



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	North Fox Island, Michigan	<b>Accident Number:</b>	CEN18LA298
<b>Date &amp; Time:</b>	July 29, 2018, 14:35 Local	<b>Registration:</b>	N32WR
<b>Aircraft:</b>	Extra EA300	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Midair collision	<b>Injuries:</b>	2 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

An airline transport pilot in an aerobatic low-wing airplane, an Extra 300, with a passenger on board was landing while an airline transport pilot in a high-wing airplane, a Cessna 172, near maximum weight with two passengers on board was conducting a short/soft-field takeoff from an nontowered, island-based runway surrounded by tall trees.

The Extra pilot and passenger reported that the pilot's landing intention was communicated on the common traffic advisory frequency (CTAF) with no replies. They saw an airplane at the opposite end of the airstrip, and the pilot decided to land. The Cessna pilot reported that he monitored the CTAF and then taxied down the center of the runway; he heard a radio call on the frequency from an airport on a nearby island. The Cessna pilot made his departure radio call on the CTAF in the blind and conducted a rolling departure with as much runway ahead as possible; he did not hear or see any other airplanes. The Cessna lifted off about 5 to 7 ft above ground level and accelerated to best angle of climb speed plus 10 knots. The Extra pilot indicated that he did not see any aircraft while he was on final approach to landing until his airplane was about 20-30 ft above the landing surface just before the threshold when he saw a bright object out the right side just in front of the wing. The Extra and the Cessna then collided.

The CTAF frequency at the accident airport is not recorded. However, a witness monitoring another CTAF frequency on a nearby island overheard the pilot of an airplane calling intention to land and remarked to a customer that the call was on the wrong frequency. It is likely that the Extra pilot was transmitting on the CTAF frequency for the airport on a nearby island; the Cessna pilot likely heard this transmission but attributed it to a pilot landing at the other airport.

The airport leaseholder's website contained a link to pilot information, which included a safety briefing for the airport. The briefing recommended that the airport's CTAF, as well as another local airport's CTAF, be monitored. In addition, the briefing recommended that arriving aircraft fly over the airfield and scan for aircraft on the ground using a left traffic pattern. The briefing advised that the airport is in

the Unimproved Airport Category and that pilots "land at your own risk."

The Extra pilot's use of an incorrect CTAF precluded him from hearing the Cessna pilot's transmission of his intent to depart. In addition, trees surrounding the runway precluded the Extra pilot from seeing the Cessna's departure until it was too late to take evasive action.

## Probable Cause and Findings

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

The Extra pilot's failure to see and avoid the Cessna, which resulted in an in-flight collision. Contributing to the accident was the failure of the Extra pilot to tune his radio to the correct frequency, which resulted in no common traffic advisories being heard or recognized as relevant by either pilot.

### Findings

Personnel issues	Monitoring other aircraft - Pilot
Personnel issues	Use of equip/system - Pilot

# Factual Information

## History of Flight

Landing	Midair collision (Defining event)
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On July 29, 2018, about 1435 eastern daylight time, an Extra EA300 LC airplane, N32WR, and a Cessna 172 airplane, N6021A, collided in flight over runway 25 at the North Fox Island Airport (6Y3), North Fox Island, Michigan. The Extra EA300 LC was landing and the Cessna 172 was departing. The airline transport pilot and passenger on the Extra EA300 LC were uninjured and the airline transport pilot and two passengers on the Cessna 172 received minor injuries. The Extra EA300 LC sustained substantial right-wing damage and the Cessna 172 sustained substantial empennage, left wing, and fuselage damage during the collision and subsequent impact with terrain. The Extra EA300 LC was registered to Captain Property and Investment LLC and was operated by its pilot. The Cessna 172 was registered to and operated by its pilot. Both flights were being conducted as Title 14 *Code of Federal Regulations* Part 91 personal flights. Day visual meteorological conditions prevailed in the area about the time of the accident, and the flights were not operated on flight plans. The Extra EA300 LC departed from the Appleton International Airport, near Appleton, Wisconsin, and was destined for 6Y3. The Cessna 172 was originating from 6Y3 at the time of the accident.

According to the pilot of N32WR, the flight was uneventful until the landing phase. He initiated the descent approximately 10 miles from 6Y3 and started self-announcing his intentions "in accordance with Advisory Circular 90-66B." At no time were there any responses or transmissions heard from other aircraft at 6Y3. Upon reaching the pattern altitude of 1,700 ft, the pilot continued the left-hand pattern to final.

At approximately 30-40 feet above the surface, the pilot started to round out while slowing in order to land just beyond the threshold to maximize the runway surface for the rollout. He advised that there were no aircraft visible during the final and approach to landing until an estimated 20-30 feet above the landing surface just prior to the threshold which was marked by 3 yellow cones. Out of the pilot's right side, just in front of the right-hand wing, he saw a bright object which turned out to be a departing airplane.

The pilot stated that N32WR aircraft impacted the other airplane. He said that the airplane yawed strongly to the right. The pilot was able to regain control and ended up coming to a stop about 800 ft beyond the resting place of the other airplane, near the imaginary runway centerline. The pilot determined his passenger was ok and he egressed to help the other airplane's occupants.

