Aviation Investigation Final Report

Location:	Wasilla, Alaska	**Accident Number:**	ANC16FA052
Date & Time:	August 5, 2016, 13:40 Local	**Registration:**	N1839Z
Aircraft:	Cessna 210-5	**Aircraft Damage:**	Substantial
Defining Event:	Midair collision	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor and student pilot on board the Cessna were conducting practice takeoffs and landings using the airport's published right-turn traffic pattern. At the same time, the commercial pilot of a single-engine de Havilland airplane departed an airport 5 miles to the north, proceeded to the airport and turned onto the final leg of the traffic pattern for landing. The instructor on board the Cessna reported that, during their fourth landing, just as the student began the landing flare, there was a sudden loud noise, and the airplane abruptly nosed down and impacted the runway. The instructor reported that he did not hear or see the other airplane before the collision.

The pilot of the de Havilland reported that neither he nor his passenger heard any radio transmissions from the Cessna, and they did not see the Cessna in the traffic pattern until impact. The pilot stated that, about 70 ft above the runway surface, the Cessna overtook the de Havilland from directly above, impacting the propeller. The pilot was able to maintain control and subsequently landed the airplane.

A postaccident examination of both airplanes, revealed signatures consistent that the initial impact sequence was between the empennage of the Cessna and the propeller assembly of the de Havilland. The pilots for both airplanes reported no mechanical anomalies that would have prevented the airplanes from maneuvering to avoid an impact.

Day visual meteorological conditions prevailed in the area, and neither airplane was in communication with air traffic control; the airport was not equipped with a control tower. A recording of transmissions made on the airport's common traffic advisory frequency (CTAF) revealed that, although the Cessna instructor made radio transmissions throughout the first three traffic patterns; no radio transmissions were heard from the Cessna pilots during the final (accident) traffic pattern. The de Havilland pilot stated his airplane's position before entering the traffic pattern and again on the final leg announcing his intent to land.

Postaccident examination and testing of the two radios in the Cessna revealed no mechanical anomalies. Additionally, the radios in both airplanes were tuned to the correct frequency for the airport CTAF. The

Cessna instructor reported the he made a radio transmission during the final traffic pattern. It was undetermined why no CTAF radio transmission from the Cessna was heard on the CTAF recording for the accident traffic pattern.

Neither airplane was equipped with an Automatic Dependent Surveillance – Broadcast (ADS-B) system or cockpit display of traffic information. Had both airplanes been fully equipped with an ADS-B system capable of both transmitting and receiving position data and issuing traffic alerts via cockpit display, each pilot would have been alerted to the presence of the other airplane, and it is likely that the collision would have been avoided.

The see-and-avoid concept requires a pilot to look through the cockpit windows, identify other aircraft, decide if any aircraft are collision threats, and, if necessary, take the appropriate action to avert a collision. There are inherent limitations of this concept, including limitations of the human visual and information processing systems, pilot tasks that compete with the requirement to scan for traffic, the limited field of view from the cockpit, and environmental factors that could diminish the visibility of other aircraft.

OpsVue track data showed the flights paths for both airplanes as coming from opposite directions for the landing. It is likely that the pilots had relaxed their vigilance in looking for traffic when operating in the airport environment. The circumstances of this accident underscore the difficultly in seeing airborne traffic by pilots; the foundation of the "see and avoid" concept in VMC, even when the cockpit visibility offers opportunities to do so, and particularly when the pilots have no warning of traffic in the vicinity.

See-and-Avoid Concept

According to 14 *CFR* 91.113, "Right-of-Way Rules," "when weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft." In addition, FAA AC 90-48D, "Pilots' Role in Collision Avoidance," which was in effect at the time of the accident, stated that the see-and-avoid concept requires vigilance at all times by each pilot, regardless of whether the flight is conducted under instrument flight rules or VFR.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The failure of both pilots to see and avoid each other while landing at a non-tower-controlled airport, which resulted in a midair collision. Contributing to the accident was the absence of radio calls from the Cessna during the traffic pattern preceding the accident.

Findings

Personnel issues	Monitoring other aircraft - Pilot
Personnel issues	Monitoring other aircraft - Pilot of other aircraft

Factual Information

History of Flight

Landing	Midair collision (Defining event)

On August 5, 2016, about 1340 Alaska daylight time, a Cessna 210-5 airplane, N1839Z, and a turbine-powered, tailwheel/ski-equipped, de Havilland DHC-2T (Beaver) airplane, N30CC, collided midair while landing at Wasilla Airport (PAWS), Wasilla, Alaska. The certificated flight instructor and student pilot on board the Cessna sustained minor injuries, and the commercial pilot and passenger on board the de Havilland were not injured. Visual meteorological conditions prevailed in the area at the time of the accident. The Cessna was registered to Flying High, LLC, and it was operated by the student pilot under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as an instructional flight. The Cessna departed Merrill Field Airport (PAMR), Anchorage, Alaska, about 1230. The de Havilland was privately owned, and it was operated by the pilot under the provisions of 14 *CFR* Part 91 as a personal flight. The de Havilland departed Leisurewood Airstrip (9AK6), Wasilla, Alaska, about 1340. Neither airplane was operating on a flight plan.

