

Development of a kit for the collection of human DNA evidence in wildlife crime cases in Scotland.

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This project began in May 2019, and is jointly funded by the SIPR Evidence and Investigation Network Collaborative Projects Theme: Addressing the Future Research Challenges in Forensics, and by the Partnership for Action Against Wildlife Crime (PAW) Scotland Forensic Working Group, which is administered by Scottish Natural Heritage.

BACKGROUND

The project focuses on the investigation of wildlife crime in Scotland, initially concentrating on crimes such as deer poaching and raptor persecution, but with the potential to be applied to a wide range of wildlife and heritage crimes in future. Wildlife crime is a high priority for the Scottish Government, yet prosecution and conviction rates remain low for these types of crime. This results in part from the fact that many of these types of crime occur in remote locations that can be hard to reach, presenting a challenge to Police Scotland in terms of gathering sufficient evidence for the identification and prosecution of perpetrators.

The investigation of wildlife crime can focus on the identification of the animal species in question on, or in the possession of the suspect, by testing for the DNA of the relevant species. However, these are specialised tests that are only available for some species, which can be expensive and difficult to develop and run, particularly given that few forensic laboratories have the capabilities to handle animal evidence. An alternative approach would be for wildlife crime investigations to focus on the recovery of human DNA originating from the perpetrator, either on animal remains or from any tools involved in the criminal activity. Several studies have now shown that it is possible to recover reportable human DNA profiles from the carcasses of poached deer and from baits, traps, and carcasses in raptor persecution cases. Targeting the perpetrator's DNA would allow investigators to verify a link between a specific individual and the incident under investigation, and has the benefit of requiring no specialist techniques, as the evidence can be processed using standard DNA analysis procedures.

Indications that it is possible to recover human DNA profiles in wildlife crimes

make the identification of the perpetrators of these crimes a realistic goal, if evidence can be collected in a timely manner. The procedures for recovering human DNA evidence from animal remains are very simple and quick, and so with proper training, the collection of this evidence could be done by individuals such as Special Constables, wildlife officers, or rangers. This would require an easy-to-use kit containing all of the materials needed to collect evidence from animal remains, and instructions on how to collect the evidence.

AIMS AND PRELIMINARY FINDINGS

The initial aim of this project was therefore to develop a prototype kit for the collection of human DNA evidence from wildlife crime scenes, and then test its effectiveness for recovering human DNA of suitable quality and quantity for profiling from deer carcasses in both the laboratory and the natural environment. This work began in May 2019 when two MSc Forensic Science students from the University of Strathclyde, Jillian Mackay and Kerry Mullen, joined the project team. The whole team spent a



weekend at the Creag Meagaidh National Nature Reserve, kindly hosted by Scottish Natural Heritage's Rory Richardson, learning about the problem of deer poaching. In addition, volunteers and students at Creag Meagaidh helped to test an early prototype of the DNA recovery kit to ensure it could be used easily with minimal instruction. A final prototype kit was then developed, with guidance from Chris Gannicliffe at the Scottish Police Authority Forensic Services, and the two students spent the remainder of their projects beginning the testing of the prototype kits.

Using deer carcasses produced within an existing population management scheme, this work confirmed that the kit could be used to recover human DNA profiles from deer handled in the outdoor environment, and that this could be successfully carried out by volunteers with no experience in evidence recovery. A protocol was also developed for more detailed laboratory testing of the kit, allowing DNA to be deposited on and recovered from deer legs repeatedly, minimising the number of deer carcass samples required. Preliminary laboratory experiments indicated that the ability to recover human DNA using the kit was significantly impacted by the "shedder status" of the human donor, that is, the propensity of an individual to deposit DNA on surfaces they touch. Results also suggested that human DNA could be recovered from deer carcasses for several days after deposition, and that the amount of DNA recovered was reduced when the donor had recently touched other surfaces.

FUTURE DIRECTIONS

The preliminary work carried out in 2019 was due to be developed further in summer 2020 by additional MSc Forensic Science project students at the University of Strathclyde. Unfortunately, due to the Covid-19 coronavirus pandemic, this was not possible. Work will continue once laboratory-based projects can resume, and will further examine the performance of the kit in both laboratory and natural environments. Once the kit has been tested and optimised, a training programme will be developed to instruct the potential end-users of the kit in the collection of DNA evidence.

It is hoped that the project will result in improved partnership working around wildlife crime in Scotland, through the enhancement of the ability to investigate crimes of this type. The impact of this will be to increase the rates of prosecution and conviction in wildlife crime cases in Scotland, and to act as a deterrent to potential perpetrators of these crimes. In addition, as well as the academic impact on the forensic science research community in Scotland and beyond, it is also hoped that the project will have wider future impacts through the use of the kit in other jurisdictions and in different types of wildlife and heritage crime.