

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR23LA107

GLOBAL POSITIONING SYSTEM (GPS) DEVICE

Specialist's Factual Report

November 16, 2023

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A. ACCIDENT SUMMARY

Location: Yuma, Arizona
Date: February 6, 2023
Time: 2135 mountain standard time (MST)
Helicopter: Bell OH-58A, Tri Rotor Spray & Chemical, N36FA

B. GLOBAL POSITIONING SYSTEM (GPS) DEVICE SPECIALIST

Specialist: W. Deven Chen
National Transportation Safety Board (NTSB)
Washington, DC

C. DETAILS OF THE INVESTIGATION

A recorder group was not convened. The NTSB Vehicle Recorder Division received the following GPS device:

Recorder Manufacturer/Model:	Satloc M3 Bantam
Recorder Serial Number:	1314-HH05736-0039

1.0 Recorder Description

The Satloc M3 Bantam is part of an on-board control system designed to programmatically control agricultural, aerial spray operations based on vendor and user specified prescription maps. The Satloc device can drive a cockpit mounted lightbar guidance system and a real-time graphic moving map display providing visual guidance to the pilot. Flow rates can be pilot selected or based on mapping created using a proprietary software package called MapStar that runs on a desktop computer. The device can record historical information to an internal, compact flash (CF) card or flash drive depending on user configuration.

1.1 Recorder Condition and Data Recovery

The Satloc M3 Bantam had no visible damage upon arrival at the Vehicle Recorder Division, as shown in figure 1. An internal CF card was recovered from the device, and data were extracted and converted into engineering unit data using laboratory tools.



Figure 1. Top and side views of the Satloc M3 Bantam as received.

1.2 Recording Description

The data extracted from the CF card included 110 log files. The last log file recorded on February 6, 2023, was identified to be associated with the accident flight. The duration of the recording was 2:05:06, from 19:30:38 MST to 21:35:44 MST. The sampling rate varied between 1 to 5 Hz.

1.2.1 Parameters Provided

Table 1 lists the recorder parameters verified and provided in this report.

Table 1. Satloc M3 Bantam data parameters provided.

Parameter Name (unit)	Parameter Description
Altitude (feet)	Altitude above Mean Sea Level (feet)
Heading (degrees)	Aircraft heading (degrees)
Latitude (deg)	Geographic latitude (degrees)
Longitude (deg)	Geographic longitude (degrees)
Speed (mph)	Average groundspeed between current and previous data point (miles per hour)
Spray Status (On/Off)	Spray status (discrete: on or off)

1.3 Time Correlation

The data were recorded in MST, the local time of the event, and were kept for the rest of the report.

D. FIGURES AND TABULAR DATA

Figures 2 to 6 contain the Satloc M3 Bantam data recorded during the event on February 6, 2023.

Figures 2 and 3 show data parameters plots of the accident flight. Figure 2 shows data parameters plot of the entire recording, and figure 3 shows the final portion from 21:29:00 MST to the end of the recording. The plots are configured

such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

Figures 4 to 7 show Google Earth overlays of the accident flight. Figure 4 shows the entire flight recording. Figure 5 shows the two sprayed areas during the accident flight, and figures 6 and 7 show the final portion of the accident flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The recorded data from the Satloc M3 Bantam indicated that the accident aircraft took off from Tri-Rotor AG Services at around 19:30:38 MST. The accident aircraft then travelled to the first sprayed area and started spraying at around 19:50:00 MST. At around 20:43:00 MST, the accident aircraft left the first sprayed area and travelled to the second sprayed area. The accident aircraft arrived at the second sprayed area at around 20:49:00 MST and started spraying. At 21:35:44, the last recorded data point prior to the crash, the accident aircraft was traveling at a groundspeed of approximately 24 mph and at an altitude of approximately 50 ft.

