

# **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety

Washington, D.C. 20594

## **Unmanned Aircraft System (UAS) Aerial Imagery Factual Report**

4/4/2022

### **A. ACCIDENT**

Location:

Date:

Time:

Event:

Investigator-in-charge (IIC):

**ERA20LA206**

Eatonton, GA

June 5, 2020

1520 eastern daylight time

N135VE, Piper PA-31T

Leah Read

National Transportation Safety Board  
(NTSB), Eastern Region

### **B. PERSONNEL**

UAS remote pilot in command (RPIC):

Cathy Gagne

NTSB, Washington, DC (Marietta, GA)

### **C. ACCIDENT SUMMARY**

On June 5, 2020, about 1520 eastern daylight time, a Piper PA-31T, N135VE, was destroyed when it was involved in an accident near Eatonton, Georgia. The two pilots and the three passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

### **D. DETAILS OF IMAGERY**

#### **1.0 Equipment and Procedures**

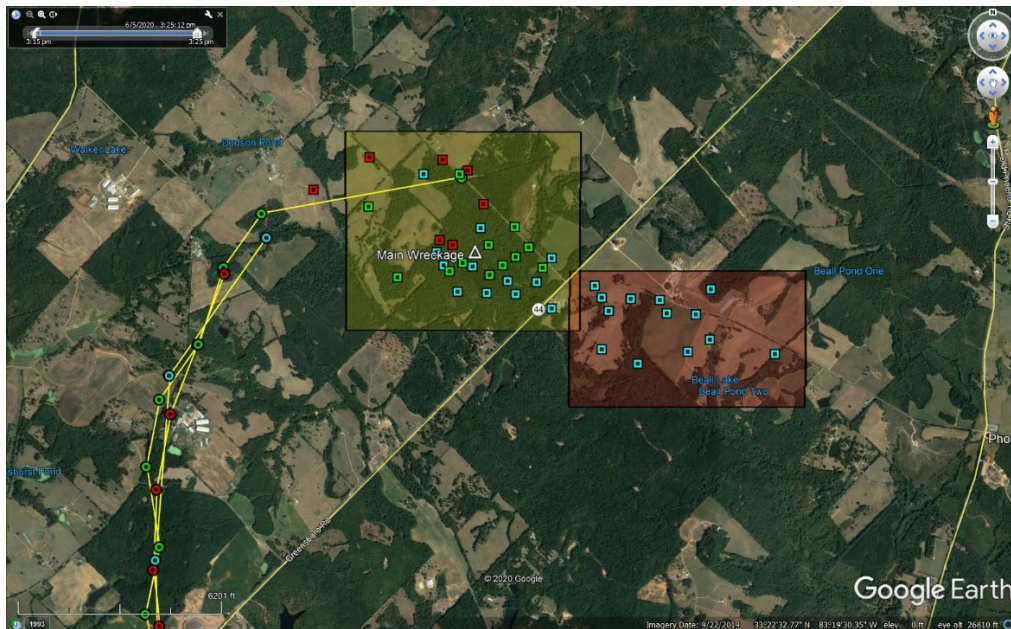
##### **Equipment**

Flights were conducted on June 7 and 13, 2020, and April 9, 2021, using the NTSB DJI Phantom 4 Advanced small UAS (sUAS, or drone). The drone is equipped with a dual GPS/GLONASS receiver, which provides georeferenced information on all still photos, and an FC6310 camera with the Sony Exmor 1" CMOS sensor with a focal length of 8.8 mm. Still photo resolution is 20 megapixels in JPG format.

The intended use for the UAS was to search for the airplane's left engine within a defined priority search area (about 1.2 square miles) provided by NTSB Air Traffic Control (ATC) specialist as derived from a review of ATC radar data for the accident flight showing both transponder and primary returns. An approximate 1-square-mile lesser priority search area was defined to be searched, as time permitted.

## Procedures

The main wreckage (which included the fuselage and right engine) was located in a rural, wooded area about 1/4 mile southwest of Tanyard Road. All flights were operated within Class G airspace under the provisions of 14 *CFR* Part 107.



**Figure 1.** Screen capture from Google Earth showing relative locations of priority intended search area (yellow transparent box) and optional search area (red transparent box). Colored circles

Potential hazards to flight operations were the presence of trees (which limited the areas in which the UAS could be flown due to the need to maintain visual line of sight) and tall grass (which could interfere with launching and landing). Flight operations mitigations included: 1) using only manual flight modes to actively limit flight path and adjust altitudes as needed to maintain visual line of sight and clearance from trees, 2) using a launch pad (vehicle rubber floor mat), and 3) using only hand-catch recoveries to avoid the tall grass during landing.