The instructor on board the Cessna stated that he and the student departed from PAMR to conduct basic instrument flight training before proceeding to PAWS to practice landings. He said that, after arriving at PAWS, the student completed three successful stop-and-go landings on runway 4 while using the published right traffic pattern. He added that he was using the airport's common traffic advisory frequency (CTAF) of 122.80 MHz to announce their positions and intentions throughout the series of stop-and-go landings. The Cessna had two communication radios installed and the instructor and student reported that they utilized the Narco COM IIA radio while at PAWS, due to the presence of static when the Garmin GNS 430 radio was operated. The instructor stated that, during the accident landing, just as the student began the landing flare, there was a sudden loud noise, and the airplane abruptly nosed down. The airplane's nose subsequently impacted the runway. The instructor reported that neither he nor the student heard or saw the other airplane before the collision. The instructor additionally reported that the airplane's landing and navigation lights were on at the time of the accident.

The pilot of the de Havilland stated that he and his passenger were en route to PAWS to get fuel before continuing to Healy, Alaska. He stated that, after departing from 9AK6, which was located about 5 miles northwest of PAWS, he conducted a straight-in final approach for landing on runway 4. He further stated that, while on final approach, about 70 ft above ground level (agl) over the runway threshold, the Cessna overtook the de Havilland from directly above, impacting the propeller. Following the impact with the Cessna, the pilot continued the approach and landed on runway 4. The pilot was able to maintain control and maneuver the airplane off the runway to avoid impacting the Cessna. The de Havilland subsequently departed the left side of the runway and came to rest in about 5 ft high vegetation on sloping terrain. The pilot stated that he used the CTAF before and after entering the straight-in final for runway 4 at PAWS, announcing his positions and intentions. The pilot reported that neither himself nor the passenger heard or visually acquired the Cessna before impact. The pilot additionally reported that the airplane's landing and navigation lights were on at the time of the accident.

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	July 10, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 20, 2015
Flight Time:	(Estimated) 4947.2 hours (Total, all aircraft), 20 hours (Total, this make and model), 4947.2 hours (Pilot In Command, all aircraft), 174 hours (Last 90 days, all aircraft), 65 hours (Last 30 days, all aircraft), 2.5 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:	Student	**Age:**	55,Female
Airplane Rating(s):	None	**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:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 21, 2011
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 74 hours (Total, all aircraft), 26.2 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1839Z
Model/Series:	210-5	**Aircraft Category:**	Airplane
Year of Manufacture:	1962	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	205-0039
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	June 1, 2016 Annual	**Certified Max Gross Wt.:**	3300 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5322.4 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-470-S
Registered Owner:	On file	**Rated Power:**	260 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Both airplanes were equipped with the required communication equipment for the airspace in which they were operating. Neither airplane was equipped with an automatic dependent surveillance – broadcast (ADS-B) system, nor was either airplane required to be equipped with such a system.

Cessna

The fixed-gear, high-wing, single-engine airplane was manufactured in 1962. The airplane was configured with seating for 2 pilots and no passengers. The airplane was powered by a Continental IO-470 reciprocating engine. The airplane was white with light blue and dark blue accent lines, white wings, a chrome propeller spinner, and a black 2-blade McCauley propeller.

De Havilland

The tailwheel/ski-equipped, high-wing, single-engine airplane was manufactured in 1964. The airplane was configured with seating for 1 pilot and 9 passengers. The airplane was powered by a Pratt & Whitney Canada PT6A-34 turbine engine. The airplane was beige with light blue and grey accent lines, beige wings, a beige propeller spinner, and a black 3-blade Hartzell propeller.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAWS,354 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	21:36 Local	**Direction from Accident Site:**	52°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	16°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	ANCHORAGE, AK (MRI)	**Type of Flight Plan Filed:**	None
Destination:	Wasilla, AK (IYS)	**Type of Clearance:**	VFR;VFR flight following
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	WASILLA IYS	**Runway Surface Type:**	Asphalt
Airport Elevation:	353 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	04	**IFR Approach:**	None
Runway Length/Width:	3700 ft / 75 ft	**VFR Approach/Landing:**	Stop and go;Traffic pattern

PAWS is located about 3.5 miles southwest of Wasilla, Alaska at an elevation about 350 ft above mean sea level. The hilly terrain surrounding the airport is heavily wooded and populated with residential neighborhoods. PAWS has a mixed population of general aviation tenants and commercial aviation tenants, with a variety of airplanes and helicopters stationed at the airport. The airport is operated by the city of Wasilla, Alaska.

PAWS is within Class G airspace at the surface; Class E airspace begins at 700 ft above the surface. The airport was not equipped with a control tower. PAWS was equipped with 2 parallel runways; Runway 04S/22S measured about 1,690 ft long and about 60 ft wide and was composed of turf and gravel. Runway 04/22 measured about 3,700 ft long and about 75 ft wide and was composed of asphalt. The published traffic pattern for runway 04/22 is right traffic. PAWS does not have a published VFR traffic pattern altitude.

