Interview Otter

00:16 R: Where do Otters come from?

00:23 Q: We get Otters sent to us from all over England and Wales, helped by members of the public who report them and then coordinated by the environmental agency in England, Natural Resources in Wales and they are couriered to us, frozen ready for post mortem.

02:21 R: How do people know to send Otters to you?

02:33 Q: There is a whole range of organisations from the Wildlife Trust to the Environment Agency, all of whom are aware of the long history of the project and pass the word. We sometimes give talks to Wildlife Trusts, we have information postcards, we have a website and a Facebook group, so word travels.

02:56 R: Tell me how often Otters come in , how many come in, how it has changed over the many years of the project, how long has the project has been going?

03:05 Q: When the project started in the early 90's they were really very few Otters found dead, primarily these were road kill. In 1992 we had maybe less than 10 Otters, now we get nearly 200 Otters every year. The project has really grown, partly that increase I think is because of greater public awareness but in the most part it is due to the expansion of Otter populations, they are doing really very well now across England and Wales so sadly that means that more of them are getting killed on the roads.

03:45 R: Could you explain what you have been doing with these Otters over the years. The ecological monitoring first.

04:06 Q: When the project started really it was driven by the fact that Otters can be a useful environmental sentinel. They are top of the food chain and they range across aquatic, terrestrial habitats they can pick up environmental contaminants in their tissues and by analysing those tissues we can measure the concentration of things like PCB's , organochlorine pesticides, which are very harmful not only to Otters but also to a very wide range of wildlife and also to humans. We were using the Otters as a means of monitoring concentrations of those contaminants. As the project has gone on we have used the fact that we have got this

05:07 Q: At really high levels some of these contaminants can affect the reproductive biology so impacting on how many young are produced which has a direct impact on population size. Even without those direct effects we get indirect effects on top predators because some of the lower trophic levels, the animals which they are feeding on are affected. Many of the rivers, fish populations had really crashed and so were not able to support the top predators. We saw the disappearance of Otters across much of England, and populations survived only in the far South West,, in Scotland parts of Wales and in East Anglia.

06:03 Q: As the pollutant levels has decreased we have seen a gradual recovery of the whole of the aquatic eco system and Otters have returned. Now they have been found in every single

county in England again, it is really a success story there in terms of, legislations has controlled those contaminants and our wildlife has recovered.

06:30 R: What is the situation now? Is the population levelling off?

06:38 Q: In some areas now we think that populations are at carrying capacity i.e., the environment really cannot support any more of them. In other areas the populations are still restricted to some extent either by limited habitat or by the level of mortality.

07:53 Q: Populations generally across the UK have increased, in some areas that is still limited by things like the high mortality on roads and the lack of suitable habitat. In other areas we think they are just about reaching carrying capacity, i.e., there are as many there as the environment can support. Some indications of this are coming from our post mortem work. For example, increase level of aggression between Otters we can see from things like the bite wounds to the genital area and to the feet, that shows they are interacting and having aggressive interactions probably due to competition for territory.

08:38 R: Can you give me a rough Idea of how many Otters there are in the country?

08:40 Q: No

08:47 R: Are the numbers that you are getting levelled off or are they still increasing?

08:52 Q: The numbers that we are getting now have really levelled off, between 180-200 a year across England and Wales and that does not seem to be increasing anymore.

10:51 Q: This is an Otter that Was found in North Wales and he obviously had a light impact because there was very little damage externally. We decide to have him mounted so that we could use it as a teaching aid. You can see the general.. he is a good size male and when we the dissection…

11.53 Q: So when we receive and animal like this for post mortem, the first thing that we do is a wide range of external observations, so we are looking for things like active parasites which very often are found around the ears and between the shoulder blades in areas where they find it quite difficult to groom. We are looking very carefully at the feet, the webbing here and the pads underneath very often are an area where you find puncture wounds from bites. Under his tail here the anogenital area is the area that is targeted in aggression between Otters so we look for tooth marks there as well. We examine the teeth very carefully and we are looking for anything like signs of wear, signs of damage, signs of decay.

12.59 Obviously we measure things like the body size and weight for comparison with other individuals and then we open the Otter up. We start with an incision just under the throat and carrying all the way, the full length of the body and really peal back the tissue so that we can expose the organs inside.

13:35 We take a huge range of tissue samples. For contaminant work for example we take liver samples, so they are analysed for contaminant concentrations. Nestled in among the loaves of the liver we find the gall bladder and we examine that carefully to look for Biliary parasites and we have recently found 2 species of Biliary parasites that are, were thought to

be new to the UK and we have been researching those but in fact we suspect now that they been here for a long, long time but had not been discovered. We examine the kidneys, we are looking at sectioning those to look for kidney stones. The adrenal gland we look at and we measure the size and look for any abnormalities because they can be an indication of physiological stress. We look at the stomach, assess whether there is anything interesting in the stomach contents and though out the intestine, we take faecal samples again those can be used in parasitological research

14:44 We take .. those that we have been using to analyse the chemistry of the scent so that we can match that to the individual characteristics that we have recorded like the sex and the age, class and assess what the Otters are communicating through their scent.

15:03 We open up the chest cavity and look at the heart and the lungs, the thymus gland. With all of the organs we are measuring the weight of the organs so that we can look at departures from normality, because we have got a very large sample size, we have now looked at over 2000 animals, we can plot out graphs for example that show the relationship, the normal relationship between the weight of the Otter and the weight of each individual organ and from that we can then see if there are any departures from that normal relationship.