The corresponding tabular data used to create the above figures is provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

W. Deven Chen
Electrical Engineer - Recorder Specialist

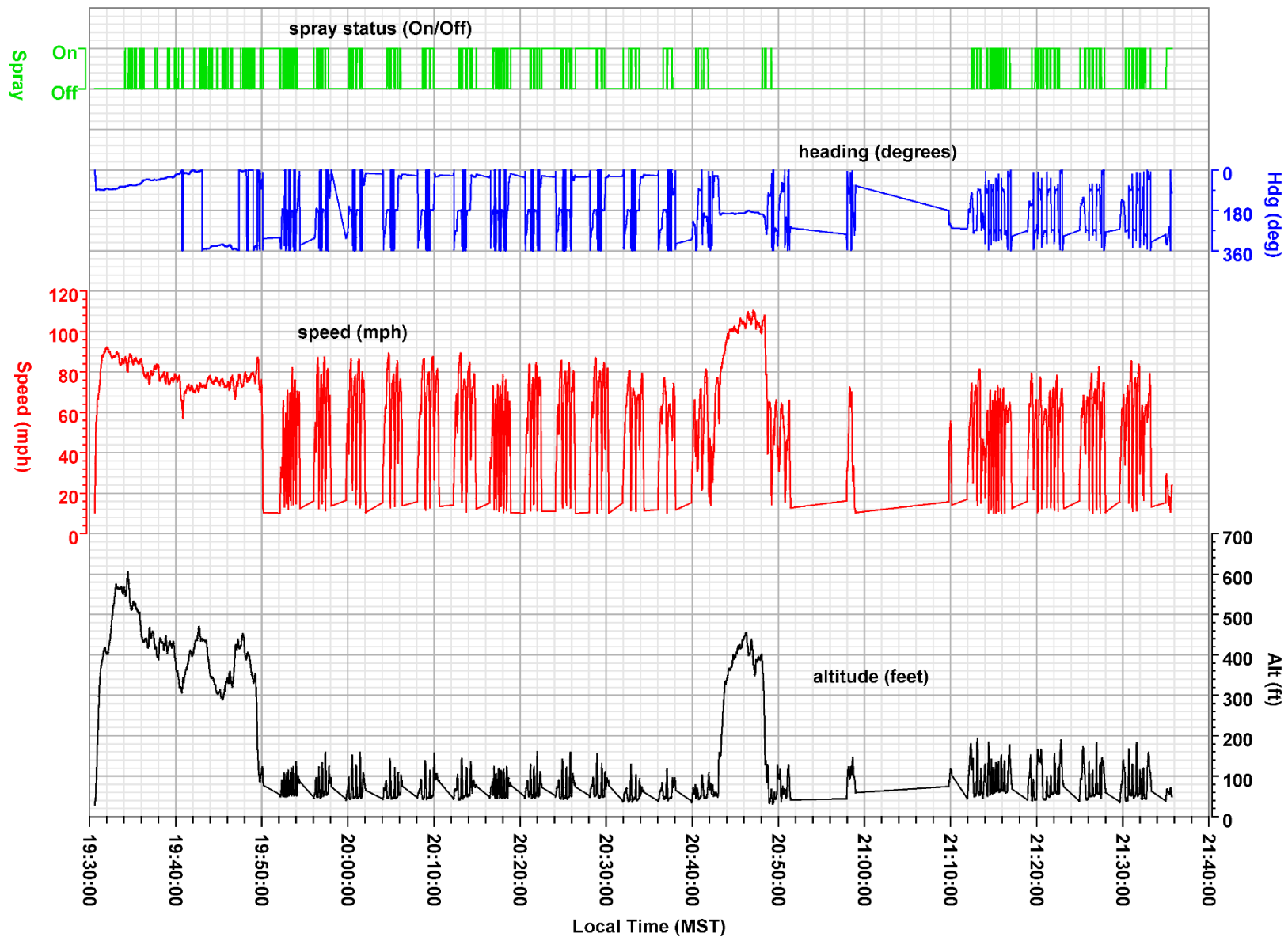


Figure 2. Plot of data parameters for the entire accident flight recording.