Wreckage and Impact Information

Crew Injuries:	2 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	61.569721,-149.546112(est)

The National Transportation Safety Board (NTSB) investigator-in-charge (IIC), three aviation safety inspectors (ASI) from the Federal Aviation Administration (FAA), along with a team of law enforcement officers from the Wasilla Police Department traveled to the accident scene on August 5. The NTSB IIC and the FAA ASIs performed accident site documentation, examined both airplanes, and interviewed the occupants of both airplanes. A postaccident examination of both airplanes, revealed signatures consistent that the initial impact sequence was between the empennage of the Cessna and the propeller assembly of the de Havilland. The substantial damage sustained to the empennage of the Cessna during the impact sequence rendered the airplane uncontrollable and impacted the runway. The de Havilland pilot was able to maintain control and maneuver the airplane off the runway to avoid impacting the Cessna; however, the de Havilland sustained substantial damage from the Cessna impacting its right wing. During the examination of both airplanes at the accident scene revealed that, when power was applied, the 122.80 MHz frequency was displayed for each radio selected in each airplane. The pilots of both airplanes stated that there were no preimpact mechanical failures or malfunctions that would have precluded normal operation of their respective airplanes.

Communications

A CTAF recording for PAWS was obtained from a private individual. The Cessna instructor could be heard making position reports during the three previous traffic patterns for the stop-and-go landings. No transmissions were heard from the Cessna instructor or student during the accident approach. The pilot of the de Havilland made two transmissions. During the first, he indicated that the airplane was "inbound from the north 3 miles out." The second transmission was, "Wasilla Area Traffic, Beaver Charlie-Charlie will be entering a -- coming in from the north left will be 4, Runway 4, Wasilla." For more information, refer to the PAWS CTAF transcript in the public docket.

Tests and Research

On August 10, the NTSB IIC and two FAA ASIs traveled to PAWS to test the two radios in the Cessna. The Cessna was equipped with two communication radios, a Garmin GNS 430 (serial number 97129593) and a Narco COM 11A (serial number 31760). The airplane was also equipped with a Garmin GMA 340 (serial number 96275630) communication control device that facilitated the selection between the two radios. Power was applied to the airplane and the two radios were tuned to 122.80 MHz. The inter-communication system (ICS) isolation feature was selected for "crew" on the Garmin GMA 340. The NTSB IIC and the FAA ASI communicated over the radios; the NSTB IIC was in the airplane on the radios, and the FAA ASI was using a handheld radio set to 122.80 MHz at various distances from the airplane. The test was conducted on a ramp at PAWS where the Cessna was temporarily stationed after the accident. The results were as follows:

Garmin GNS 430 (using left side of cockpit headset port). COM1/COM1 (frequency) MIC (microphone) selected. Transmit and receive were loud and clear.

Narco COM 11A (using left side of cockpit headset port). COM2/COM2 (frequency) MIC (microphone) selected. Transmit was weak, receive was loud and clear.

Garmin GNS 430 (using right side of cockpit headset port). COM1/COM1 MIC selected. Transmit and receive were loud and clear.

Narco COM 11A (using right side of cockpit headset port). COM2/COM2 MIC selected. Transmit was weak, receive was loud and clear.

No malfunctions or failures were noted with the Garmin GMA 340. Refer to the N1839Z Radio Testing Report in the public docket for more information.

Additional postaccident examination and testing of the Cessna's two radios was conducted on August 23 at Northern Lights Avionics, Inc. (an FAA-authorized avionics repair station), Anchorage, Alaska, with oversight from the NTSB IIC and an NTSB air safety investigator. No malfunctions or failures were noted for the transmit and receive function checks for the Garmin GNS 430 and the Narco COM 11A. No malfunctions or failures were noted with the operational checks with the Garmin GMA 340. Refer to the N1839Z Northern Lights Avionics, Inc. Work Order in the public docket for more information about the checks conducted. An examination of the Cessna's maintenance records revealed no evidence of uncorrected mechanical discrepancies with the airframe.

Additional Information

OpsVue Track Data

OpsVue track data was used to produce the flight tracks for the two airplanes. OpsVue is a commercially-available program that provides track data in a "mosaic" format, by taking all available surveillance data (ADS-B, radar track data, etc.) received from a transponder-equipped aircraft and applying "smoothing" to achieve the displayed flight track and overlaid onto satellite imagery. The track data showed a convergence of the two airplanes' flight paths about 0.80 miles southwest of the approach end of runway 04 at PAWS before the midair collision over runway 4. The precise altitudes captured for the two airplanes in the OpsVue track data could not be confirmed due to the way in which altitude information is corrected for barometric pressure within the OpsVue system.

Non-Towered Airport Flight Operations

FAA Advisory Circular 90-66B, "Non-Towered Airport Flight Operations," states in part:

The pilot in command's primary responsibility is to see and avoid other aircraft and to help them see and avoid his or her aircraft. Keep lights and strobes on. The use of any traffic pattern procedure does not alter the responsibility of each pilot to see and avoid other aircraft. Pilots are encouraged to participate in "Operation Lights On," a voluntary pilot safety program described in the Aeronautical Information Manual that is designed to improve the "see-and-avoid" capabilities.

It is recommended that airplanes observe a 1,000 ft agl traffic pattern altitude. Large and turbine-powered airplanes should enter the traffic pattern at an altitude of 1,500 ft agl or 500 ft above the established pattern altitude. A pilot may vary the size of the traffic pattern depending on the aircraft's performance characteristics.

The FAA encourages pilots to use the standard traffic pattern when arriving or departing a non-towered airport or a part-time-towered airport when the control tower is not operating, particularly when other traffic is observed or when operating from an unfamiliar airport. However, there are occasions where a pilot can choose to execute a straight-in approach for landing when not intending to enter the traffic pattern, such as a visual approach executed as part of the termination of an instrument approach. Pilots should clearly communicate on the CTAF and coordinate maneuvering for and execution of the landing with other traffic so as not to disrupt the flow of other aircraft. Therefore, pilots operating in the traffic pattern should be alert at all times to aircraft executing straight-in landings, particularly when flying a base leg prior to turning final.

