Aviation Investigation Final Report

Location:	Ogden, Utah	**Accident Number:**	WPR18FA063
Date & Time:	December 29, 2017, 14:41 Local	**Registration:**	N4395R
Aircraft:	Cessna 172M	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial pilot and private pilot-rated passenger departed on a local flight in day visual meteorological conditions and climbed to a peak altitude about 2,370 ft above ground level. The airplane then entered a gradual, wings-level descent during which it began to fly over a large lake. The airplane impacted the water and subsequently sank.

The airplane was mostly intact and exhibited no evidence of mechanical failures or anomalies that would have precluded normal operation. Given the condition of the airplane, flight track, altitude data, and the proximity to land, it is likely that the pilot intentionally descended the airplane to low altitude over the lake. It is also likely that the lake exhibited a glassy surface due to low wind conditions about the time of the accident, which would have reduced depth perception and made it difficult for the pilot to judge the airplane's height above the water. Additionally, toxicology of the pilot revealed the presence of three different impairing medications. It is likely that he was experiencing combined adverse effects of these three central nervous system depressants, which contributed to his failure to maintain clearance from the water while performing low-altitude flight.

Probable Cause and Findings

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

The pilot's failure to maintain clearance from the water while flying over a lake with glassy surface conditions. Contributing to the accident was the pilot's use of three impairing medications.

Findings

Aircraft	Altitude - Not attained/maintained
Environmental issues	Water - Effect on personnel
Personnel issues	Perception - Pilot
Personnel issues	Prescription medication - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering	Controlled flight into terr/obj (CFIT)

On December 29, 2017, about 1441 mountain standard time, a Cessna 172M, N4395R, was substantially damaged when it impacted the northern portion of the Great Salt Lake near Ogden, Utah. The commercial pilot and a private pilot-rated passenger were fatally injured. The airplane was registered to the Hill Flying Club Inc. and was operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight which originated from Ogden-Hinckley Airport (OGD), Ogden, Utah, about 1420.

A review of the OpsVue flight data, which uses NextGen data that includes flight location data, indicated that the airplane departed OGD and flew towards the west. During the initial climb, the groundspeed varied between 73 and 102 knots. About 5 minutes after takeoff, the airplane leveled off about 6,250 ft mean sea level (msl) and began to fly over the lake, south of Promontory Point. Shortly thereafter, the airplane entered a slight climb to a peak altitude of 6,575 ft msl (about 2,377 ft above ground level). The airplane then turned to a northwest heading, initiated a descent, to fly over the peninsula, west of high terrain and Promontory Point. The last point of data indicated that the airplane continued on a northwest heading, was located on the western edge of the peninsula, and was about to fly over the lake again. The airplane was descending from an altitude of 5,350 ft msl and the groundspeed was 98 knots.

After family members reported that the pilots had failed to return from their flight, the Federal Aviation Administration (FAA) issued an Alert Notice (ALNOT) for the airplane. A ground and air search ensued; however, the search was terminated on January 2, 2018. The airplane was located by a private search on January 13, 2018, under 20 ft of water about 5 miles northwest of the last data point and about 26.5 miles west-northwest of OGD.

Based on the flight track information and the location of the wreckage, the airplane descended about 1,152 ft over about 5 miles, which corresponds to a descent rate of about 230 ft per mile, or a descent angle of less than 2° at 100 mph.

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	71,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 11, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 5587 hours (Total, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	74,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 10, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 317.5 hours (Total, all aircraft)		

Commercial Pilot

The pilot held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane. In addition, he held a flight instructor certificate with a rating for airplane single-engine. The pilot held a third-class FAA airman medical certificate issued on July 11, 2016, with the limitation, "must have available glasses for near vision." On the application for that certificate, the pilot reported 5,587 total hours of flight experience.

Pilot Rated Passenger

The pilot-rated passenger held a private pilot certificate with an airplane single-engine land rating. Review of his logbook indicated 375.1 total hours of flight experience. His most recent third-class FAA airman medical certificate was issued on April 10, 2014, with a limitation that stated, "must have available glasses for near vision." His medical certificate expired for all classes in April 2016.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N4395R
Model/Series:	172M M	**Aircraft Category:**	Airplane
Year of Manufacture:	1974	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	17263145
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	November 24, 2017 Annual	**Certified Max Gross Wt.:**	2299 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-320-E2D
Registered Owner:	On file	**Rated Power:**	150 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The four-seat, high-wing, fixed-gear airplane was manufactured in 1974. It was powered by a Lycoming O-320-E2D engine rated at 160 horsepower and equipped with a fixed pitch propeller.