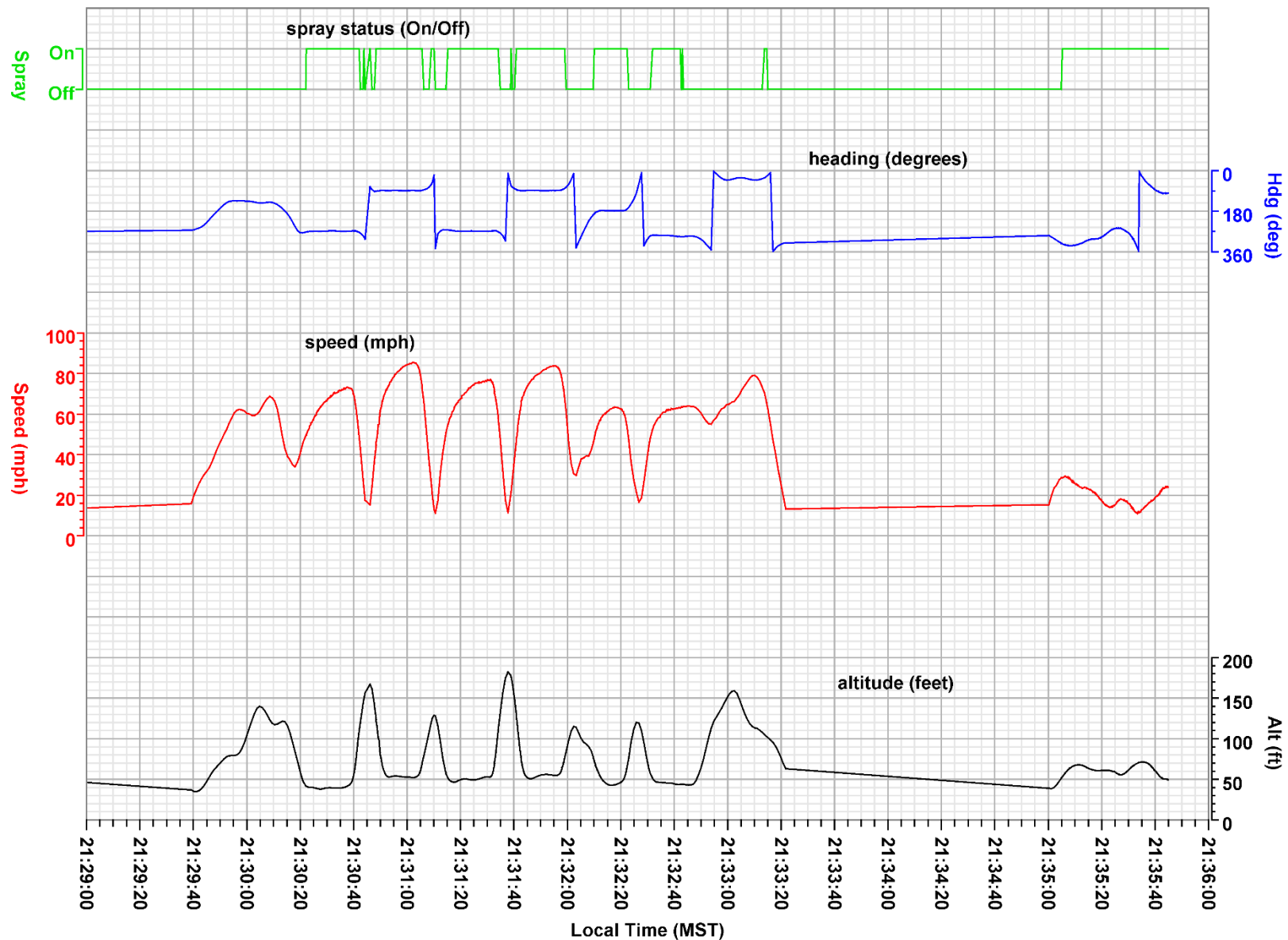


Figure 3. Plot of data parameters for the accident flight from 21:29:00 MST to the end of the recording.



Figure 4. Google Earth overfly of the entire accident flight recorded on February 6, 2023.