Automatic Dependent Surveillance – Broadcast (ADS-B)

The FAA implemented national ADS-B technology in Alaska. Formerly known as Capstone, the joint industry/FAA program (which includes ground-based stations, satellites, and airplane avionics) currently provides pilots with situational awareness by displaying the airplane's position over terrain and warns pilots of the presence of other ADS-B-equipped aircraft that may be present, while using global positioning system technology coupled with an instrument panel mounted moving map display.

Right-of-Way Rules

14 *CFR* 91.113 lists the right-of-way rules for aircraft, and states:

(a) Inapplicability. This section does not apply to the operation of an aircraft on water.

(b) General. When weather conditions permit, regardless of whether an operation is conducted under

instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

(c) In distress. An aircraft in distress has the right-of-way over all other air traffic.

(d) Converging. When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories -

(1) A balloon has the right-of-way over any other category of aircraft;

(2) A glider has the right-of-way over an airship, powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

(3) An airship has the right-of-way over a powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

However, an aircraft towing or refueling other aircraft has the right-of-way over all other engine-driven aircraft.

(e) Approaching head-on. When aircraft are approaching each other head-on, or nearly so, each pilot of each aircraft shall alter course to the right.

(f) Overtaking. Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(g) Landing. Aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

Vigilant Lookout

FAA Advisory Circular 90-48D, "Pilots' Role in Collision Avoidance," states in part:

Pilots should also keep in mind their responsibility for continuously maintaining a vigilant lookout regardless of the type of aircraft being flow. Remember that most midair collision accidents and reported near midair collision incidents occurred during good VFR weather conditions and during the hours of daylight.

Pilot Profiles

FAA P-8740-51, "How to Avoid a Midair Collision," states in part:

There is no way to say whether the inexperienced pilot or the older, more experienced pilot is more likely to be involved in an in-flight collision. A beginning pilot has so much to think about he may forget to look around. On the other hand, the older pilot, having sat through many hours of boring flight without spotting any hazardous traffic, may grow complacent and forget to scan. No pilot is invulnerable.

The See-and-Avoid Concept

In 1991, the Australian Transport Safety Bureau published a research report titled "Limitations of the See-and-Avoid Principle." The report discusses the role of the see-and-avoid concept in preventing collisions and some of its inherent limitations and states in part:

Cockpit workload and other factors reduce the time that pilots spend in traffic scans. However, even when pilots are looking out, there is no guarantee that other aircraft will be sighted. Most cockpit windscreen configurations severely limit the view available to the pilot. The available view is frequently interrupted by obstructions such as window-posts which totally obscure some parts of the view and make other areas visible to only one eye....Visual scanning involves moving the eyes in order to bring successive areas of the visual field onto the small area of sharp vision in the centre of the eye. The process is frequently unsystematic and may leave large areas of the field of view unsearched….The physical limitations of the human eye are such that even the most careful search does not guarantee that traffic will be sighted….An object which is smaller than the eye's acuity threshold is unlikely to be detected and even less likely to be identified as an approaching aircraft….The human visual system is better at detecting moving targets than stationary targets, yet in most cases, an aircraft on a collision course appears as a stationary target in the pilot's visual field. The contrast between an aircraft and its background can be significantly reduced by atmospheric effects, even in conditions of good visibility. An approaching aircraft, in many cases, presents a very small visual angle until a short time before impact. In addition, complex backgrounds such as ground features or clouds hamper the identification of aircraft via a visual effect known as 'contour interaction'. This occurs when background contours interact with the form of the aircraft, producing a less distinct image. Even when an approaching aircraft has been sighted, there is no guarantee that evasive action will be successful.

Midair Collison Avoidance Technology

The NTSB has published Safety Alert SA-058 Prevent Midair Collisions: Don't Depend on Vision Alone. This document discusses the benefits of utilize technologies in the cockpit to prevent midair collisions and states in part:

The "see-and-avoid" concept has long been the foundation of midair collision prevention. However, the inherent limitations of this concept, including human limitations, environmental conditions, aircraft blind spots, and operational distractions, leave even the most diligent pilot vulnerable to the threat of a midair collision with an unseen aircraft.

Technologies in the cockpit that display or alert of traffic conflicts, such as traffic advisory systems and automatic dependent surveillance–broadcast (ADS-B), can help pilots become aware of and maintain *separation from nearby aircraft. Such systems can augment reality and help compensate for the limitations of visually searching for traffic.*

Airport Flying Areas

The Alaskan Aviation Safety Foundation published Safety Briefing "Avoiding A Midair Collison in Alaska – Airport Traffic Advisory Reminders." This document discusses midair collision avoidance reminders while conducting flight operations in Alaska and states in part:

Almost all midair collisions occur during daylight hours and in visual flight rules conditions. Most collisions happen within 5 miles of an airport (during final or short final approach to landing), and usually on weekend afternoons. Pilots in Alaska need to communicate, listen, and maintain a visual scan in all areas where they take off and land such as lakes, rivers, gravel bars, and especially around airports.

