UNWOMANNED SYSTEMS IN WETLAND DELINEATIONS

WOMEN DRONE PILOTS TAKE FLIGHT IN BURGEONING WETLAND DELINEATION WORK

By Jeremy Schewe, PWS with Caitlin Burke and Kelly Brezovar, PWS

USE OF DRONES and other technologies in wetland delineation work is rising. Technology affords greater speed and accuracy at a time that issues like fluctuating regulations and the impacts of climate change are making wetland delineations more complex. And growing recognition of the importance of wetlands as valuable climate mitigation assets adds urgency to this work; protecting wetlands is a burgeoning part of the carbon offsets industry and will likely be a significant driver in wetland science job creation in years to come.

But finding solutions to the complex challenges facing wetlands (and indeed, the world), takes far more than technology. Making this technology more accessible to a gender diverse array of workers that are moving into industries like engineering and wetlands is also critically important. Women are frequently left out of media portraying drone pilots, one article noted. According to Microsoft, as reported on the site Women and Drones, women who had "STEM role models are 1.4 times more likely to pursue opportunities within these fields, yet only 40 percent of girls [currently] say they have a role model in STEM. If we want to see more girls in STEM, it's OUR responsibility to inspire them."

Jeremy Schewe, PWS, Ecobot's Chief Scientific Officer, invited two drone pilots into a discussion on the gender diversity gap in the piloting of drones for wetland fieldwork. Caitlin Burke is an Ecologist at Resource Environmental Solutions. Kelly Brezovar is a Professional Wetland Scientist, Environmental Team Lead and Senior Environmental Scientist at Hollaway Environmental + Communication Services.

How are drones used in the wetland delineation process?

Kelly Brezovar: We use drones for doing preliminary assessments for wetlands, and occasionally for evaluating bird nests. Drones give us a birds-eye view of the property. We do our wetland planning and our work planning based on what we see aerially. It makes the process more efficient.

We also use it for public involvement to track project progress. We fly the drone over a project, see where it's at, and then overlay those layers to show what we've accomplished in nine months. The footage provides a great visual representation of our efforts.

Caitlin Burke: We're not at the point where drones are delineating the wetlands for us – which is good for job security – but I'm using it to supplement my reports. You can see a general demarcation of the wetland boundary using the aerial imagery and videos captured by the drone. Especially on large sites, it's helpful to have that imagery once

you're back in the office and get a general sense of where that boundary is. It helps me zero in on places to take data points.

How has field work evolved since you have been in this industry, and what role does technology play in that evolution?

Kelly Brezovar: When I first started doing delineations, everything was done by hand. We would measure distances by counting our footsteps. As the biologist, I would be taking notes and a colleague would follow me around with a very cumbersome GPS system.

Now we have wetland delineation software like Ecobot to enter and store our datapoints, which both improves efficiency and reduces errors, as well as drones which help familiarize us with the topography of the land.

Earlier drones would merely take images from above, which meant the areas weren't properly georeferenced. We had to put markers on the areas we were surveying so we could properly georeference them once we got back to the office. Now we have drones that can connect to the internet, satellites, and can properly georeference the data points and images.

We recently completed a seagrass survey using the drone. I was able to pop it up in the air, have it looking directly down and taking snaps along pre-planned transects . We were able to patch together a very accurate, real-time aerial map of what was there. Before drones, we would have been in a boat, in waist-deep water, walking around and holding a GPS unit in the air making every effort not to fall and destroy the unit. Drones save us a lot of time and effort.

Caitlin Burke: When I first started in this industry, we didn't have drones – at least at my company – but we did have a way to capture aerial photography. One of the owners of our company was a pilot and he would fly his personal airplane over our project sites and another coworker would lean his camera out the window and take pictures of our project sites. They would have to set a whole day aside and hit every project site on that trip. Now you take the drone with you and you can grab better and more accurate imagery in a much shorter amount of time.

I did not have an app for collecting wetland field data until the past year. It's always been paper and pencil. The Ecobot app ties in nicely with GIS programs we already use. I'm a big GIS fan – I do all my own mapping for wetland delineations and for all the reporting I do. Before Ecobot I had been using the ESRI Collector app for mapping boundaries, and it's nice to have these apps that talk to each other. We use Ecobot to collect the field data and grab the wetland boundary and it all gets uploaded right back into ArcGIS and it's all there for my reports. It's enhanced my efficiency greatly in the last year that I've been using it.

Would you say technology improves the accuracy of your reporting as well?

Caitlin Burke: Yes, I would agree with that. We've all been in situations where you can't read your own handwriting, especially if you try to transcribe your notes a week later.

I would prefer to spend more time in the field taking more careful data using a wetland delineation software that stores it for me than scribbling something down and rushing to get back to the office and forgetting what that data point looked like. So I definitely think it's increased accuracy as well.

How else do you use drones in your work?

Kelly Brezovar: We use them when looking for wetlands or potential impacts to wetlands in hard to reach areas. For example, when oil and gas companies are conducting horizontal directional drilling, we use the drone to help us conduct environmental inspections and look for any inadvertent returns, such as plumes occurring in waters that aren't readily accessible.

Caitlin, your work takes wetland delineation a step further. Tell us about wetland mitigation banking and your role there.