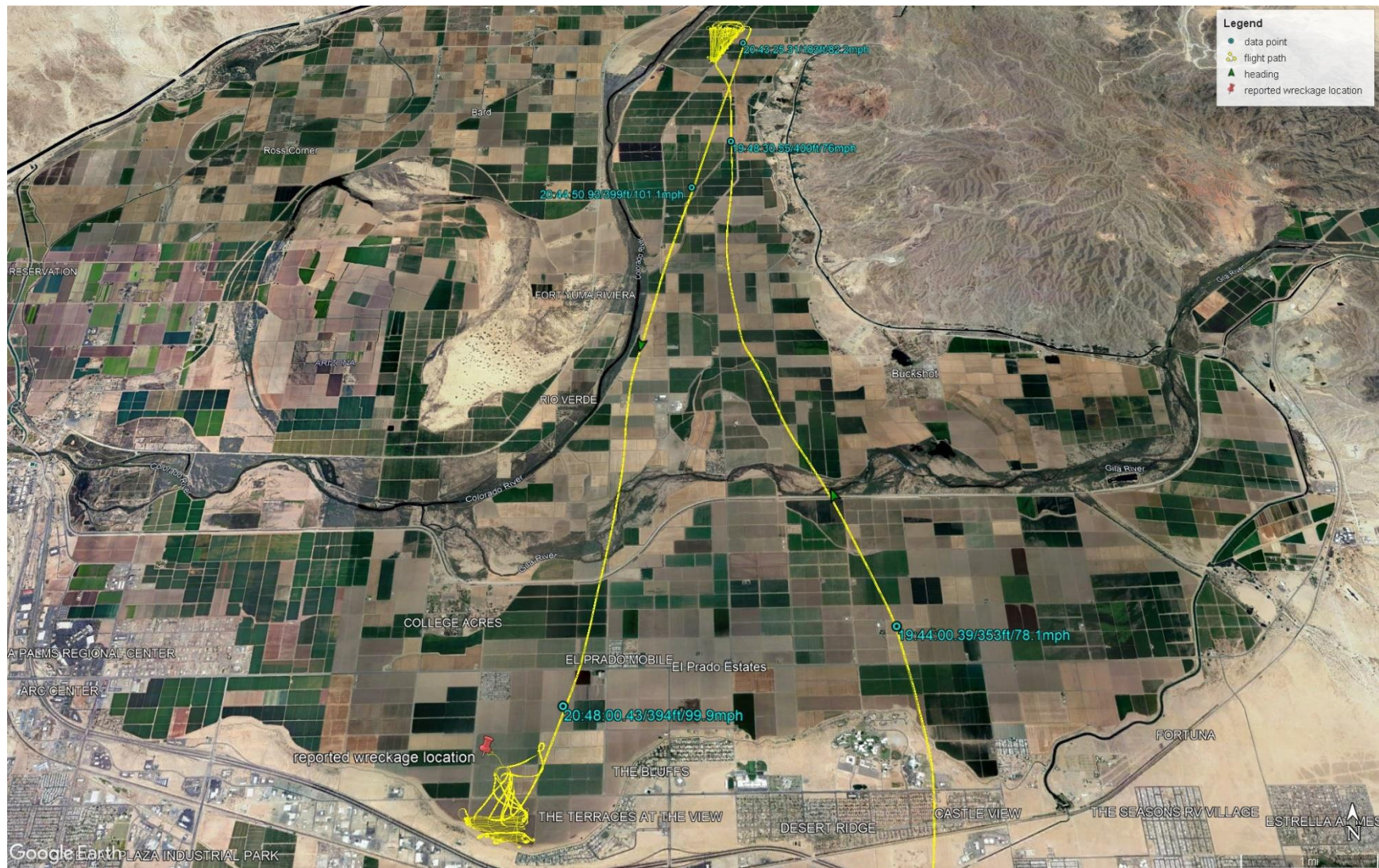


Figure 5. Google Earth overly showing the two areas being sprayed during the accident flight.



Figure 6. Google Earth overfly of the final portion of the accident flight.