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Hugh Youngers ; FAA Polaris CMO; Anchorage , AK
Original Publish Date:	February 26, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93774

Aviation Investigation Final Report

Location:	Wasilla, Alaska	**Accident Number:**	ANC16FA052
Date & Time:	August 5, 2016, 13:40 Local	**Registration:**	N30CC
Aircraft:	DEHAVILLAND DHC 2	**Aircraft Damage:**	Substantial
Defining Event:	Midair collision	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The flight instructor and student pilot on board the Cessna were conducting practice takeoffs and landings using the airport's published right-turn traffic pattern. At the same time, the commercial pilot of a single-engine de Havilland airplane departed an airport 5 miles to the north, proceeded to the airport and turned onto the final leg of the traffic pattern for landing. The instructor on board the Cessna reported that, during their fourth landing, just as the student began the landing flare, there was a sudden loud noise, and the airplane abruptly nosed down and impacted the runway. The instructor reported that he did not hear or see the other airplane before the collision.

The pilot of the de Havilland reported that neither he nor his passenger heard any radio transmissions from the Cessna, and they did not see the Cessna in the traffic pattern until impact. The pilot stated that, about 70 ft above the runway surface, the Cessna overtook the de Havilland from directly above, impacting the propeller. The pilot was able to maintain control and subsequently landed the airplane.

A postaccident examination of both airplanes, revealed signatures consistent that the initial impact sequence was between the empennage of the Cessna and the propeller assembly of the de Havilland. The pilots for both airplanes reported no mechanical anomalies that would have prevented the airplanes from maneuvering to avoid an impact.

Day visual meteorological conditions prevailed in the area, and neither airplane was in communication with air traffic control; the airport was not equipped with a control tower. A recording of transmissions made on the airport's common traffic advisory frequency (CTAF) revealed that, although the Cessna instructor made radio transmissions throughout the first three traffic patterns; no radio transmissions were heard from the Cessna pilots during the final (accident) traffic pattern. The de Havilland pilot stated his airplane's position before entering the traffic pattern and again on the final leg announcing his intent to land.

Postaccident examination and testing of the two radios in the Cessna revealed no mechanical anomalies. Additionally, the radios in both airplanes were tuned to the correct frequency for the airport CTAF. The Cessna instructor reported the he made a radio transmission during the final traffic pattern. It was undetermined why no CTAF radio transmission from the Cessna was heard on the CTAF recording for the accident traffic pattern.

Neither airplane was equipped with an Automatic Dependent Surveillance – Broadcast (ADS-B) system or cockpit display of traffic information. Had both airplanes been fully equipped with an ADS-B system capable of both transmitting and receiving position data and issuing traffic alerts via cockpit display, each pilot would have been alerted to the presence of the other airplane, and it is likely that the collision would have been avoided.

The see-and-avoid concept requires a pilot to look through the cockpit windows, identify other aircraft, decide if any aircraft are collision threats, and, if necessary, take the appropriate action to avert a collision. There are inherent limitations of this concept, including limitations of the human visual and information processing systems, pilot tasks that compete with the requirement to scan for traffic, the limited field of view from the cockpit, and environmental factors that could diminish the visibility of other aircraft.

OpsVue track data showed the flights paths for both airplanes as coming from opposite directions for the landing. It is likely that the pilots had relaxed their vigilance in looking for traffic when operating in the airport environment. The circumstances of this accident underscore the difficultly in seeing airborne traffic by pilots; the foundation of the "see and avoid" concept in VMC, even when the cockpit visibility offers opportunities to do so, and particularly when the pilots have no warning of traffic in the vicinity.

See-and-Avoid Concept

According to 14 *CFR* 91.113, "Right-of-Way Rules," "when weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft." In addition, FAA AC 90-48D, "Pilots' Role in Collision Avoidance," which was in effect at the time of the accident, stated that the see-and-avoid concept requires vigilance at all times by each pilot, regardless of whether the flight is conducted under instrument flight rules or VFR.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The failure of both pilots to see and avoid each other while landing at a non-tower-controlled airport, which resulted in a midair collision. Contributing to the accident was the absence of radio calls from the Cessna during the traffic pattern preceding the accident.

Findings

Personnel issues	Monitoring other aircraft - Pilot
Personnel issues	Monitoring other aircraft - Pilot of other aircraft

Factual Information

History of Flight

Landing	Midair collision

On August 5, 2016, about 1340 Alaska daylight time, a Cessna 210-5 airplane, N1839Z, and a turbine-powered, tailwheel/ski-equipped, de Havilland DHC-2T (Beaver) airplane, N30CC, collided midair while landing at Wasilla Airport (PAWS), Wasilla, Alaska. The certificated flight instructor and student pilot on board the Cessna sustained minor injuries, and the commercial pilot and passenger on board the de Havilland were not injured. Visual meteorological conditions prevailed in the area at the time of the accident. The Cessna was registered to Flying High, LLC, and it was operated by the student pilot under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as an instructional flight. The Cessna departed Merrill Field Airport (PAMR), Anchorage, Alaska, about 1230. The de Havilland was privately owned, and it was operated by the pilot under the provisions of 14 *CFR* Part 91 as a personal flight. The de Havilland departed Leisurewood Airstrip (9AK6), Wasilla, Alaska, about 1340. Neither airplane was operating on a flight plan.

