

Researchers use radio tags to learn more about animal species. One English firm, run by biologists for biologists, specialises in the manufacture of these radio tags, reports Ron Toft.

■ Ever wondered how scientists keep tabs on creatures as diverse as birds, reptiles, fish and mammals in an effort to shed new light on their often remarkable secret lives? The answer, in many cases, is radio tags, some of which weigh well under a gram.

During the past three decades, UK business Biotrack Ltd has made more than 70,000 miniature biological tracking devices which have collectively revealed a wealth of data about more than 1,000 animal species in over 100 countries.

Based in the Dorset, England, town of Wareham, Biotrack is – and always has been – run by biologists for biologists. “Practical radio-tracking is inseparable from the development and manufacture of high-quality radio tags,” explained general manager-cum-biologist Brian Cresswell. “We have always understood the needs of researchers and the questions they are trying to answer because we are researchers ourselves.”

Biotrack – acquired in early 2007 by Lotek Wireless Inc of Newmarket, Ontario, Canada – makes around 5,000 tags annually. Every miniature device is tailored to a specific customer and research project.

“Tags are mainly used to ascertain how animals disperse, where and how far they go and what habitats they use,” Cresswell told me. “Some researchers, however, have more subtle, more specialised, objectives, such as finding out the causes of animal mortality. There’s a lot of interest, too, in discovering what predators eat.”

One project, for which Biotrack made tags, monitored the behaviour of pike in such a way that researchers could tell from the data beamed back when the fish were active and striking at other fish and when they were inactive and digesting their prey.

Cresswell himself has long been involved in studying the feeding habits of nightjars – nocturnal, insectivorous birds which migrate to the UK every year to breed.

“Radio tracking has been crucial to several important discoveries arising from this work,” he told me. “For example, during their active period, which is at night, the birds fly several kilometres from their nesting areas to feed in deciduous woodland and on farmland and wet meadows. Measures to conserve nightjars have hitherto concentrated on places where they breed, but this research suggests that it is just as important to conserve their feeding habitat some distance away.”

Cresswell is also involved in a project studying the fortunes of reintroduced red-billed curassows in the Atlantic rainforest of Brazil. “These turkey-sized birds have been seriously reduced in

# Hot on the Trail







number through hunting for food. They are fairly stupid in that their anti-predator strategy involves leaping four metres into a tree and looking down on whatever is after them. Unfortunately, that strategy doesn't work if the predator below has a gun!

"We made tags to put on captive-bred curassows to see what happened to them after they had been released into the wild. The birds were 18 months old when they were set free and the tags are designed to last for two years, so we should be able to monitor the curassows as they start breeding.

"From radio tracking, we know that 60 per cent of the released birds are still alive after the first year, which is good. Had they not been monitored, we would have no idea of just how successful or otherwise the release programme had been."

Researchers studying goshawks discovered quite by chance while conducting other studies with radio tags that they could tell when these birds were dismembering their prey by monitoring what their tails were doing.

"It was already known that a goshawk holds its tail virtually upright when stationary and pretty much horizontal when flying," said Cresswell. "What was not realised, however, is that this species uses its tail as a brace when feeding. In other words, the tail moves up and down when the goshawk is stationary and pulling its prey apart.

"By studying the changes in the pulse rate from the tail-mounted transmitter, the researchers could tell when the birds were feeding. By tracking birds to their plucking sites, they could then discover what the goshawks had killed and eaten."

The smallest tag Biotrack makes at present weighs just 0.3 grams and is used on birds, bats and insects. An even lighter device is in development. The biggest tag weighs around 400 grams and is fitted to large deer.

Around 70 per cent of Biotrack's products are exported all over the world. The biggest countries, in terms of sales, are France, Germany and Spain.

"Our speciality is small tags for birds, bats and other small creatures, whereas our complementary parent company, Lotek, makes radio tags for largely different species, especially fish."

Tails, backs, necks, legs, wings and ears. Tags are attached to various parts of an animal's body, the exact part varying according to species and research objective.

Tail tags are the commonest and safest for birds and are attached to feathers that drop off during moulting. Special tail tags have also been made for tapirs, the South American mammal.

Backpack tags are used for medium to large birds. Modified versions are produced by Biotrack for mammals, fish, reptiles and amphibians.