Caitlin Burke: I also work on wetland mitigation bank document preparation. As a company we seek out land that would be an ideal site to construct a wetland mitigation bank or restore wetlands for permittee-responsible mitigation. Oftentimes, that involves a farm field where you can break the drain tiles and restore the natural hydrology to the site and have wetlands pop back up. I'm oversimplifying it – there's more work involved, such as permitting and documentation required to get a bank approved to the point where we can begin to sell the credits to clients needing to mitigate for wetland impacts.

I'm just starting to get into bat habitat mitigation sites. It's similar to wetland mitigation, but it's selecting a site that is a prime bat habitat - usually hardwood stands of trees where bats roost or caves where they hibernate. Heavily wooded areas where bats might be migrating through and roosting would be prime habitat to protect. The process works in a similar way to wetland crediting. If you're an energy company and you're building a solar farm, your wind turbines are proposed to have a certain amount of impact to bats which you may have to mitigate for by purchasing credits from a bat habitat mitigation bank.

How are drones involved in those mitigations?

Caitlin Burke: Drones help you get a sense of the topography of the site. If we're doing stream bank restoration, the imagery is so clear. You can zoom in on erosion in the stream bank and pinpoint areas for restoration. If you've got a large farmed site where there might be farmed wetlands or broken drain tiles, you can see saturated soils easily from aerial imagery. I think it will come in really handy for us to fly those sites at the beginning of a project and take photos throughout the stages of the project as well. Then you can have a nice time-lapse of the wetland bank construction.

What do you foresee as the future for drones in the field of environmental science and environmental engineering?

Caitlin Burke: At this time, drone footage is mostly used for marketing and promotional purposes and for supplementing reports, as well as documentation for agencies. In the future, I'd like to use it more for analysis. There are apps we can connect the drone to that would allow us to collect topographic data, calculate volumes, cut and fill, which could be helpful for streambank restoration work in the floodplain. If the drone can provide accurate elevations, you can calculate those volumes just by flying the site. That's where I see the use of drones headed in our industry.

There is also an emerging technology out there to identify vegetation types using drone programs. I haven't used anything like that yet but I can see that it's coming.

Tell me about being a woman in this industry.

Caitlin Burke: I'm used to being the only woman at field meetings – and that's okay. I've always had great mentors, both male and female. My current (male) boss encourages me to make sure my voice is heard, and I haven't felt like it's been an issue. I know we need more women in STEM and more mentors for younger women trying to get in STEM and stick with it.

I'm getting involved in a virtual drone event for high school aged girls called FlyGirls, with the Cobb County School District (Georgia) to create excitement about drones and STEM fields in general. Every girl has received a drone and gets to do different projects using their drones. I will have the opportunity to engage with the girls, talk about how I use drones in the real world and hopefully spark some excitement about that.

I have been fortunate to have strong, female mentors in my life (in and out of STEM fields), and this has given me the confidence to know

that I am capable of a career in this field. I hope to pay it forward and serve as a mentor and a resource for young women who may need that little extra push or encouragement. It is so important that we work to change the perception that STEM fields are geared towards men, and to create the supportive and welcoming environment that we all would benefit from.

Why is it important for women to be surveying land?

Kelly Brezovar: It's important to maintain diversity and encourage people from all types of backgrounds, degrees, study areas, age groups, races, and genders to participate in science, land conservation, and land management. Keeping a wide array of diverse scientists from different backgrounds makes the science better and more effective. As a native Texan with a heritage of German, Mexican, and Native American descent, I feel like this cultural background, in addition to my being a woman, gives me a unique perspective of the land I survey.

Do diverse teams achieve better results and, if so, how?

Kelly Brezovar: When working out in the field or preparing reports with someone so different than yourself, you gain knowledge you would have never considered and the opportunities for innovation are endless. For instance, I am more specialized in coastal habitats, wetlands, wildlife, construction, and coastal mitigation whereas my colleague Chris Garza is more specialized in forestry, botany, coastal prairies, entomology, fungi, and ecological restoration. My drone knowledge also pairs well with Chris' GIS and mapping experiences to ensure we capture all angles for more efficient flight. Chris is much more analytical whereas I am more big-picture, and we work well as a team to effectively and efficiently survey land and are able to better fly, delineate, and understand the ecological conditions and values. All in all, we are both striving to collect data that gears towards our diverse interests, while adequately capturing the land for either preservation, restoration, mitigation, or permitting.

Caitlin Burke: In a diverse workplace, there is greater collaboration and ease of communication. This inherently leads to more thoughtful discussion and better solutions for clients. I do find that I am able to build professional relationships more easily with young women like myself. I might be able to communicate with female clients or regulatory agents in a way that my male colleagues cannot. This also allows the team to engage with and potentially attract a more diverse client base.

Finally, Kelly, how did you get interested in flying drones?

Kelly Brezovar: I began working with drones in 2011, but it was hard to get on the docket for flying it because a lot of people who had been flying it for longer had seniority. So I decided to get my own drone.

In November of 2017, a friend suggested I get a drone pilot, so I did. The following month, I got my pilot license and continue to finesse my skills and explore new ways to use this technology.

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