The instructor on board the Cessna stated that he and the student departed from PAMR to conduct basic instrument flight training before proceeding to PAWS to practice landings. He said that, after arriving at PAWS, the student completed three successful stop-and-go landings on runway 4 while using the published right traffic pattern. He added that he was using the airport's common traffic advisory frequency (CTAF) of 122.80 MHz to announce their positions and intentions throughout the series of stop-and-go landings. The Cessna had two communication radios installed and the instructor and student reported that they utilized the Narco COM IIA radio while at PAWS, due to the presence of static when the Garmin GNS 430 radio was operated. The instructor stated that, during the accident landing, just as the student began the landing flare, there was a sudden loud noise, and the airplane abruptly nosed down. The airplane's nose subsequently impacted the runway. The instructor reported that neither he nor the student heard or saw the other airplane before the collision. The instructor additionally reported that the airplane's landing and navigation lights were on at the time of the accident.

The pilot of the de Havilland stated that he and his passenger were en route to PAWS to get fuel before continuing to Healy, Alaska. He stated that, after departing from 9AK6, which was located about 5 miles northwest of PAWS, he conducted a straight-in final approach for landing on runway 4. He further stated that, while on final approach, about 70 ft above ground level (agl) over the runway threshold, the Cessna overtook the de Havilland from directly above, impacting the propeller. Following the impact with the Cessna, the pilot continued the approach and landed on runway 4. The pilot was able to maintain control and maneuver the airplane off the runway to avoid impacting the Cessna. The de Havilland subsequently departed the left side of the runway and came to rest in about 5 ft high vegetation on sloping terrain. The pilot stated that he used the CTAF before and after entering the straight-in final for runway 4 at PAWS, announcing his positions and intentions. The pilot reported that neither himself nor the passenger heard or visually acquired the Cessna before impact. The pilot additionally reported that the airplane's landing and navigation lights were on at the time of the accident.

Pilot Information

Certificate:	Commercial	**Age:**	49,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	July 18, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 20, 2016
Flight Time:	(Estimated) 6800 hours (Total, all aircraft), 1200 hours (Total, this make and model), 6550 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 45.5 hours (Last 30 days, all aircraft), 1.2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	DEHAVILLAND	**Registration:**	N30CC
Model/Series:	DHC 2 T	**Aircraft Category:**	Airplane
Year of Manufacture:	1964	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1566TB4
Landing Gear Type:	Tailwheel; Ski/wheel	**Seats:**	10
Date/Type of Last Inspection:	July 19, 2016 100 hour	**Certified Max Gross Wt.:**	6000 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:		**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	C126 installed, not activated	**Engine Model/Series:**	PT-6A-34
Registered Owner:	On file	**Rated Power:**	650 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Both airplanes were equipped with the required communication equipment for the airspace in which they were operating. Neither airplane was equipped with an automatic dependent surveillance – broadcast (ADS-B) system, nor was either airplane required to be equipped with such a system.

Cessna

The fixed-gear, high-wing, single-engine airplane was manufactured in 1962. The airplane was configured with seating for 2 pilots and no passengers. The airplane was powered by a Continental IO-470 reciprocating engine. The airplane was white with light blue and dark blue accent lines, white wings, a chrome propeller spinner, and a black 2-blade McCauley propeller.

De Havilland

The tailwheel/ski-equipped, high-wing, single-engine airplane was manufactured in 1964. The airplane was configured with seating for 1 pilot and 9 passengers. The airplane was powered by a Pratt & Whitney Canada PT6A-34 turbine engine. The airplane was beige with light blue and grey accent lines, beige wings, a beige propeller spinner, and a black 3-blade Hartzell propeller.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAWS,354 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	21:36 Local	**Direction from Accident Site:**	52°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	16°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	WASILLA, AK (9AK6)	**Type of Flight Plan Filed:**	None
Destination:	Wasilla, AK (IYS)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	WASILLA IYS	**Runway Surface Type:**	Asphalt
Airport Elevation:	353 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	04	**IFR Approach:**	None
Runway Length/Width:	3700 ft / 75 ft	**VFR Approach/Landing:**	Stop and go;Traffic pattern

PAWS is located about 3.5 miles southwest of Wasilla, Alaska at an elevation about 350 ft above mean sea level. The hilly terrain surrounding the airport is heavily wooded and populated with residential neighborhoods. PAWS has a mixed population of general aviation tenants and commercial aviation tenants, with a variety of airplanes and helicopters stationed at the airport. The airport is operated by the city of Wasilla, Alaska.

PAWS is within Class G airspace at the surface; Class E airspace begins at 700 ft above the surface. The airport was not equipped with a control tower. PAWS was equipped with 2 parallel runways; Runway 04S/22S measured about 1,690 ft long and about 60 ft wide and was composed of turf and gravel. Runway 04/22 measured about 3,700 ft long and about 75 ft wide and was composed of asphalt. The published traffic pattern for runway 04/22 is right traffic. PAWS does not have a published VFR traffic pattern altitude.

