

# THE HUNT FOR RED OCTOBER

*FLIGHT INTO THE UNKNOWN - MARCH 9, 2019*

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# RED OCTOBER

## THE SEARCH AREA

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On Friday I went to beach access #5 to measure the distance from the old revetment wall to the furthest point point on the beach (3,189 feet). My neighbor was still pretty new at flying so I told him to come with me and I'd help him get some flight practice in. Since I was measuring, I launched on the boardwalk, John started from there as well and this is the area he was flying over.



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Long story short, he couldn't get the drone back to the start position before the battery ran out so it landed on it's own in this area somewhere. The connection from the drone to the controller was lost so there was no further positioning available after it landed. I figured if I flew my drone over the area maybe I could see something so I started high up but realized I would need to get much lower to see any detail.



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This gives you an idea of the terrain in question. The water is about knee deep and very difficult to maneuver through. I was hoping the drone would be caught on a bush or sitting above the waterline so it would be visible, but it's black so I knew if it was under water it would be virtually impossible to see. My original strategy was to fly a grid pattern and take photo's. The video feedback was helpful, but searching for such a small object on the live screen wasn't really an option so I figured I could look the through the photo's later and see if I could find it. Plus, I had used up most of my batteries doing the measurement so I only had about 10 minutes of flight time left. I took as many photo's as I could and tried to cover as much ground as possible. I had my doubts after I saw all the water.



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## Photographic detail

All that evening and into the night, I combed through the images one by one looking for detail amongst the heavy brush. In this photo, you can see a beer can just under the surface of the water. This encouraged me because it showed I had enough detail to be able to see it as long as I was directly over it. Unfortunately, this is where I began to see the flaw in my strategy. Even though I could see detail in the photo, I couldn't recognize where I was in the larger area so if I saw the drone, it was hard to know where I was when saw it. I stopped searching and went back to an overall view of the area I had taken from higher up and tried to match the close up view on to the larger view. This is where I began to see another flaw. As I flew the grid pattern, I took photo's of the area going in one direction, then I turned around and flew back taking photo's on the return. The problem is the angle of view is completely different in those two views making it virtually impossible to match things up because the same view looks completely different when photographed from opposite sides. I needed a new strategy.



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## Flight Data

This is a screen grab of the flight data from John's last flight, the yellow represents everywhere the drone flew, The green "H" (home) represents where the flight started, you can see the red arrow is the drone. I realized you could overlay the flight data onto a map but you'll also notice the boardwalk doesn't even exist in the satellite view so the image is outdated. I figured I could still use it because there were enough similarities to make it work. I overlaid this flight data onto a photograph I had taken and figured we would just have to search that area and we'd be good to go.



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The overlay didn't match up perfectly but in my best guess, I figured the drone was somewhere here and that searching on foot would be our only option. The area seemed small enough that we couldn't miss. Even if it was under water, the water was clear enough that if you were standing right there you would see it, so we set out to search that area. From this photo it looks easy, but in reality it's virtually impossible to walk around in that brush.



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This is what the area is like. The water is knee-deep, the green bushes are over your head, and you have to climb over all the downed trees and shrubs to move forward, also, keep in mind, the drone is a DJI Mavic it's only about 8" x 4", it's quite literally a needle in a haystack in this brush. If the drone fell down into the undergrowth instead of laying right on top, there is no way you would see it unless you stepped right on it. And even though we had a rough idea where to search, once you were deep in the brush, you couldn't tell where you were to know if you were still in the search area.



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## Visual observation

This is John heading out into the area to search. We spent quite a few hours looking but it a hopelessness was starting to set in. John wasn't happy, understandably, but we had to call it a day. The ride back was bleak. We were soak and wet, scraped up and bleeding, and it looked like we'd never find the drone. Later that night, I tried to figure out what more I could do to pinpoint this thing, I knew it didn't just disappear off the face of the earth but it was quite literally like looking for a needle in a haystack. I went back to the flight data and looked around.



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The blue line and the circle are a slider and when you drag the circle, the red arrow moves giving you a realtime video of the flight. I kept looking at the numbers at the top and they were saying the drone was 177.8 ft away from the "H" (home) position, but that's not helpful when you're trekking through the jungle. I noticed when I moved the slider the two numbers just above the blue line moved as well, turns out those are GPS coordinates, but I didn't recognize them as decimal numbers, I'm used to them written as degrees, minutes, and seconds. I searched online and found a converter that would convert decimal GPS to degrees, minutes, and seconds (<https://www.fcc.gov/media/radio/dms-decimal>). Now I had something to go on. I slid the slider all the way to the end and got those numbers, 32.318180 and -80.466721, and converted them to coordinates 32° 19'05"N and 80° 28'00", I wondered how accurate the coordinates were but figured at least I would know where I'm walking in the middle of the brush. I used a more precise compass I downloaded a while ago when I got my sUAS pilots license, it's called Commander Compass and let's you input coordinates as well as turning on a pinger that makes a noise as you get closer. We decided to give the search one more shot, if we found it, great, if not, so be it. I turned on the compass and started walking. I looked down every 10 feet or so to make sure we were still heading in the right direction, keep going it said. The arrow was facing forward so I took a few more steps and looked again. It was facing backwards as though I had walked right past it. I looked down but saw nothing. I turned around and moved to the left about two feet and there it was. I was blown away at how accurate the coordinates were as well as how precise the iPhone app was. It was amazing! The drone had landed on some grass just at the surface of the water. The weight of the drone had pushed the grass down slightly so that it was sitting in water but not submerged. As I write this, the drone is drying out thoroughly and once we are sure there is no moisture in the housing and circuitry, we will try and power it up. Working or not WE FOUND IT!



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Here is where the drone was found. You can see it was close to where we predicted, but that meant nothing while searching.



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## Visual observation

John was quite a ways away from it when he started searching,



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## Visual observation

I've blown up the photo and you can actually see the black drone lying on the grass where we found it.



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One very happy man after we found his drone.

## A Happy Ending

A lot of excellent lessons learned during this whole process and a few of the take-aways when using a drone to search for an object are:

1. Photo's taken of the overall area from higher up are most useful.
2. When taking lower photo's of detail, take them while flying in the same direction so objects that are on the left in one photo, won't be on the right in others.
3. If the object is sighted, take a photo while flying directly above it. The photo will contain GPS coordinates of where it was taken which can be used later.
4. Download Compass Commander app and install.