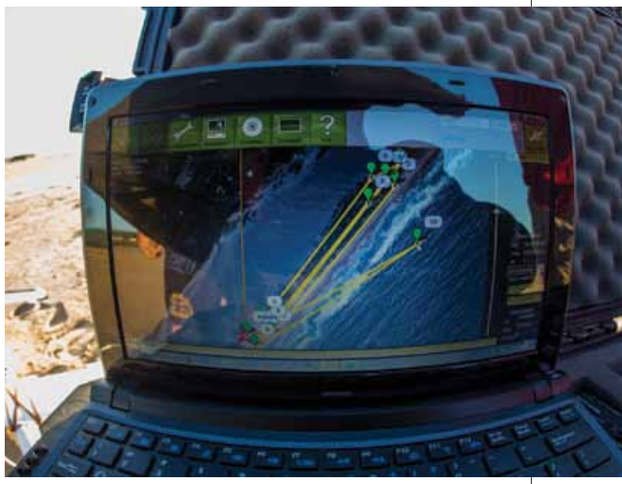
the drone ZONE



DRONES COME IN ALL SORTS OF SHAPES AND SIZES, FROM GLIDERS AND FIXED-WING PLANES TO HELI-COPTERS, AND ... ARE **CHANGING THE WAY SCIENTISTS ESTIMATE THE SIZES OF BIRD COLONIES**

ANDREW AVELEY (4)

NOWADAYS ornithologists are spoilt for choice with technologies that enable us to conduct research in ways we could only have dreamed of 10–15 years ago. Options like GPS–GSM units enable us to have birds SMSing their location to a server several times a day. We use radar to follow mass migrations; have 10-gram solar-powered satellite transmitters tracking birds like Amur Falcons to China and back; pressure loggers that allow us to see how deep seabirds dive; infra-red thermal-imaging cameras to measure birds' body temperature profiles; 24-hour live-feed video surveillance cameras on nests; stable isotopes to infer the origins of migrating birds; and tablets and smartphones that facilitate direct data capture and submission for projects such as SABAP2.

For years scientists have struggled to obtain accurate counts of colonial-nesting waterbirds without causing excessive disturbance to their colonies. Traditionally, biologists have walked through the colony as quickly and quietly as possible, but it is inevitable that the birds suffer some disturbance during the process, sometimes leading to the loss of nests (especially in gull colonies, where the birds are not above stealing other birds' eggs or small chicks). As a result, these invasive monitoring techniques are frowned upon, especially when dealing with threatened species. Aerial counts by plane or helicopter have been done, but these methods are very costly, take time to organise, and their high noise levels can still unsettle the birds.

So the advent of a new census technique has been welcomed. Enter the era of the UAV, or unmanned aerial vehicle. Better known as remote-controlled planes, drones come in all sorts of shapes and sizes, from gliders and fixed-wing planes to helicopters, and these machines are changing the way scientists estimate the sizes of bird colonies.

In the past decade UAVs have been used in wildlife counts on a range of animals from alligators to whales and dolphins, but it is in bird research where their popularity is gaining ground. Used in 2006 for the first time on birds (to count breeding Black-headed Gulls in Spain), UAVs have been put to work mostly in the USA to count Sandhill Cranes, ibises, geese and cormorants. Few field studies have been published yet, with none reported in Africa. Drones were first deployed in South Africa in November 2012, when a locally designed and custom-built UAV from Steadi Drone in Knysna was used to census the Kelp Gull *Larus dominicanus* colony on the Keurbooms River in Plettenberg Bay. This is one of the largest colonies of this species in South Africa, and accurate counts would allow long-term monitoring and assessment of how the species adjusts to continued anthropomorphic development and climate change.

The project was the brainchild of Mike Bridgeford, chairman of Bird-Life Plettenberg Bay, who wanted to assist CapeNature officials in getting accurate data with minimal disturbance to the colony. He successfully raised the funds needed to hire the drone, and assembled a team to coordinate the project. It will form part of Minke Witteveen's MSc project, conducted under the supervision of Professor Peter Ryan of the Percy FitzPatrick Institute of African Ornithology at UCT and Dr Mark Brown of the Nature's Valley Trust.

The first flights, conducted on 28 November 2012, tested the gulls' reactions to the silent intruder. With some trepidation, the drone was launched from the beach about 50 metres from the nearest nest. The birds closest to it flew up to mob it, but once it gained sufficient altitude, the gulls left the drone alone and it silently flew the pre-programmed flight: three sweeps of the entire length of the peninsula where the gulls breed. After another brief mobbing on its descent, the drone landed safely and we had our first evidence that the scheme might actually work.

The team returned on 4 December, this time to take the first census photographs. The drone handled the extra weight of the camera without a problem, and high-resolution images were taken of the entire colony. After 'stitching' the digital images together, we counted at least 1 716 Kelp Gull nests in this colony. In future, regular monthly or bi-weekly photographic surveys will enable us to determine the peak breeding times and the total number of breeding birds.

Our success with the drone will doubtless pave the way for similar work to be done on other species elsewhere in the country.

MARK BROWN

above *A fixed-wing drone gets a gull's view of the breeding colony.*

above *Wing-man. A Kelp Gull accompanies the drone as it comes in to land.*

top, left *Duran de Villiers and the Steadi Drone team prepare the system for the flight over the Kelp Gull colony.*

top, right *The system can be pre-programmed with exact flight paths. The fully automated flights can then be repeated precisely on a regular basis.*