

# Otters reveal their identity

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Genetic analyses of the feces could prove to be a promising approach when investigating otter populations, as researchers have written in the scientific journal *Conservation Genetics*. Credit: Photo: Andre Kunzelmann

Researchers of the Helmholtz Center for Environmental Research have developed two new methods, in order to be able to better estimate the numbers of European Otters (*Lutra lutra*) and their effects on the fish farming industry.

The researchers succeeded for the first time in gathering more accurate data on the otter population in the heath and pond region of the Oberlausitz Biosphere Reserve. Genetic analyses of the faeces could

prove to be a promising approach when investigating otter populations, as researchers have written in the scientific journal *Conservation Genetics*. The new method does not only apply to otters, but also to all vertebrates.

The information can be used to ensure effective nature conservation. Accurate information on the size of the otter population makes it possible to calculate the quantity of fish eaten per pond and hence the damage incurred to the local fish farming industry. Consequently, appropriate damage compensation would improve the acceptance of otters among the local fish farming industry and thus the protection of this endangered species, as is required by national and international law. For population size estimates, the classical method of MRR (Mark Release Recapture) is enhanced by modern DNA analyses.

The frequency with which an otter visits and hunts in a body of water can be assessed more accurately if the age of the faeces are also taken into account. This second new approach improves considerably the accuracy of otter visiting rates to ponds in many situations and is not limited to the faeces alone, but can also be applied to other kinds of animal traces (i.e. feeding traces, tracks and traces from activity) according to the international researcher team in the scientific journal *Journal of Applied Ecology*.

Striking around at dawn: eroded fish remains bare witness the following morning to the otters feeding habits. Since these nocturnal and dawn-active animals are particularly demanding to their habitat, *Lutra lutra* belongs to the category of very threatened mammal species in Central Europe. These gourmet-eaters with their brown fur and many long vibrissae around the mouth are extremely shy. It is difficult enough to observe them but to catch them is nearly impossible. But how can the otter protected effectively if there are only very vague assumptions about its numbers? Experts estimate the otter population in the heath and pond

region of the Oberlausitz Biosphere Reserve to be anything between 200 and 600 individuals. "The State of Saxony pays compensation for the damage that otters cause to fish farms. Therefore a cheap and simple method is required, which can be used to estimate the otter population, so that one has an idea of how much compensation one should be paid", Dr. Bernd Gruber from the UFZ describes one of the problems. "In practice it is difficult to check the real damage. Somebody would have to go out to the site each time and take a look at the fish and otter traces, which is just not feasible."

Just like every other predator, the otter also leaves traces behind. Researchers are now using these traces, in order to be able to estimate the number of animals in an area more accurately than was previously possible. Up to thirty times a day an otter will mark its territory to indicate its presence to potential partners or competitors. "The practical thing about the otter is that it uses its droppings for the social communication and therefore leaves them exposed, making it very easy for us to find", explains Simone Lampa, who together with her UFZ colleagues collected over 700 faecal samples in the Oberlausitz over the last two years. As the cells at the surface of the intestine are constantly regenerated in vertebrates and the old cells are discarded, tiny DNA traces are found on each faecal sample therefore revealing the individual they came from. Just like in a paternity test, cotton swabs are used to take a smear, which is put into a plastic tube and sent to the laboratory. However, compared with blood or tissue samples, the DNA in faecal samples is only represented by a few cells, making it a very difficult procedure. "In addition to this there is also still the problem that a high number of proteins, bacteria and enzymes in the faeces disturb the analysis," reports Dr. Marion Hoehn, who is an expert in conservation genetics of vertebrates. "We have to extract the DNA and copy it several times in order to make it visible, which is prone to errors. The process therefore has to be repeated several times to obtain the true genotype."

Thus, the researchers were thrilled that they were able to more than double the success rate compared to earlier procedures. Their new method brings further crucial progress with it: it combines modern genetics with the classical approach to population studies using Mark Release Recapture (MRR). In traditional MMR, animals are captured, marked, and released, and eventually recaptured. During the recapture events researchers note whether the animal had already been marked or not. After several recapture periods it is possible to mathematically calculate just how many animals are present, based on the ratio of marked to unmarked individuals. For the cryptic otter this method is not feasible. In our novel approach, not the animal itself is captured but its "genetic fingerprint", which is derived from the faecal sample. For the accuracy of the population estimates it is important that faeces are collected every day from the same location within the same time intervals. The relocation rates should be as similar as possible, so as not to falsify the results with coincidental findings. The costs of this technique amounted to approximately 30 Euros per faecal sample. "That is still the more favourable option compared to having to involve numerous people in observing the area on a daily basis. It does not necessarily have to be the faeces that are collected, as it is also possible to use hair. The main thing is to get hold of the DNA. In the future this will be the standard method of estimating population sizes of cryptic species", Bernd Gruber assumes. But as is often the case, the curse lies in the detail: Attempts to determine the population size of wild cats failed several years ago, because insufficient cat hair stuck to the adhesive strips that had been set up for the samples. In spite of such setbacks Simone Lampa is also still optimistic that in the future genetic analyses will be able to tell us a lot more about wild animal populations: "In principle our procedure is applicable to all vertebrates. We just need to find the appropriate genetic markers, which mark the crucial DNA segments in the genome. These already exist for several mammal species."

So far, researchers cannot say exactly how many otters are now living in the Oberlausitz. To do so they still have to collect faecal samples from a number of places, but for a small region reliable data now exists: At the 305 hectare-study site between Hoyerswerda and Bautzen there are 32-40 otters. The new method has helped us considerably in finding out more about this majestic nocturnal swimmer in the ponds of the Lausitz.

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