The pilot then ran toward the other airplane, a Cessna 172. One Cessna occupant was already out of the airplane and another left the airplane through the right-hand door. The third occupant was still inside, but before the Extra pilot could reach the airplane, the third occupant had departed through the right-hand door as well. There was an observed fuel leak from the left-hand wing of the Cessna as fuel was exiting out of the topside wing vent.

According to the passenger in N32WP, the flight was approaching North Fox Island and the pilot announced on the radio we were approaching with the intention of landing on the Island. He checked the weather on Beaver Island, the weather report was good and again on the radio said we were approaching, and we were minutes out. They heard no response. The passenger reiterated that the pilot announced on the radio at least 4 times saying we were heading to North Fox Island with the intention of landing and we never received a response. The pilot set up for final approach and the conditions of the field looked good. They saw a different aircraft at the opposite end of the airstrip, and the pilot decided to land. The passenger indicated that the other aircraft that came up under us was not observed. When the airplane came to a final stop the passenger's first response to ask the pilot "what just happened." The pilot responded that "we just hit another airplane."

According to the pilot of N6021A, the airplane was flown into 6Y3 for overnight on a camping trip. The pilot of N6021A started engines on the south side of the airfield about 1422. The airplane was positioned in an open clearing on the south end of the airfield and the common traffic advisory frequency (CTAF), 122.9 megahertz, was monitored. Preflight checks were conducted, and the airplane was taxied down the center of the runway. The pilot reported that he heard a radio call from Washington Island Airport. A radio call from the 172 announced the airplane's departure in the blind. The planned takeoff was a soft field, minimum run departure with anticipated obstructions, crosswinds, and wind shear at tree top level. No turning circle was present at the departure end of the runway and the pilot advised that a soft/short, close to gross weight takeoff was made for a rolling departure with as much runway ahead as possible. No other airplanes were heard or seen. The takeoff was as planned, and the airplane lifted off the ground into ground effect about 5 to 7 ft above ground level. The airplane was accelerated to best angle of climb speed plus 10 knots. About 1431, a loud explosion occurred, and the airplane swerved 100° to the right. Full counter control deployment brought the airplane to remain in ground effect. The airplane was right of centerline and a second explosion and "violent" stop occurred. During the stopping contact, the airplane was 50° off runway heading and the left main landing gear dug into the soft soil. The left wing remained on the heading and the rest of the airplane rotated to a stop about 30° off runway heading, which forced the left wing into the cabin where it trapped the pilot in the right seat. The passenger in the left seat assisted the right seated pilot to get out of the airplane.

## Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	47,Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Rear
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	5-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	June 11, 2018
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	April 20, 2018
<b>Flight Time:</b>	4600 hours (Total, all aircraft), 215 hours (Total, this make and model), 4175 hours (Pilot In Command, all aircraft), 45 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 1.2 hours (Last 24 hours, all aircraft)		

The pilot of N3ZWR held a Federal Aviation Administration (FAA) airline transport pilot certificate with a multi engine land rating and he held commercial pilot privileges in single-engine land airplanes. He also held a flight instructor certificate with single-engine and multi engine ratings. The pilot held an FAA first class medical certificate, dated June 11, 2018, with a limitation that the medical was not valid for any class after September 30, 2019. Additionally, the pilot held a Statement of Demonstrated Ability for monocular vision.

The pilot of N6021A held an FAA airline transport pilot certificate with a multi engine land rating and he held commercial pilot privileges in single-engine land airplanes. He also held a flight instructor certificate with single-engine and multi engine ratings. The pilot held an FAA first class medical certificate dated, July 24, 2018, with a limitation to wear corrective lenses.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Extra	<b>Registration:</b>	N32WR
<b>Model/Series:</b>	EA300 LC	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2014	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Aerobatic	<b>Serial Number:</b>	LC033
<b>Landing Gear Type:</b>	Tailwheel	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	December 7, 2017 Annual	<b>Certified Max Gross Wt.:</b>	2095 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	217 Hrs at time of accident	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	AEIO-580-B1A
<b>Registered Owner:</b>		<b>Rated Power:</b>	315 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

N32WR was a single-engine, two-place, low-wing, fixed tailwheel landing gear, monoplane, designed to be fully aerobatic. The airplane was powered by a 315-horsepower engine which drove a three-bladed, constant-speed propeller. The pilot reported that the airplane underwent an annual on December 7, 2017 and that the airplane accumulated 217 hours of total time at the time of the accident. The fuselage was constructed of a tubular steel frame covered with aluminum and fabric fairings; the wing's construction was carbon-fiber reinforced plastic (CRP). The ailerons were almost full span and there are no flaps. The airplane had two cockpits, in tandem, covered with a clear, one-piece canopy. The airplane stalls about 55 to 60 kts based on weight.

N6021A, was a single engine, four-place, high-wing, fixed tricycle landing gear, all-metal design airplane. The airplane was powered by a 145-horsepower engine which drove a fixed pitch propeller. The pilot reported that the airplane underwent an annual in January of 2018 and that the airplane accumulated 2,800 hours of total time. The airplane had side-by-side seating in the front and a rear couch (two seats) in the back of the cabin. The airplane had dual flight controls. The airplane had a high wing that constituted the roof of the airplane's cabin. The airplane's checklist for an obstacle clearance takeoff indicated a best angle of climb speed of 60 mph (about 52 kts).