Review of the airframe and engine logbooks revealed that the most recent annual inspection was completed on November 24, 2017, at a tachometer time of 1,580.5 hours, and an engine time since major overhaul of 1,580.5 hours. At the time of the accident, the airplane had flown 18.5 flight hours since the inspection.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KOGD,4439 ft msl	**Distance from Accident Site:**	31 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	105°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.14 inches Hg	**Temperature/Dew Point:**	9°C / -3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	OGDEN, UT (OGD)	**Type of Flight Plan Filed:**	None
Destination:	OGDEN, UT (OGD)	**Type of Clearance:**	Unknown
Departure Time:	14:20 Local	**Type of Airspace:**	Class G

The 1453 recorded weather observation at OGD, included wind from 320° at 4 knots, 10 miles visibility,

clear sky, temperature 6°C, dew point, -2°C, and an altimeter setting of 30.15 inches of mercury.

No significant weather or precipitation was present in the area at the time of the accident.

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:**	41.330001,-112.663612(est)

According to the recovery specialist, the wreckage was located in the northern portion of the Great Salt Lake at a depth of about 20 ft and elevation of about 4,198 ft, msl. Sonar imagery indicated that the main wreckage came to rest inverted, oriented on a heading of about 195°. The engine was about 110 ft from the main wreckage on a heading of about 108°.

A diver who participated in the recovery stated that the visibility in the water was less than 1 ft. He reported that the vertical stabilizer and the left horizontal stabilizer and elevator appeared to be intact. He also confirmed that the airplane was inverted. He felt his way to the forward portion of the fuselage and stated that there appeared to be no damage, wrinkling, or buckling of the left side of the fuselage. The door windows were broken on each door, in order to give access to the door handle and open the door during the recovery.

The wreckage was recovered from the lake on March 8, 2018. The main wreckage was mostly intact and consisted of both wings, the fuselage, and the empennage. The rudder counterweight and the right fuel cap had separated and were not recovered. All flight control surfaces remained attached. Flight control cable continuity was established when the airplane was removed from the water by the recovery personnel. The aileron cables were then cut to aid in recovery.

Airframe Examination

The wind screen was fragmented, and the firewall and instrument panel were partially attached. Both cabin doors remained attached. The right door window was separated and located with the main wreckage. The baggage door was closed and locked.

The fuel selector handle was observed in the right tank position; however, it was separated from the valve and free to rotate. The fuel selector valve was removed and found in the "both" position. The valve was functionally tested in all positions with no anomalies. The magneto switch was in the "both" position and the flap selector handle was in the retracted position. All circuit breakers were observed in the closed position.

The right wing remained attached to the fuselage at the wing root and was separated during the recovery.

The wing was bent upward about 135° near midspan and displayed extensive damage. The leading edge was displaced downward about 45° from the root to about midspan. The fuel tank wing skin was removed, and no damage was noted to the fuel cell. The fuel screen was clear of contaminates. The right flap and aileron were attached and remained mostly intact. The flap jack screw was in the flaps-retracted position.

The left wing remained attached to the fuselage and sustained damage. The leading edge was displaced downward about 30° from the root to about midspan. According to the recovery specialist, the fuel cap was removed during the recovery to drain water from the tank. The fuel tank wing skin was removed, and no damage was noted to the fuel cell. The fuel screen was clear of contaminants. The left flap and aileron were attached and remained mostly intact. The vented fuel cap and filler neck lock ring were undamaged.

The empennage remained mostly attached to the fuselage. The vertical stabilizer was folded to the left and exhibited extensive damage. The rudder remained attached to the vertical stabilizer and displayed extensive impact damage. The horizontal stabilizers remained attached to the empennage and displayed some impact damage on both tips. The elevators displayed extensive impact damage. Both elevator balance weights remained attached. The left elevator rivets holding the elevator to the torque tube were sheared. The trim tab actuator measured about 1.4 inches, which corresponded to about 5° tab-up when properly rigged.

Engine

All of the engine accessories remained attached to their respective housings. Manual rotation was attempted by rotating the propeller; about 10° of rotation was achieved. Both magnetos were removed and exhibited extensive corrosion. They were unable to be rotated. Cylinder Nos. 1 and 3 were removed, and about one-half turn of manual rotation was accomplished. Engine valve continuity was visually established, and no anomalies were noted.

The oil filter was removed and cut open; no contaminants were noted. The oil pressure screen was removed, and no anomalies were noted.

The carburetor was removed and disassembled, and the floats were intact. Salt was observed in the carburetor bowl.

According to the recovery specialist, all eight spark plugs were removed during the recovery in order to lubricate the engine. Seven of the eight spark plugs that were removed were present during the examination. All seven spark plugs displayed saltwater corrosion.

The power flow short stack exhaust was examined, and with the exception of being bent slightly aft, no anomalies were noted.

The propeller remained attached to the engine. Both propeller blades were displaced towards the aft side of the blade about 16 inches from the propeller hub.

