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## Animals tracked with tiny tags summon their own drones

Keeping tabs on threatened species just got easier, thanks to sensor-laden, networked tracking tags, and automated drones that fly out to gather the data

By Paul Marks



Someone to watch over you  
(Image: Frans Lanting/Corbis)

IN A dark, rainy forest on New Zealand’s Great Barrier Island, zoologist Robin Freeman waited. And waited. He spent two weeks in 2008 on a stakeout in anticipation of a black petrel. It was due back at its nest – and with it, the expensive GPS data logger it was wearing. All along, one thought nagged at Freeman: “There must be a better way of doing this.”

And now there is. Using Freeman’s subsequent work on GPS-tag miniaturisation, engineers at Microsoft Research in Cambridge, UK, last week introduced a new generation of tracking tags that can be interrogated from the air by drones. On sensing a weak signal from one postage-stamp-sized tag fixed to an animal, a drone can fly towards the creature on autopilot and retrieve the tag’s data.

But that’s not all. The tags contain networking hardware that allows them to contact each other and send their data from one tag to the next until the information reaches a tag within range of a base station, which could be attached to a fixed antenna or to a drone. “So obtaining data from a single member of a tracked wolf pack could result in all the data for the individuals it has been in contact with,” says Freeman, who is now with the Zoological Society of London, which is working alongside University College London and Microsoft in a venture called Technology For Nature.

### “A single member of a tracked wolf pack could deliver data for every individual in the pack”

“Drones can fly around listening for the ‘heartbeats’ of the tags,” says Lucas Joppa, the Microsoft team’s leader. “Once the autopilot flies it to the animal, the drone can turn on its high-definition cameras and start getting a more holistic sense of what’s going on.”

Several conservation organisations are getting ready to launch trials of the new tag system. In the Republic of the Congo, the Wildlife

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Islands Foundation (SIF), meanwhile, aims to use the system to study the little-known giant bronze gecko, *Ailuronyx trachygaster*, which was discovered in 2002.

The Zambian Carnivore Programme (ZCP), based in Mfuwe, will probably run the first field test for the drones. The ZCP works in several parks around the country and is studying the effects of poaching and snaring on populations of African wild dogs and cheetahs, which are hunted for their meat. "Ground tracking alone has proven to be a big obstacle in Kafue National Park due to the habitat, limited road network and wide-ranging behaviour of cheetahs and wild dogs," says Paul Schuette, a research ecologist with the ZCP. "So we are exploring options for unmanned aerial vehicles." It plans to start tests in 2014.

The tags use a suite of sensors to log a creature's GPS position and direction of movement. Such information allows researchers to look for movement signatures that indicate when the animal is hunting, eating or scavenging. If it is killed by a poacher, or poisoned by a pesticide, motion will cease. Likewise, sensors that measure temperature, humidity and elevation can help researchers deduce if a changing climate is altering an animal's range.

Christopher Kaiser-Bunbury of the SIF is excited by the potential. "Drones would come into their own on Aldabra Atoll, where we could monitor giant tortoises roaming across very large, inaccessible areas." n

## Threat mapper

A new type of search engine could help conservationists get a quick view of which species are threatened, and where.

Piero Visconti at Microsoft Research in the UK built software that lets users enter simple search terms - "Ethiopian wolves", say - and displays results from the International Union for the Conservation of Nature's Red List. The results are shown in a user-friendly mapping visualisation, but the key trick is something Visconti calls iterative search. As users keep searching for new species, the system overlays each new set of results on the map atop the old. Areas where many species overlap could indicate areas of particular concern to conservationists.

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