and ground, the sensory system in the inner ear helps to identify the pitch, roll, and yaw movements of the aircraft. When visual contact with the horizon is lost, the vestibular system becomes unreliable. Without visual references outside the aircraft, there are many situations in which normal motions and forces create convincing illusions that are difficult to overcome…Unless a pilot has many hours of training in instrument flight, flight should be avoided in reduced visibility or at night when the horizon is not visible. A pilot can reduce susceptibility to disorienting illusions through training and awareness, and learning to rely totally on flight instruments.

According to the FAA Airplane Flying Handbook (FAA-H-8083-3A), Chapter 10 - Night Operations, "In addition to night vision limitations, pilots should be aware that night illusions could cause confusion and concerns during night flying." The handbook also stated:

A black-hole approach occurs when the landing is made from over water or non-lighted terrain where the runway lights are the only source of light. Without peripheral visual cues to help, pilots will have trouble orienting themselves relative to Earth. ... If navigation aids (NAVAIDs) are unavailable, careful attention should be given to using the flight instruments to assist in maintaining orientation and a normal approach. If at any time the pilot is unsure of his or her position or attitude, a go-around should be executed.

Administrative Information

Investigator In Charge (IIC):	Kemner, Heidi
Additional Participating Persons:	Bill Meadows; FAA/FSDO; Orlando, FL David Schuck; Quest Aircraft Company; Sandpoint, ID Leslie Ederer; Pratt & Whitney Engine Services; Montreal
Original Publish Date:	April 20, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96800