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	61.569721,-149.546112(est)

The National Transportation Safety Board (NTSB) investigator-in-charge (IIC), three aviation safety inspectors (ASI) from the Federal Aviation Administration (FAA), along with a team of law enforcement officers from the Wasilla Police Department traveled to the accident scene on August 5. The NTSB IIC and the FAA ASIs performed accident site documentation, examined both airplanes, and interviewed the occupants of both airplanes. A postaccident examination of both airplanes, revealed signatures consistent that the initial impact sequence was between the empennage of the Cessna and the propeller assembly of the de Havilland. The substantial damage sustained to the empennage of the Cessna during the impact sequence rendered the airplane uncontrollable and impacted the runway. The de Havilland pilot was able to maintain control and maneuver the airplane off the runway to avoid impacting the Cessna; however, the de Havilland sustained substantial damage from the Cessna impacting its right wing. During the examination of both airplanes at the accident scene revealed that, when power was applied, the 122.80 MHz frequency was displayed for each radio selected in each airplane. The pilots of both airplanes stated that there were no preimpact mechanical failures or malfunctions that would have precluded normal operation of their respective airplanes.

Communications

A CTAF recording for PAWS was obtained from a private individual. The Cessna instructor could be heard making position reports during the three previous traffic patterns for the stop-and-go landings. No transmissions were heard from the Cessna instructor or student during the accident approach. The pilot of the de Havilland made two transmissions. During the first, he indicated that the airplane was "inbound from the north 3 miles out." The second transmission was, "Wasilla Area Traffic, Beaver Charlie-Charlie will be entering a -- coming in from the north left will be 4, Runway 4, Wasilla." For more information, refer to the PAWS CTAF transcript in the public docket.

Tests and Research

On August 10, the NTSB IIC and two FAA ASIs traveled to PAWS to test the two radios in the Cessna. The Cessna was equipped with two communication radios, a Garmin GNS 430 (serial number 97129593) and a Narco COM 11A (serial number 31760). The airplane was also equipped with a Garmin GMA 340 (serial number 96275630) communication control device that facilitated the selection between the two radios. Power was applied to the airplane and the two radios were tuned to 122.80 MHz. The inter-communication system (ICS) isolation feature was selected for "crew" on the Garmin GMA 340. The NTSB IIC and the FAA ASI communicated over the radios; the NSTB IIC was in the airplane on the radios, and the FAA ASI was using a handheld radio set to 122.80 MHz at various distances from the airplane. The test was conducted on a ramp at PAWS where the Cessna was temporarily stationed after the accident. The results were as follows:

Garmin GNS 430 (using left side of cockpit headset port). COM1/COM1 (frequency) MIC (microphone) selected. Transmit and receive were loud and clear.

Narco COM 11A (using left side of cockpit headset port). COM2/COM2 (frequency) MIC (microphone) selected. Transmit was weak, receive was loud and clear.

Garmin GNS 430 (using right side of cockpit headset port). COM1/COM1 MIC selected. Transmit and receive were loud and clear.

Narco COM 11A (using right side of cockpit headset port). COM2/COM2 MIC selected. Transmit was weak, receive was loud and clear.

No malfunctions or failures were noted with the Garmin GMA 340. Refer to the N1839Z Radio Testing Report in the public docket for more information.

Additional postaccident examination and testing of the Cessna's two radios was conducted on August 23 at Northern Lights Avionics, Inc. (an FAA-authorized avionics repair station), Anchorage, Alaska, with oversight from the NTSB IIC and an NTSB air safety investigator. No malfunctions or failures were noted for the transmit and receive function checks for the Garmin GNS 430 and the Narco COM 11A. No malfunctions or failures were noted with the operational checks with the Garmin GMA 340. Refer to the N1839Z Northern Lights Avionics, Inc. Work Order in the public docket for more information about the checks conducted. An examination of the Cessna's maintenance records revealed no evidence of uncorrected mechanical discrepancies with the airframe.

Additional Information

OpsVue Track Data

OpsVue track data was used to produce the flight tracks for the two airplanes. OpsVue is a commercially-available program that provides track data in a "mosaic" format, by taking all available surveillance data (ADS-B, radar track data, etc.) received from a transponder-equipped aircraft and applying "smoothing" to achieve the displayed flight track and overlaid onto satellite imagery. The track data showed a convergence of the two airplanes' flight paths about 0.80 miles southwest of the approach end of runway 04 at PAWS before the midair collision over runway 4. The precise altitudes captured for the two airplanes in the OpsVue track data could not be confirmed due to the way in which altitude information is corrected for barometric pressure within the OpsVue system.

Non-Towered Airport Flight Operations

FAA Advisory Circular 90-66B, "Non-Towered Airport Flight Operations," states in part:

The pilot in command's primary responsibility is to see and avoid other aircraft and to help them see and avoid his or her aircraft. Keep lights and strobes on. The use of any traffic pattern procedure does not alter the responsibility of each pilot to see and avoid other aircraft. Pilots are encouraged to participate in "Operation Lights On," a voluntary pilot safety program described in the Aeronautical Information Manual that is designed to improve the "see-and-avoid" capabilities.

It is recommended that airplanes observe a 1,000 ft agl traffic pattern altitude. Large and turbine-powered airplanes should enter the traffic pattern at an altitude of 1,500 ft agl or 500 ft above the established pattern altitude. A pilot may vary the size of the traffic pattern depending on the aircraft's performance characteristics.

The FAA encourages pilots to use the standard traffic pattern when arriving or departing a non-towered airport or a part-time-towered airport when the control tower is not operating, particularly when other traffic is observed or when operating from an unfamiliar airport. However, there are occasions where a pilot can choose to execute a straight-in approach for landing when not intending to enter the traffic pattern, such as a visual approach executed as part of the termination of an instrument approach. Pilots should clearly communicate on the CTAF and coordinate maneuvering for and execution of the landing with other traffic so as not to disrupt the flow of other aircraft. Therefore, pilots operating in the traffic pattern should be alert at all times to aircraft executing straight-in landings, particularly when flying a base leg prior to turning final.