Medical and Pathological Information

Autopsies of the pilot and passenger were performed by the Box Elder County, Utah, Office of the Medical Examiner. The autopsies determined that the cause death for both occupants was "drowning."

Commercial Pilot

Toxicology testing at the FAA Forensic Sciences Laboratory was negative for carbon monoxide. Testing detected ethanol at 23 mg/dl in the urine but none in the blood (blood levels are used to determine impairment). The following medications, which are generally considered not to be impairing, were also detected: the pain and fever medication acetaminophen; the nasal decongestant oxymetazoline; the prostate treatments tamsulosin and terazosin; and the antidepressant venlafaxine, at 0.054 µg/ml in blood, and its metabolite, desmethylvenlafaxine, in blood.

Testing also detected the following potentially impairing drugs in blood: gabapentin at 3.897 µg/ml; hydrocodone at 0.082 µg/ml; its active metabolite, dihydrocodeine, at 0.024 µg/ml; and morphine at 0.078 µg/ml.

Gabapentin is an anti-seizure medication also used to treat chronic pain and is marketed under various names, including Neurontin. It is a central nervous system depressant and may cause symptoms including somnolence, dizziness, impaired coordination, involuntary eye movement and fatigue. It carries the warning: "prescribers and patients should be aware that patients' ability to assess their own driving competence, as well as their ability to assess the degree of somnolence caused by gabapentin, can be imperfect." It is only available by prescription. This medication is disqualifying for FAA medical certification.

Hydrocodone is a prescription, short-term use medication used to relieve severe pain. Hydrocodone is in a class of medications called opiate (narcotic) analgesics. Hydromorphone and dihydrocodeine are active metabolites of hydrocodone. Hydrocodone carries the warnings: "exposes users to the risks of addiction, abuse, and misuse," and "profound sedation, respiratory depression, coma, and death may result from the concomitant use of hydrocodone … with benzodiazepines or other CNS depressants (e.g., non-benzodiazepine sedatives/hypnotics, anxiolytics, tranquilizers, muscle relaxants, general anesthetics, antipsychotics, other opioids, alcohol)." The range of blood levels where hydrocodone is considered to have therapeutic psychoactive effects is between 0.01 and 0.05 µg/ml.

Morphine is a prescription medication used to relieve moderate to severe pain. It is in a class of medications called opiate (narcotic) analgesics. The medication has the potential to impair mental and/or physical ability required for the performance of potentially hazardous tasks, e.g. flying, driving, and operating heavy machinery. This medication is disqualifying for FAA medical certification.

Morphine, hydrocodone, and gabapentin are all central nervous system depressants and have a combined additive effect on toxic drug effects, including sedation, slowed or difficult breathing, and death.

On his FAA medical certificate application, the pilot reported that he used the anti-inflammatory medication oxaprozin to treat joint pain and the acid-reducing medication omeprazole for stomach

protection. These medications are generally considered not to be impairing.

A review of the pilot's primary care medical records between February 2015 and December 2017 revealed that he was receiving ongoing testosterone replacement injections and had lower back pain and left knee arthritis. His active medications as of December 2017 included the antihistamine nasal spray azelastine; the acid-reducing medication omeprazole; the anti-inflammatory medication oxaprozin; the cholesterol medication fenofibric acid; the nasal steroid spray fluticasone; the prostate medication terazosin; and the oral antifungal medication terbinafine. The nasal spray azelastine carries a warning of sedation, while the other medications are generally not considered to be sedating or impairing. The records contained no documentation of treatment for depression or recent opioid prescriptions.

Passenger

Toxicology testing was negative for carbon monoxide and volatiles. Tamsulosin was detected in the urine and blood. Tamsulosin is a prescription medication used to treat the symptoms of an enlarged prostate. Tamsulosin is in a class of medications called alpha blockers and generally not considered to be impairing.

Additional Information

The pilot that flew the airplane earlier on the day of the accident reported no anomalies with the airplane during his flight. While refueling the airplane after the flight, the refueler attached a ground strap to the exhaust and stated that the exhaust seemed loose. The club's director of maintenance sent out a mechanic who subsequently examined the exhaust stack and determined that the airplane was airworthy. According to the mechanic, the accident pilot was aware of the issue, agreed with his determination, and decided to fly the airplane.

Smooth "glassy" water can be a hazard because without texture on the surface of the water, there is no good way to judge height. According to the FAA, Seaplane Operations Guide, "reduced depth perception in glassy water is a frequent factor in accidents, even among experienced pilots." The guide further states "it isn't until the smooth surface is broken into wind ripples that reflections are completely destroyed, and you can count on good depth perception."

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Kent Gibbons; Federal Aviation Administration; Salt Lake City, UT Andrew Hall; Textron Aviation; Wichita, KS Troy Helgeson; Lycoming Engines; Williamsport, PA
Original Publish Date:	May 19, 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=96565