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KSJX, 666 ft msl	<b>Distance from Accident Site:</b>	15 Nautical Miles
<b>Observation Time:</b>	14:35 Local	<b>Direction from Accident Site:</b>	36°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	230°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.05 inches Hg	<b>Temperature/Dew Point:</b>	25°C / 16°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Appleton, WI (ATW )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	North Fox Island, MI (6Y3 )	<b>Type of Clearance:</b>	VFR flight following; None
<b>Departure Time:</b>	12:37 Local	<b>Type of Airspace:</b>	

At 1435, the recorded weather at the Beaver Island Airport, Beaver Island, Michigan, was: Wind 230°; at 8 kts, variable from 210° to 270°; visibility 10 statute miles; sky condition clear; temperature 25°C; dew point 16°C; altimeter 30.06 inches of mercury.

## Airport Information

<b>Airport:</b>	NORTH FOX ISLAND 6Y3	<b>Runway Surface Type:</b>	Grass/turf
<b>Airport Elevation:</b>	639 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	25	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3000 ft / 100 ft	<b>VFR Approach/Landing:</b>	Full stop; Traffic pattern

6Y3 was a public, non-towered airport, which was owned by the State of Michigan, Department of Natural Resources and was leased to the Recreational Aviation Foundation. It was located on North Fox Island about 24 nautical miles northwest of Charlevoix, Michigan and about 15 nautical miles southwest of Beaver Island, Michigan. The airport had one runway and an estimated elevation of 639 ft above mean sea level. Runway 7/25 was a 3,000 ft by 100 ft runway with a turf surface. The airport used 122.9 megahertz as its CTAF. Remarks listed on the FAA's airport master record at the time of the accident included:

RWY 07 RWY & DISPL-D THRESHOLDS MKD WITH 3- YELLOW CONES ...  
TALL TREES ALL QUADRANTS. TREES OBSTRUCT WINDSOCK, READINGS UNRELIABLE

The Michigan Department of Transportation, Office of Aeronautics published a Michigan Airport Directory and provided Android and Apple applications that included airport information on 6Y3. Their directory similarly listed the airport remarks indicated on the FAA's master record. However, the

Michigan Airport Directory also listed the leaseholder's website and indicated it had a safety brief.

The leaseholder's website homepage contained a link to pilot information. The pilot information dropdown menu included a safety briefing link where a safety briefing can be reviewed before landing at 6Y3. That 6Y3 safety briefing page, in part, stated:

#### Airstrip Communication Frequency

122.9 CTAF (recommend monitor 122.8 also for other traffic in area)

Closest AWOS Beaver Island Airport 15nm N.E. 118.075

#### Arrival Procedure

Announce intentions on 122.9

Fly over airfield scan for aircraft on the ground

Left hand pattern

#### Departure Procedure

122.9 announce intentions before taxi

Please be courteous and do not fly over South Fox Island (Horse Farm)

Cautions or be aware of the following items:

60-80 ft trees surround airstrip

Windsock blocked by trees (use wave direction for wind reference)

Winds on approach and departures ...

It is a Unimproved Airport Category and is listed as "Land at your own risk"

### Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 None	<b>Latitude, Longitude:</b>	45.482223,-85.78083(est)

According to images and statements, the airplanes, after the inflight collision, came to rest beyond runway 25's displaced threshold cones. The Extra exhibited right-wing leading-edge damage forward of its outboard aileron hinge, displaced right landing gear, and separations of sections of all three propeller blades. The Cessna exhibited a semicircular impact mark about midspan on its rudder along with forward crushing of the rudder and deformation of the vertical stabilizer. An outboard section of the left elevator trailing edge exhibited forward crushing. The trailing-edge of the left wing exhibited a torn opening located about midspan near the junction of the flap and aileron. The left wing was rotated clockwise and its inboard leading-edge migrated under the forward cabin center top skin. The aft cabin center top skin



sections exhibited a separation. Ground scars and liberated airplane parts are located between the displaced threshold and the Cessna.

## Additional Information

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The accident report from the pilot of N32WR contained a recommendation, which, in part, stated: With respect to "how could this accident/incident have been prevented," the following actions seem prudent and in my opinion would have prevented this accident:

1. Per AC 90-66B, section 9.1, General Operating Practices, "Use of...and CTAF procedures by radio-equipped aircraft are required at all airports without operating control towers." Section 10.1 states, "Departing aircraft should continuously monitor I communicate on the appropriate frequency from startup, during taxi, and until 10 miles from the airport, unless 14 CFR or local procedures require otherwise." 10.1.1 states, "To achieve the greatest degree of safety, it is essential that"

1. All radio-equipped aircraft transmit/ receive on a common frequency identified for that purpose of airport advisories, as identified in appropriate aeronautical publications." I would not have attempted a landing knowing there was another aircraft about to takeoff at 6Y3. Furthermore, if a radio transmission were received, we could have worked out a resolution to the possibility of a collision by agreeing on sequencing my arrival and his departure.

2. Per 9.2 of AC 90-668, Collision Avoidance, "The Pilot in command's (PIC) primary responsibility is to see and avoid other aircraft and to help them see and avoid his or her aircraft."

