Using drones to capture animal footprints

While the need to develop software capable of accurately analyzing footprints has been WildTrack’s focus, there has been a growing need for speedier data collection, which until now has relied on long hours of fieldwork.

This prompted WildTrack to see if using mapping drones, such as the eBee X, could provide a faster, more efficient method of UAV-assisted data collection.

senseFly eBee X The senseFly eBee X was used to map an area off the coast of Beaufort, North Carolina, home to the Duke University Marine Lab.

“Until now, we’ve had to trek miles in the harshest conditions— from the searing desert in Namibia to the deepest snow in northeast China— to locate cheetah or Amur tiger prints,” said Dr. Alibhai. “We’re now working with senseFly to explore how we can expedite this process using its eBee X fixed-wing drone.”

senseFly eMotion Flight Planning Software A ground station (laptop) is used for mission planning using senseFly’s eMotion flight planning software.

Working with senseFly and its partners at the Duke Marine Laboratory, WildTrack conducted tests of senseFly drones and drone cameras along the North Carolina coast.

eBee X Mapping Drone LaunchA successful senseFly eBee X fixed-wing drone launch in Beaufort, North Carolina.

Preliminary tests proved successful, and the images captured with the senseFly Aeria X photogrammetry camera successfully identified human footprint trails in the sand.

shoal nadir image captured with a senseFly drone and drone cameraA nadir image of a shoal along the North Carolina coast, captured using the senseFly Aeria X photogrammetry camera.

In terms of resolution, the drone achieved ground sample distances (GSDs) of one and two centimeters.

3D point cloud of the mission area along the North Carolina coast.

With the two-centimeter dataset, an orthomosaic of the entire set of imagery captured by the drone was created in Pix4D, which was then used to seamlessly scroll through a single image of the mission area.

Pix4D mesh of eBee X images taken at the Carolina Coast A Pix4D orthomosaic of the area mapped using a senseFly eBee X.

This allowed for easy identification of areas of interest — areas where human, dog and even horse tracks were found.

High-resolution drone image taken with senseFly eBee X and Aeria X mapping camera High-resolution nadir image of footprints in the sand, captured using a senseFly eBee X mapping drone and senseFly Aeria X photogrammetry camera.

From there, the team used the reference points identified in the two-centimeter dataset and viewed them in the higher resolution one-centimeter dataset to get a clearer look at the tracks.

high resolution drone image taken with senseFly eBee XUsing drones and advanced drone cameras, researchers can capture high-resolution images of footprints in the sand.

These results were then used to establish the viability of senseFly’s drones and cameras for an upcoming black rhino monitoring project in Namibia. The images captured by the drone would be used for the following:

Terrain mapping in the rhino protection areas (custodianships) to produce rhino protection maps for anti-poaching, resource optimization and rhino management

High-resolution imaging of objects of interest (cryptic ground evidence) on the ground, of which the primary objects of interest would be footprint trails as well as other signs of animal and human activity, such as snares, human trails, tire tracks, etc.

Anti-poaching analysis, specifically infrared capability to detect illegal poacher activity and rhinos at night

Multispectral analysis for the enhanced detection of cryptic ground evidence and vegetation mapping/drought assessment

Namibia is one of the last three black rhino strongholds in the world, holding around 30% of the global population. Because the species has been mercilessly killed for its horn, used in traditional medicine in the far east, the total worldwide population is thought to be only 5,000.

“Biodiversity is disappearing at 1000 times background rates, yet we totally depend on biodiversity for our own survival,” said Dr. Jewell. “We threaten our own existence when we fail to protect the other species that inhabit this planet.”