Automatic Dependent Surveillance – Broadcast (ADS-B)

The FAA implemented national ADS-B technology in Alaska. Formerly known as Capstone, the joint industry/FAA program (which includes ground-based stations, satellites, and airplane avionics) currently provides pilots with situational awareness by displaying the airplane's position over terrain and warns pilots of the presence of other ADS-B-equipped aircraft that may be present, while using global positioning system technology coupled with an instrument panel mounted moving map display.

Right-of-Way Rules

14 *CFR* 91.113 lists the right-of-way rules for aircraft, and states:

(a) Inapplicability. This section does not apply to the operation of an aircraft on water.

(b) General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

(c) In distress. An aircraft in distress has the right-of-way over all other air traffic.

(d) Converging. When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories -

(1) A balloon has the right-of-way over any other category of aircraft;

(2) A glider has the right-of-way over an airship, powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

(3) An airship has the right-of-way over a powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

However, an aircraft towing or refueling other aircraft has the right-of-way over all other engine-driven aircraft.

(e) Approaching head-on. When aircraft are approaching each other head-on, or nearly so, each pilot of each aircraft shall alter course to the right.

(f) Overtaking. Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(g) Landing. Aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

Vigilant Lookout

FAA Advisory Circular 90-48D, "Pilots' Role in Collision Avoidance," states in part:

Pilots should also keep in mind their responsibility for continuously maintaining a vigilant lookout regardless of the type of aircraft being flow. Remember that most midair collision accidents and reported near midair collision incidents occurred during good VFR weather conditions and during the hours of daylight.

Pilot Profiles

FAA P-8740-51, "How to Avoid a Midair Collision," states in part:

There is no way to say whether the inexperienced pilot or the older, more experienced pilot is more likely to be involved in an in-flight collision. A beginning pilot has so much to think about he may forget to look around. On the other hand, the older pilot, having sat through many hours of boring flight without spotting any hazardous traffic, may grow complacent and forget to scan. No pilot is invulnerable.

The See-and-Avoid Concept

In 1991, the Australian Transport Safety Bureau published a research report titled "Limitations of the See-and-Avoid Principle." The report discusses the role of the see-and-avoid concept in preventing collisions and some of its inherent limitations and states in part:

Cockpit workload and other factors reduce the time that pilots spend in traffic scans. However, even when pilots are looking out, there is no guarantee that other aircraft will be sighted. Most cockpit windscreen configurations severely limit the view available to the pilot. The available view is frequently interrupted by obstructions such as window-posts which totally obscure some parts of the view and make other areas visible to only one eye....Visual scanning involves moving the eyes in order to bring successive areas of the visual field onto the small area of sharp vision in the centre of the eye. The process is frequently unsystematic and may leave large areas of the field of view unsearched….The physical limitations of the human eye are such that even the most careful search does not guarantee that traffic will be sighted….An object which is smaller than the eye's acuity threshold is unlikely to be detected and even less likely to be identified as an approaching aircraft….The human visual system is better at detecting moving targets than stationary targets, yet in most cases, an aircraft on a collision course appears as a stationary target in the pilot's visual field. The contrast between an aircraft and its background can be significantly reduced by atmospheric effects, even in conditions of good visibility. An approaching aircraft, in many cases, presents a very small visual angle until a short time before impact. In addition, complex backgrounds such as ground features or clouds hamper the identification of aircraft via a visual effect known as 'contour interaction'. This occurs when background contours interact with the form of the aircraft, producing a less distinct image. Even when an approaching aircraft has been sighted, there is no guarantee that evasive action will be successful.

Midair Collison Avoidance Technology

The NTSB has published Safety Alert SA-058 Prevent Midair Collisions: Don't Depend on Vision Alone. This document discusses the benefits of utilize technologies in the cockpit to prevent midair collisions and states in part:

The "see-and-avoid" concept has long been the foundation of midair collision prevention. However, the inherent limitations of this concept, including human limitations, environmental conditions, aircraft blind spots, and operational distractions, leave even the most diligent pilot vulnerable to the threat of a midair collision with an unseen aircraft.

Technologies in the cockpit that display or alert of traffic conflicts, such as traffic advisory systems and automatic dependent surveillance–broadcast (ADS-B), can help pilots become aware of and maintain separation from nearby aircraft. Such systems can augment reality and help compensate for the limitations of visually searching for traffic.

Airport Flying Areas

The Alaskan Aviation Safety Foundation published Safety Briefing "Avoiding A Midair Collison in Alaska – Airport Traffic Advisory Reminders." This document discusses midair collision avoidance reminders while conducting flight operations in Alaska and states in part:

Almost all midair collisions occur during daylight hours and in visual flight rules conditions. Most collisions happen within 5 miles of an airport (during final or short final approach to landing), and usually on weekend afternoons. Pilots in Alaska need to communicate, listen, and maintain a visual scan in all areas where they take off and land such as lakes, rivers, gravel bars, and especially around airports.

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Hugh Youngers ; FAA Polaris CMO; Anchorage , AK
Original Publish Date:	February 26, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93774