At 6Y3, both runways have displaced thresholds due to trees. As evidenced by this accident, it is not possible to see an aircraft line up and depart if using full length (commencing the takeoff roll at the base of the trees). While I certainly appreciate taking full length to increase safety during takeoff, I think it would be prudent to reevaluate the risk of not being in a position to see final from the ground or a portion of the displaced portion leading up to the marked threshold (three yellow cones). Based on this, I would remove a portion of the displaced section and disallow its' use, or at a minimum, add a statement in the airport remarks section of the [airport facility directory] that if using full length, aircraft approaching to land cannot see another aircraft, nor can aircraft using full length visually clear final before taking into position for takeoff.

3. Per 91.113(g), landing aircraft have the right of way over aircraft already on the ground. I do not understand why right of way was not given to my landing aircraft in this instance.

The accident report from the pilot of N6021A contained a recommendation, which, in part, stated that "the use of new seat belts and shoulder harnesses allowed for almost no injury despite violent in flight collision and subsequent crash landing. ... Aviator sunglasses prevented eye injury [from] exploding glass and shrapnel."

An excerpt from 14 CFR Part 91.113 stated, "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."

An NTSB Safety Alert, See and Be Seen: Your Life Depends on It, in part, stated that pilots can "encourage passengers to help look for traffic."

The Airplane Flying Handbook section on Airport Traffic Patterns, in part, stated that 34% of mid-air collisions in the traffic pattern occur on final and another 34% occur over the runway. It additionally said, "High-wing airplanes have restricted visibility above while low-wing airplanes have limited visibility below. The worst-case scenario is a low wing airplane flying above a high-wing airplane. Banking from time to time can uncover blind spots. The pilot should also occasionally look to the rear of the airplane to check for other aircraft."

Subsequent to the accident, the airport manager and a representative of the Michigan Department of Transportation, Office of Aeronautics submitted 4 remarks for publication on the airport's master record. The remarks were:

- OVERFLY THE FIELD BEFORE ENTERING TRAFFIC PATTERN
- ANNOUNCE ALL INTENTIONS ON 122.9
- WATCH FOR AIRCRAFT TAXIING & TAKING OFF BEFORE LANDING
- SAFETY BRIEFING & PILOT INFO AVAILABLE AT [HTTPS://THERAF.ORG/](https://theraf.org/)

## **Communications**

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The CTAF frequency at 6Y3 is not recorded. However, a witness monitoring the CTAF frequency, 122.8 megahertz, on Beaver Island, Michigan, overheard an aircraft calling their intentions to land at 6Y3. He remarked to a customer that the aircraft was making their calls on the wrong channel. The witness did not catch the N number or type of aircraft. The next morning the witness was told about the crash and what time it happened. He subsequently told coworkers that he was at the shop about that time and heard an aircraft calling on the wrong frequency.

## **Flight recorders**

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The Extra's pilot forwarded video files recorded by his passenger. The video starts and showed

that the engine cowl blocked the lower third to half of the frame. The video showed the airplane aligning with the runway centerline in a right bank turn. Once aligned, the video showed airplane made minor banking maneuvers. However, no slips were noted on the video. The engine cowl blocked the view of the near edge of the airport clearing. About 14 seconds after the start of the video a drop in RPM is recorded. About 22 seconds after the start of the video, the engine RPM is increased and then decreased about 23.1 seconds. The first sign of another aircraft is observed about 22.6 seconds after the start of the video when the right wingtip of the Cessna appears from the right side of the Extra's engine cowling. The airplanes impacted about 24 seconds after the start of the video, the field of view changes to the inside of the Extra, and the sounds of impact continue through about 27.8 seconds when the video ends.

## Tests and Research

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The German Federal Bureau of Aircraft Accident Investigation (BFU) investigated an inflight collision accident with an Extra EA300 airplane and an Xtreme 3000 airplane. Both airplanes were low-wing aircraft. The BFU produced a factual report that contains graphic depictions of a pilot's area of view that is restricted below the low-wing airplane's fuselage and wings. The BFU's report is appended to the docket material associated with this investigation.

A review of a Cessna visibility study in reference to 172 airplanes revealed, in part, that the limit of forward visibility from the left pilot's seat was about a 54° arc between the cowling and the top of the windshield. It showed that the lateral visibility limit through the front windscreen from the left pilot seat was about a 137° arc between the left and right side of the windshield. The limit of vertical visibility from the left pilot's through the left door window was about a 55° arc between the lower surface of the left wing and the bottom of the left door's window. The limit of vertical visibility across the cabin through the right door window was about a 25° arc between the lower surface of the right wing and the bottom of the right door's window. The cabin ceiling restricts the pilot's overhead visibility. Top, rear visibility is obstructed by the left and right wings and the aft cabin ceiling. Visibility directly behind the airplane is accomplished through two aft cabin side windows, one on the left side and the other on the right. The limit of vertical visibility from the left pilot's through each aft cabin side window was about a 14° arc between the top and bottom of the respective aft cabin side window.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Malinowski, Edward
<b>Additional Participating Persons:</b>	Thomas G Kozura; Federal Aviation Administration; Grand Rapids, MI Ricardo Asensio; Textron Aviation; Wichita, KS Jens Eisenreich; Bureau of Aircraft Accidents Investigation; Braunschweig
<b>Original Publish Date:</b>	November 19, 2019
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=97920">https://data.nts.gov/Docket?ProjectID=97920</a>

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

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).