RPIC conducted numerous UAS launches to search for wreckage from two fields east of the accident site (one southwest of Tanyard Road and the other northeast of Tanyard Road) and from a field northwest of the accident site (from private property southwest of Tanyard Road). Tree obstructions limited the areas that could be searched while maintaining VLOS contact with the drone.

Wreckage search flights were flown both in automated mode using the Capture control application for grids and manually using the control application Litchi while avoiding overflight of ground personnel. Litchi was programmed to take photographs at 2-second intervals (due to the density of foliage), and altitudes were varied between 100 ft

to 380 ft above ground level (agl), as needed, to maintain visual line of sight with the drone. Total flight time for all flights was about 2 hours.

Due to line-of-sight limitations and time constraints, only a small percentage of the desired search area could be flown, and no additional wreckage was located using the UAS. One area of interest, a possible ground crater, was identified during the April 9, 2021, sorties; however, subsequent ground access to that area by the RPIC found evidence of past brush-clearing activities at that location and no evidence of airplane wreckage.

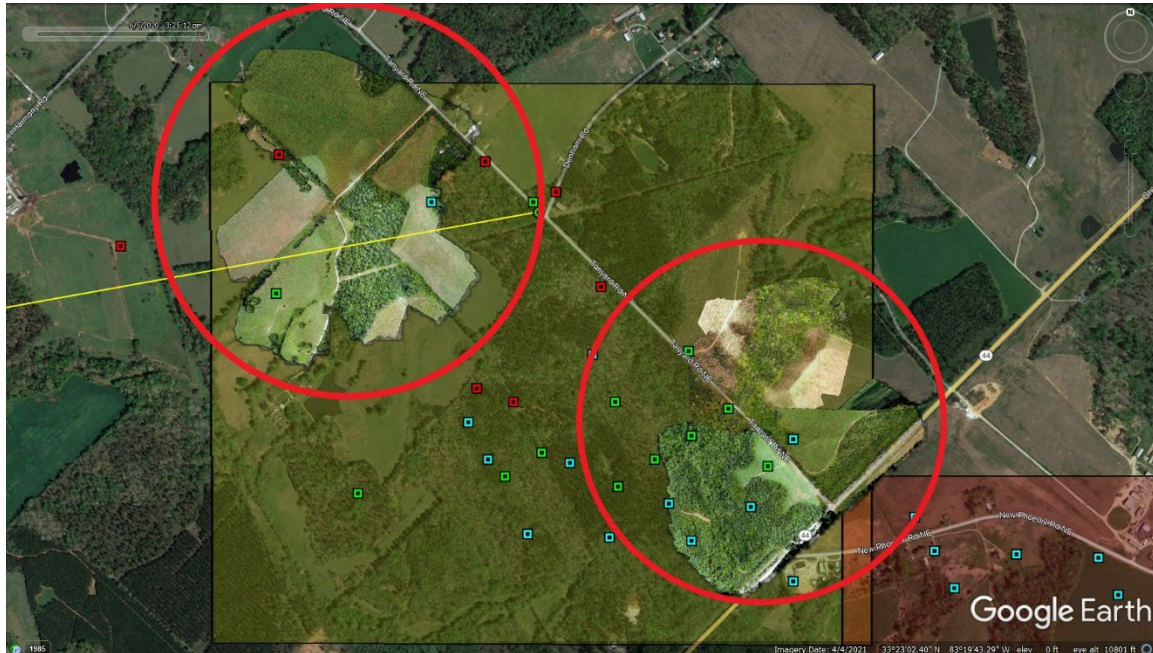
## **Processing**

The sUAS gathered more than 6,450 high-resolution photos suitable for processing in Pix4D. RPIC reviewed each image on a large screen to check for visible ground or tree canopy anomalies that could be used to inform ground searches for the airplane's left engine. Images that inadvertently captured residential dwellings were discarded. The geo-referenced still images were processed using Pix4D photogrammetry software to create a high-resolution orthomosaic map in GoogleEarth for another visual review for anomalies that could be indicative of wreckage and to show which areas were searched via drone.

GoogleEarth was used to create a wreckage plot using the GPS coordinates for recovered wreckage pieces (see section 2.1).