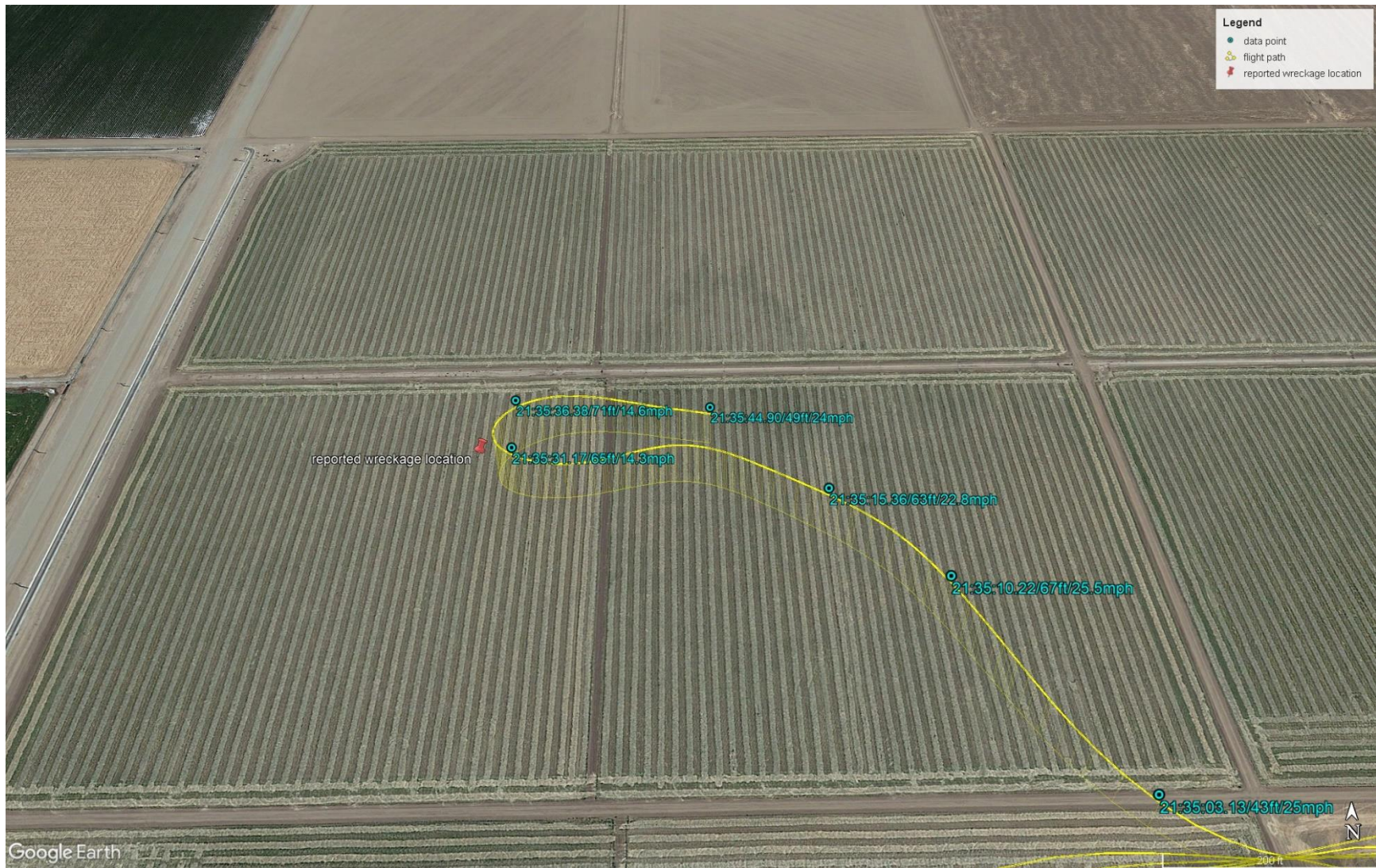


Figure 7. Google Earth overlay of the final portion of the accident flight near the reported wreckage location. Note that the terrain on Google Earth is turned off for this figure.