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# Aviation Investigation Final Report

<b>Location:</b>	North Fox Island, Michigan	<b>Accident Number:</b>	CEN18LA298
<b>Date &amp; Time:</b>	July 29, 2018, 14:35 Local	<b>Registration:</b>	N6021A
<b>Aircraft:</b>	Cessna 172	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Midair collision	<b>Injuries:</b>	3 Minor
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

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The Extra pilot and passenger reported that the pilot's landing intention was communicated on the common traffic advisory frequency (CTAF) with no replies. They saw an airplane at the opposite end of the airstrip, and the pilot decided to land. The Cessna pilot reported that he monitored the CTAF and then taxied down the center of the runway; he heard a radio call on the frequency from an airport on a nearby island. The Cessna pilot made his departure radio call on the CTAF in the blind and conducted a rolling departure with as much runway ahead as possible; he did not hear or see any other airplanes. The Cessna lifted off about 5 to 7 ft above ground level and accelerated to best angle of climb speed plus 10 knots. The Extra pilot indicated that he did not see any aircraft while he was on final approach to landing until his airplane was about 20-30 ft above the landing surface just before the threshold when he saw a bright object out the right side just in front of the wing. The Extra and the Cessna then collided.

The CTAF frequency at the accident airport is not recorded. However, a witness monitoring another CTAF frequency on a nearby island overheard the pilot of an airplane calling intention to land and remarked to a customer that the call was on the wrong frequency. It is likely that the Extra pilot was transmitting on the CTAF frequency for the airport on a nearby island; the Cessna pilot likely heard this transmission but attributed it to a pilot landing at the other airport.

The airport leaseholder's website contained a link to pilot information, which included a safety briefing for the airport. The briefing recommended that the airport's CTAF, as well as another local airport's CTAF, be monitored. In addition, the briefing recommended that arriving aircraft fly over the airfield and scan for aircraft on the ground using a left traffic pattern. The briefing advised that the airport is in

the Unimproved Airport Category and that pilots "land at your own risk."

The Extra pilot's use of an incorrect CTAF precluded him from hearing the Cessna pilot's transmission of his intent to depart. In addition, trees surrounding the runway precluded the Extra pilot from seeing the Cessna's departure until it was too late to take evasive action.

## Probable Cause and Findings

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

The Extra pilot's failure to see and avoid the Cessna, which resulted in an in-flight collision. Contributing to the accident was the failure of the Extra pilot to tune his radio to the correct frequency, which resulted in no common traffic advisories being heard or recognized as relevant by either pilot.

### Findings

Personnel issues	Monitoring other aircraft - Pilot of other aircraft
Personnel issues	(general) - Pilot of other aircraft

# Factual Information

## History of Flight

Initial climb	Midair collision
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On July 29, 2018, about 1435 eastern daylight time, an Extra EA300 LC airplane, N32WR, and a Cessna 172 airplane, N6021A, collided in flight over runway 25 at the North Fox Island Airport (6Y3), North Fox Island, Michigan. The Extra EA300 LC was landing and the Cessna 172 was departing. The airline transport pilot and passenger on the Extra EA300 LC were uninjured and the airline transport pilot and two passengers on the Cessna 172 received minor injuries. The Extra EA300 LC sustained substantial right-wing damage and the Cessna 172 sustained substantial empennage, left wing, and fuselage damage during the collision and subsequent impact with terrain. The Extra EA300 LC was registered to Captain Property and Investment LLC and was operated by its pilot. The Cessna 172 was registered to and operated by its pilot. Both flights were being conducted as Title 14 *Code of Federal Regulations* Part 91 personal flights. Day visual meteorological conditions prevailed in the area about the time of the accident, and the flights were not operated on flight plans. The Extra EA300 LC departed from the Appleton International Airport, near Appleton, Wisconsin, and was destined for 6Y3. The Cessna 172 was originating from 6Y3 at the time of the accident.

According to the pilot of N32WR, the flight was uneventful until the landing phase. He initiated the descent approximately 10 miles from 6Y3 and started self-announcing his intentions "in accordance with Advisory Circular 90-66B." At no time were there any responses or transmissions heard from other aircraft at 6Y3. Upon reaching the pattern altitude of 1,700 ft, the pilot continued the left-hand pattern to final.

At approximately 30-40 feet above the surface, the pilot started to round out while slowing in order to land just beyond the threshold to maximize the runway surface for the rollout. He advised that there were no aircraft visible during the final and approach to landing until an estimated 20-30 feet above the landing surface just prior to the threshold which was marked by 3 yellow cones. Out of the pilot's right side, just in front of the right-hand wing, he saw a bright object which turned out to be a departing airplane.

The pilot stated that N32WR aircraft impacted the other airplane. He said that the airplane yawed strongly to the right. The pilot was able to regain control and ended up coming to a stop about 800 ft beyond the resting place of the other airplane, near the imaginary runway centerline. The pilot determined his passenger was ok and he egressed to help the other airplane's occupants.

The pilot then ran toward the other airplane, a Cessna 172. One Cessna occupant was already out of the airplane and another left the airplane through the right-hand door. The third occupant was still inside, but before the Extra pilot could reach the airplane, the third occupant had departed through the right-hand door as well. There was an observed fuel leak from the left-hand wing of the Cessna as fuel was exiting out of the topside wing vent.