15:35 We take muscle tissue samples, those for example can be used in molecular analysis, so we can use DNA to asses population structuring. With that we have shown that there are really 4 distinct populations in England and Wales, between which there is really very little mixing and within those 4 there is further sub structuring of populations. We are now looking at what landscape variables really might be driving that structure, so what landscapes are there that are restricting movement and interactions between Otters that is causing that separation in their genetics.

16:40 From our work analysing the DNA of the Otters we can see that there are 4…

16:57 From our work analysing the DNA of the Otters we can see that there are 4 regional populations between which we don't see much genetic mixing. Those populations are in the South West of England, Wales and bordering English counties, the North East of England and the South East, roughly speaking. Within each of those there is further sub structuring, where we again see less mixing between different areas of those populations.

17:31 R: Significance, does it matter?

17:49 Q: In terms of the significance of that, now the view for conservation really is that we should be trying not just to maintain species but also the genetically distinct populations of those species. So it might mean arguably that we don't try and connect up those populations anD certainly it means that when we rescue individuals form the wild we should return them to where they are found and not put them back in another population that maybe as genetically different. It may be that they are a local adaptation that is specific to that area. If they are moved to another area, they might survive less well.

19:46 Q: Otters in the wild deposit something that is known as spraint along the water courses. Spraint is a mixture of faeces and scent material from the scent glands that they have at either side of the anus. It has long been thought that they are probably using that scent to communicate with one another. Because they live quite a solitary life and they have quite a large range, Otters typically, they don't very often come into direct contact with one another so they are not able to communicate vocally or in many of the other ways that you might communicate through direct contact so, it is thought that .

20:41 Otters tend to live a fairly solitary existence and they have quite a wide home range so they don't directly communicate with one another so for example, vocally. So it is thought that they need another method of communication for example to mark their territory and say this is my patch and I have been eating fish here and it is thought that they use spraint to do that and by depositing a spraint another Otter can then come along later and smell that and gain some information about the depositing individual.

21.16 Q: So that was suspected but we didn't really know how they did that or what exactly they might be communicating. So what we have done is taken the scent glands at post mortem and analysed the chemistry of that scent material and then we are matching the scent profile to data that we have collected at post mortem like sex, age class, size of the animal and various other information. We have used that to try and work out whether there are differences in the scent that characterises those factors or not. We found that there are, so potentially Otters therefore can use scent to communicate sex, age, class and reproductive status.

22:06 R: Any surprises in that communication, anything that people had not foreseen?

22:57 Q: One of the key features of the project is that we can take these quite distinct research areas like the genetics and scent communication, because we have been working on the same individuals we can then look for sort of surprising connections between those different areas of research . For example when we put together the scent data that we had collected and the genetic data, we found in fact that there are differences in scent that are distinct between these genetically distinct populations.

23:30 So potentially taking an Otter from South West England and putting it in North East England, they might be less able to communicate with one another using scent.

23:47 Something else that was interesting coming out of the scent data was that we expected to be able to discriminate sex for example. It is obviously a fairly major difference in our individuals. What we found was that were as for younger animals, for juveniles and some adults we could not discriminate sex but actually when we think about that it does seem quite logical because if adults are the individuals that are needing to interact in a sexual way, they need to be able to identify one another differently as males and females whereas for young animal , which are not sexually active yet it is actually irrelevant to them, whether they are male or female or at least that is what we suspect.

24:53 Recent research that we have been doing has been using blood samples and screening them for anti-bodies to a parasite *toxoplasma gondii*. This is a parasite that is really of enormous relevance to humans. It infects about a third of the human population worldwide. Cats are the definitive hosts which basically means that they are the only host that can release the oocysts, which are the infective stage.

25:25 When those are release into the environment they go into and are picked up by for example wild life and their life cycle develops, I won't go into all of the detail but Otters are one of the species that can become infected as those oocysts enter the water courses and are picked up either by the Otters directly or by other species which they are feeding on. We are using the otters as a way of really mapping the distribution of *toxoplasma gondii* in the wild. Further to that we are hoping to look at the genetics of parasite and see how that reflects the genetics of the parasite in the human population.

26:10 R: What have you found so far?

26:15 Q: We found so far that *toxoplasma* is very widespread in the Otter populations. We found that it is more common in older animals which we would have expected, and there is no difference in the rates of males and females picking it up. So some fairly basic findings so far, but certainly interesting in terms of the high rate of prevalence, in a wild semi aquatic mammal.

26:47 R: Have people tried looking for this parasite in populations that are not in contact with domestics cats?

27:02 Q: There has been some work on sheep and they have shown that they still have high prevalence even when there is not supposed to be cats in the area

27:23 Q: I guess I didn't bring out the fact that it is cat poo washing into our systems that really

27:46 The parasite spreads basically with cat poo, so any cat poo that is either left in peoples' gardens and washes through into rivers or cat poo that people put down the toilets and then it come out through our sewage system, that contains thousands of the oocysts which are the infective stage of the parasite and those can live for a very long time in the environment, up to a year in the environment and remain infective and then when another animal comes along and picks those up, it can infect that species and encysts within their tissues which are then eaten by another animal and the cycle continues. So effectively cats are responsible for spreading this parasite right throughout the environment.