## **2.0 Imagery products**

Excerpts from the high-resolution orthomosaic maps that were exported from Pix4D into Google Earth are included below.



**Figure 2.** Orthomosaic overlay of UAS-covered areas (circled in red) within the priority search area (yellow transparent box).

Prelaunch information provided by the Putnam County Sheriff indicated that sheriff's department personnel had marked the locations of numerous pieces of wreckage that were found scattered throughout the area east of the main wreckage. Those pieces of wreckage had been recovered before the UAS RPIC arrived, but the tape markers remained. Aircraft recovery personnel provided photographs, GPS coordinates (derived from an iPhone), and preliminary identification of these recovered pieces. Other pieces of wreckage were subsequently located by a properly owner who left them in situ, and the UAS RPIC took coordinates for these pieces on April 9, 2021, using a Trimble differential GPS (dGPS).

The table below shows the coordinates (from an iPhone GPS) for the main wreckage and pieces A through S provided by aircraft recovery personnel for the pieces they retrieved before the RPIC's arrival. Air recovery personnel also provided photographs of these pieces. The coordinates for pieces T through W were obtained by the UAS RPIC using the dGPS. The coordinates for pieces X and Y were provided by the citizens who found the pieces.<sup>1</sup> Identification information for each piece was provided by the IIC following wreckage examination with the airframe party to the investigation.

Coordinates for all the pieces were entered into GoogleEarth as placemarks.

**Table.**

| Part ID | Identification information                                    | Latitude  | Longitude  |
|---------|---------------------------------------------------------------|-----------|------------|
|         | Main wreckage                                                 |           |            |
| A       | Outboard left wing                                            | 33°22'52" | -83°19'9"  |
| B       | Horizontal stabilizer forward spar cap, left side             | 33°22'49" | -83°19'3"  |
| C       | Radome                                                        | 33°22'49" | -83°19'1"  |
| D       | Horizontal stabilizer main spar cap, lower left side, inboard | 33°22'48" | -83°19'5"  |
| E       | Radar unit                                                    | 33°22'48" | -83°19'5"  |
| F       | Right wing leading edge, outboard                             | 33°22'50" | -83°19'17" |
| G       | Right elevator and trim tab, inboard                          | 33°22'49" | -83°18'50" |
| H       | Fuselage tail fairing                                         | 33°22'49" | -83°18'50" |
| I       | Right horizontal stabilizer main spar                         | 33°22'45" | -83°18'34" |
| J       | Right wing main spar lower cap                                | 33°22'45" | -83°18'50" |
| K       | Vertical stabilizer, lower, aft                               | 33°22'47" | -83°18'35" |
| L       | Right flap, outboard end                                      | 33°22'48" | -83°18'10" |
| M       | Prop blade tip                                                | 33°22'50" | -83°18'16" |
| N       | Prop blade tip                                                | 33°22'47" | -83°18'4"  |
| O       | Prop blade tip                                                | 33°22'47" | -83°18'9"  |
| P       | Horizontal stabilizer, left                                   | 33°22'46" | -83°18'2"  |
| Q       | Horizontal stabilizer leading edge, left, outboard            | 33°22'47" | -83°18'4"  |

<sup>1</sup> Piece Y was found on November 16, 2021.

|   |                                         |               |                |
|---|-----------------------------------------|---------------|----------------|
| R | Horizontal stabilizer, right side       | 33°22'45"     | -83°17'34"     |
| S | Unidentified pieces                     | 33°22'47"     | -83°17'6"      |
| T | Left tip tank                           | 33°22'54.651" | -83°19'20.936" |
| U | Rudder, upper portion                   | 33°22'47.845" | -83°19'10.720" |
| V | Elevator balance weight                 | 33°22'50.513" | -83°19'21.361" |
| W | Engine air inlet cover                  | 33°22'54.027" | -83°19'2.357"  |
| X | Fuel cell liner, right wing             | 33°22'39.1"   | 83°15'39.5"    |
| Y | Right tip tank                          | 33°22'43"     | -83.19'19"     |
|   | possible crater (veg/ground disruption) | 33°22'53.459" | -83°19'20.397" |



**Figure 3.** Google Earth image showing distribution of wreckage pieces. Furthest piece was about 3.9 miles east (about 094° true) from main wreckage.



**Figure 4.** Orthomosaic in Google Earth showing the distribution of the wreckage pieces with regard to locations of radar returns.

The RPIC provided the IIC the Google Earth wreckage plot in .kml format.

End of report.

Catherine Gagne, RPIC