According to the passenger in N32WP, the flight was approaching North Fox Island and the pilot announced on the radio we were approaching with the intention of landing on the Island. He checked the weather on Beaver Island, the weather report was good and again on the radio said we were approaching, and we were minutes out. They heard no response. The passenger reiterated that the pilot announced on the radio at least 4 times saying we were heading to North Fox Island with the intention of landing and we never received a response. The pilot set up for final approach and the conditions of the field looked good. They saw a different aircraft at the opposite end of the airstrip, and the pilot decided to land. The passenger indicated that the other aircraft that came up under us was not observed. When the airplane came to a final stop the passenger's first response to ask the pilot "what just happened." The pilot responded that "we just hit another airplane."

According to the pilot of N6021A, the airplane was flown into 6Y3 for overnight on a camping trip. The pilot of N6021A started engines on the south side of the airfield about 1422. The airplane was positioned in an open clearing on the south end of the airfield and the common traffic advisory frequency (CTAF), 122.9 megahertz, was monitored. Preflight checks were conducted, and the airplane was taxied down the center of the runway. The pilot reported that he heard a radio call from Washington Island Airport. A radio call from the 172 announced the airplane's departure in the blind. The planned takeoff was a soft field, minimum run departure with anticipated obstructions, crosswinds, and wind shear at tree top level. No turning circle was present at the departure end of the runway and the pilot advised that a soft/short, close to gross weight takeoff was made for a rolling departure with as much runway ahead as possible. No other airplanes were heard or seen. The takeoff was as planned, and the airplane lifted off the ground into ground effect about 5 to 7 ft above ground level. The airplane was accelerated to best angle of climb speed plus 10 knots. About 1431, a loud explosion occurred, and the airplane swerved 100° to the right. Full counter control deployment brought the airplane to remain in ground effect. The airplane was right of centerline and a second explosion and "violent" stop occurred. During the stopping contact, the airplane was 50° off runway heading and the left main landing gear dug into the soft soil. The left wing remained on the heading and the rest of the airplane rotated to a stop about 30° off runway heading, which forced the left wing into the cabin where it trapped the pilot in the right seat. The passenger in the left seat assisted the right seated pilot to get out of the airplane.



## Pilot Information

<b>Certificate:</b>	Airline transport; Commercial; Flight instructor	<b>Age:</b>	50, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	July 24, 2018
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	July 26, 2018
<b>Flight Time:</b>	16000 hours (Total, all aircraft), 500 hours (Total, this make and model), 13000 hours (Pilot In Command, all aircraft), 75 hours (Last 90 days, all aircraft), 25 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

The pilot of N3ZWR held a Federal Aviation Administration (FAA) airline transport pilot certificate with a multi engine land rating and he held commercial pilot privileges in single-engine land airplanes. He also held a flight instructor certificate with single-engine and multi engine ratings. The pilot held an FAA first class medical certificate, dated June 11, 2018, with a limitation that the medical was not valid for any class after September 30, 2019. Additionally, the pilot held a Statement of Demonstrated Ability for monocular vision.

The pilot of N6021A held an FAA airline transport pilot certificate with a multi engine land rating and he held commercial pilot privileges in single-engine land airplanes. He also held a flight instructor certificate with single-engine and multi engine ratings. The pilot held an FAA first class medical certificate dated, July 24, 2018, with a limitation to wear corrective lenses.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N6021A
<b>Model/Series:</b>	172 Undesignat	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1956	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	28621
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	January 1, 2018 Annual	<b>Certified Max Gross Wt.:</b>	2299 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	2800 Hrs	<b>Engine Manufacturer:</b>	Continental
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	O-300
<b>Registered Owner:</b>		<b>Rated Power:</b>	145 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

N32WR was a single-engine, two-place, low-wing, fixed tailwheel landing gear, monoplane, designed to be fully aerobatic. The airplane was powered by a 315-horsepower engine which drove a three-bladed, constant-speed propeller. The pilot reported that the airplane underwent an annual on December 7, 2017 and that the airplane accumulated 217 hours of total time at the time of the accident. The fuselage was constructed of a tubular steel frame covered with aluminum and fabric fairings; the wing's construction was carbon-fiber reinforced plastic (CRP). The ailerons were almost full span and there are no flaps. The airplane had two cockpits, in tandem, covered with a clear, one-piece canopy. The airplane stalls about 55 to 60 kts based on weight.

N6021A, was a single engine, four-place, high-wing, fixed tricycle landing gear, all-metal design airplane. The airplane was powered by a 145-horsepower engine which drove a fixed pitch propeller. The pilot reported that the airplane underwent an annual in January of 2018 and that the airplane accumulated 2,800 hours of total time. The airplane had side-by-side seating in the front and a rear couch (two seats) in the back of the cabin. The airplane had dual flight controls. The airplane had a high wing that constituted the roof of the airplane's cabin. The airplane's checklist for an obstacle clearance takeoff indicated a best angle of climb speed of 60 mph (about 52 kts).