Leg tags are attached mainly to birds of prey and long-legged waders. "They are also used as a last resort on other bird species if tail feathers are insufficiently developed or a harness is too risky."

Originally developed by Biotrack for pheasants, necklace tags are now the 'industry' standard for game bird projects throughout western Europe.

Researchers monitoring fish, reptiles and amphibians generally use implanted or ingestible tags. Ear tags made by Biotrack have been used to track boar and bears.

The company has also developed bespoke horn tags for keeping tabs on rhinos. Each of these is inserted into a specially drilled hole in the animal's horn, while the all-important antenna is embedded in a shallow, narrow groove running around the outside of the horn. Fur tags, which are glued into position and later fall off, have been made for lynx kittens.

Biotrack tags have been used to monitor more than 1,000 wide-ranging species globally. Of these, around 60 per cent are birds and 30 per cent are mammals. The rest are fish, reptiles, amphibians and insects.

"We've supplied tags for some pretty special and unusual creatures, from hairy-nosed wombats in Australia to Madagascan fat-tailed dwarf lemurs."



Probably the most unusual request received by Biotrack was for a tag to be made for a yeti! “A French group working in the Caucasus Mountains a few years ago paid about £500 for a yeti collar tag and tracking system,” said Cresswell.

“Theirs was a genuinely serious expedition to find a hairy ape-like creature in the mountains. I guess they wanted a tag with which to track the animal if they ever found it. Quite how they intended fitting the collar to the ape they didn’t say!”

The most important consideration as far as tags and tagging are concerned is that the impact on target animals must be minimal. “We take great care when deciding how best to attach a tag,” stressed Cresswell. “Bird tags, for example, must be designed and fitted in such a way as to not affect a bird’s behaviour.

“Wing tags made by us for condors were attached to birds by means of a stainless steel bolt through a flap of skin at the front of the wing. The bolt was positioned at the tag’s balance point and aerodynamically shaped so that it didn’t vibrate in flight.

“Quite apart from ethical issues, data may be invalid if collected from an animal whose behaviour has been affected by the method used to study it.”

Some tags stay on an animal for weeks or months, before dropping off, whereas others, like those attached to condors, are fixed for life. It depends very much on what researchers are trying to discover.

Typically, signals from one of Biotrack’s VHF radio tags can be picked up from a few hundred metres to tens of kilometres.

“It depends where you are. If you track from a hill, you can pick up signals from something like 10 times as far away. Another factor is whether the animal is on the ground or in the sky, the detection range for flying birds, for example, being much greater than for ground-based mammals.”

Biotrack’s radio tags are rarely used for long distance migratory studies but are sometimes used in conjunction with satellite and GPS tags which are used for such investigations.

“Satellite tags typically don’t pinpoint locations. They are great if you are seeking accuracy down to only tens or hundreds of kilometres. You would be hard-pressed, however, to get one kilometre or better accuracy with such tags. One researcher following migratory storks to Africa used satellite tags to get an approximate location and radio tags for much more accurate local positioning.”

Tags have been used for years to track birds and many other relatively small creatures. Radio tracking is a fairly new tool, however, as far as insect research is concerned.



“A French group working in the Caucasus Mountains a few years ago paid about £500 for a yeti collar tag and tracking system,” said Cresswell. “Theirs was a genuinely serious expedition to find a hairy ape-like creature in the mountains.”

“I think we are going to learn all manner of new things about the movements and behaviour of insects as a result of radio tracking,” said Cresswell.

One insect species for which Biotrack has already supplied tags is the Mormon cricket. “It’s quite a big insect which, every now and again, forms huge, locust-like swarms. These can cause a huge amount of damage to crops. By tracking these flightless creatures, researchers discovered that one group walked about 300 metres a day on average while the other never moved more than about a metre throughout its entire life. Discovering where and how quickly pest insects move could be vital to controlling their numbers.”

Looking to the future, Cresswell says one of Biotrack’s aims is to “bring the exciting and increasingly sophisticated technology now available, such as ever-smaller electronic circuits, into the realm of radio tagging so that we can undertake global tracking of much smaller species.”

All manner of weird and wonderful things about animal movements and behaviour have been learned over the years as a direct result of radio tagging.

One can only wonder what fascinating discoveries will be made next... ■