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KSJX, 666 ft msl	<b>Distance from Accident Site:</b>	15 Nautical Miles
<b>Observation Time:</b>	14:35 Local	<b>Direction from Accident Site:</b>	36°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	230°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.05 inches Hg	<b>Temperature/Dew Point:</b>	25°C / 16°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	North Fox Island, MI (6Y3)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>		<b>Type of Clearance:</b>	None
<b>Departure Time:</b>		<b>Type of Airspace:</b>	

At 1435, the recorded weather at the Beaver Island Airport, Beaver Island, Michigan, was: Wind 230°; at 8 kts, variable from 210° to 270°; visibility 10 statute miles; sky condition clear; temperature 25°C; dew point 16°C; altimeter 30.06 inches of mercury.

## Airport Information

<b>Airport:</b>	NORTH FOX ISLAND 6Y3	<b>Runway Surface Type:</b>	Grass/turf
<b>Airport Elevation:</b>	639 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	25	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3000 ft / 100 ft	<b>VFR Approach/Landing:</b>	Full stop; Traffic pattern

6Y3 was a public, non-towered airport, which was owned by the State of Michigan, Department of Natural Resources and was leased to the Recreational Aviation Foundation. It was located on North Fox Island about 24 nautical miles northwest of Charlevoix, Michigan and about 15 nautical miles southwest of Beaver Island, Michigan. The airport had one runway and an estimated elevation of 639 ft above mean sea level. Runway 7/25 was a 3,000 ft by 100 ft runway with a turf surface. The airport used 122.9 megahertz as its CTAF. Remarks listed on the FAA's airport master record at the time of the accident included:

RWY 07 RWY & DISPL-D THRESHOLDS MKD WITH 3- YELLOW CONES ...  
TALL TREES ALL QUADRANTS. TREES OBSTRUCT WINDSOCK, READINGS UNRELIABLE

The Michigan Department of Transportation, Office of Aeronautics published a Michigan Airport Directory and provided Android and Apple applications that included airport information on 6Y3. Their directory similarly listed the airport remarks indicated on the FAA's master record. However, the

Michigan Airport Directory also listed the leaseholder's website and indicated it had a safety brief.

The leaseholder's website homepage contained a link to pilot information. The pilot information dropdown menu included a safety briefing link where a safety briefing can be reviewed before landing at 6Y3. That 6Y3 safety briefing page, in part, stated:

**Airstrip Communication Frequency**

122.9 CTAF (recommend monitor 122.8 also for other traffic in area)

Closest AWOS Beaver Island Airport 15nm N.E. 118.075

**Arrival Procedure**

Announce intentions on 122.9

Fly over airfield scan for aircraft on the ground

Left hand pattern

**Departure Procedure**

122.9 announce intentions before taxi

Please be courteous and do not fly over South Fox Island (Horse Farm)

Cautions or be aware of the following items:

60-80 ft trees surround airstrip

Windsock blocked by trees (use wave direction for wind reference)

Winds on approach and departures ...

It is a Unimproved Airport Category and is listed as "Land at your own risk"

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Minor	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	2 Minor	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	3 Minor	<b>Latitude, Longitude:</b>	45.482223,-85.78083(est)

According to images and statements, the airplanes, after the inflight collision, came to rest beyond runway 25's displaced threshold cones. The Extra exhibited right-wing leading-edge damage forward of its outboard aileron hinge, displaced right landing gear, and separations of sections of all three propeller blades. The Cessna exhibited a semicircular impact mark about midspan on its rudder along with forward crushing of the rudder and deformation of the vertical stabilizer. An outboard section of the left elevator trailing edge exhibited forward crushing. The trailing-edge of the left wing exhibited a torn opening located about midspan near the junction of the flap and aileron. The left wing was rotated clockwise and its inboard leading-edge migrated under the forward cabin center top skin. The aft cabin center top skin

sections exhibited a separation. Ground scars and liberated airplane parts are located between the displaced threshold and the Cessna.

## Additional Information

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The accident report from the pilot of N32WR contained a recommendation, which, in part, stated: With respect to "how could this accident/incident have been prevented," the following actions seem prudent and in my opinion would have prevented this accident:

1. Per AC 90-66B, section 9.1, General Operating Practices, "Use of...and CTAF procedures by radio-equipped aircraft are required at all airports without operating control towers." Section 10.1 states, "Departing aircraft should continuously monitor I communicate on the appropriate frequency from startup, during taxi, and until 10 miles from the airport, unless 14 CFR or local procedures require otherwise." 10.1.1 states, "To achieve the greatest degree of safety, it is essential that"

1. All radio-equipped aircraft transmit/ receive on a common frequency identified for that purpose of airport advisories, as identified in appropriate aeronautical publications." I would not have attempted a landing knowing there was another aircraft about to takeoff at 6Y3. Furthermore, if a radio transmission were received, we could have worked out a resolution to the possibility of a collision by agreeing on sequencing my arrival and his departure.

2. Per 9.2 of AC 90-668, Collision Avoidance, "The Pilot in command's (PIC) primary responsibility is to see and avoid other aircraft and to help them see and avoid his or her aircraft."

At 6Y3, both runways have displaced thresholds due to trees. As evidenced by this accident, it is not possible to see an aircraft line up and depart if using full length (commencing the takeoff roll at the base of the trees). While I certainly appreciate taking full length to increase safety during takeoff, I think it would be prudent to reevaluate the risk of not being in a position to see final from the ground or a portion of the displaced portion leading up to the marked threshold (three yellow cones). Based on this, I would remove a portion of the displaced section and disallow its' use, or at a minimum, add a statement in the airport remarks section of the [airport facility directory] that if using full length, aircraft approaching to land cannot see another aircraft, nor can aircraft using full length visually clear final before taking into position for takeoff.

3. Per 91.113(g), landing aircraft have the right of way over aircraft already on the ground. I do not understand why right of way was not given to my landing aircraft in this instance.

The accident report from the pilot of N6021A contained a recommendation, which, in part, stated that "the use of new seat belts and shoulder harnesses allowed for almost no injury despite violent in flight collision and subsequent crash landing. ... Aviator sunglasses prevented eye injury [from] exploding glass and shrapnel."

An excerpt from 14 CFR Part 91.113 stated, "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."

An NTSB Safety Alert, See and Be Seen: Your Life Depends on It, in part, stated that pilots can "encourage passengers to help look for traffic."

The Airplane Flying Handbook section on Airport Traffic Patterns, in part, stated that 34% of mid-air collisions in the traffic pattern occur on final and another 34% occur over the runway. It additionally said, "High-wing airplanes have restricted visibility above while low-wing airplanes have limited visibility below. The worst-case scenario is a low wing airplane flying above a high-wing airplane. Banking from time to time can uncover blind spots. The pilot should also occasionally look to the rear of the airplane to check for other aircraft."

Subsequent to the accident, the airport manager and a representative of the Michigan Department of Transportation, Office of Aeronautics submitted 4 remarks for publication on the airport's master record. The remarks were:

- OVERFLY THE FIELD BEFORE ENTERING TRAFFIC PATTERN
- ANNOUNCE ALL INTENTIONS ON 122.9
- WATCH FOR AIRCRAFT TAXIING & TAKING OFF BEFORE LANDING
- SAFETY BRIEFING & PILOT INFO AVAILABLE AT [HTTPS://THERAF.ORG/](https://theraf.org/)

## **Communications**

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The CTAF frequency at 6Y3 is not recorded. However, a witness monitoring the CTAF frequency, 122.8 megahertz, on Beaver Island, Michigan, overheard an aircraft calling their intentions to land at 6Y3. He remarked to a customer that the aircraft was making their calls on the wrong channel. The witness did not catch the N number or type of aircraft. The next morning the witness was told about the crash and what time it happened. He subsequently told coworkers that he was at the shop about that time and heard an aircraft calling on the wrong frequency.

## **Flight recorders**

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The Extra's pilot forwarded video files recorded by his passenger. The video starts and showed that the engine cowl blocked the lower third to half of the frame. The video showed the

airplane aligning with the runway centerline in a right bank turn. Once aligned, the video showed airplane made minor banking maneuvers. However, no slips were noted on the video. The engine cowl blocked the view of the near edge of the airport clearing. About 14 seconds after the start of the video a drop in RPM is recorded. About 22 seconds after the start of the video, the engine RPM is increased and then decreased about 23.1 seconds. The first sign of another aircraft is observed about 22.6 seconds after the start of the video when the right wingtip of the Cessna appears from the right side of the Extra's engine cowling. The airplanes impacted about 24 seconds after the start of the video, the field of view changes to the inside of the Extra, and the sounds of impact continue through about 27.8 seconds when the video ends.

## Tests and Research

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The German Federal Bureau of Aircraft Accident Investigation (BFU) investigated an inflight collision accident with an Extra EA300 airplane and an Xtreme 3000 airplane. Both airplanes were low-wing aircraft. The BFU produced a factual report that contains graphic depictions of a pilot's area of view that is restricted below the low-wing airplane's fuselage and wings. The BFU's report is appended to the docket material associated with this investigation.

A review of a Cessna visibility study in reference to 172 airplanes revealed, in part, that the limit of forward visibility from the left pilot's seat was about a  $54^{\circ}$  arc between the cowling and the top of the windshield. It showed that the lateral visibility limit through the front windscreen from the left pilot seat was about a  $137^{\circ}$  arc between the left and right side of the windshield. The limit of vertical visibility from the left pilot's through the left door window was about a  $55^{\circ}$  arc between the lower surface of the left wing and the bottom of the left door's window. The limit of vertical visibility across the cabin through the right door window was about a  $25^{\circ}$  arc between the lower surface of the right wing and the bottom of the right door's window. The cabin ceiling restricts the pilot's overhead visibility. Top, rear visibility is obstructed by the left and right wings and the aft cabin ceiling. Visibility directly behind the airplane is accomplished through two aft cabin side windows, one on the left side and the other on the right. The limit of vertical visibility from the left pilot's through each aft cabin side window was about a  $14^{\circ}$  arc between the top and bottom of the respective aft cabin side window.



## Administrative Information

<b>Investigator In Charge (IIC):</b>	Malinowski, Edward
<b>Additional Participating Persons:</b>	Thomas G Kozura; Federal Aviation Administration; Grand Rapids, MI Ricardo Asensio; Textron Aviation; Wichita, KS Jens Eisenreich; Bureau of Aircraft Accidents Investigation; Braunschweig
<b>Original Publish Date:</b>	November 19, 2019
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=97920">https://data.nts.gov/Docket?ProjectID=97920</a>

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

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).