INTERPOL

INTERNATIONAL CRIMINAL POLICE REVIEW

Preservation of species in the United States

by Kenneth W. GODDARD

In the Spring of 1989, in order to assist the law enforcement efforts of wildlife law enforcement officers throughout the world, the United States Fish and Wildlife Service established a new and unique federal crime laboratory in Ashland, Oregon.

Housed in a modern 23,000 square foot, concrete and glass building, and located in a small Southern Oregon town of 17,000 that is known both nationally and internationally for its Shakespearian Festival, the National Fish & Wildlife Forensics Laboratory (Wildlife Forensics Lab) is unique in the sense that it is the only full service crime laboratory in the world dedicated solely to wildlife forensics.

In terms of functional operation, the Wildlife Forensics Lab is divided into three analytical sections (Criminalistics, Serology and Morphology) and three support sections (Administration, Evidence & Property Control, and Technical Support). The Lab is currently staffed with 18 forensic specialists of widely varying disciplines, and 15 technical and clerical support personnel.

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The mission of this new laboratory is to provide wildlife forensics support to:
(1) approximately 220 special agents and 80 wildlife inspectors of the United States Fish and Wildlife Service's Division of Law Enforcement;
(2) any other United States federal agency investigating wildlife violations, e.g. the National Marine Fisheries Service, the National Park Service, the Forest Service);
(3) all 50 U.S. State fish and game agencies;
(4) the 122 signatory countries of the CITES Treaty.

Primary functions of the Wildlife Forensics Lab

Very much like any other federal, state, local or international crime laboratory, the Wildlife Forensics Lab has two primary functions: first to identify seized evidence items, and then to link — in a

Photo National Fish & Wildlife Forensics Laboratory

Photo National Fish & Wildlife Forensics Laboratory

triangular fashion — suspect, victim and crime scene, using physical evidence.

The process of linking the suspect, victim and crime scene is a fairly straightforward operation that for the most part utilizes long-established crime scene investigation procedures. And much like any other crime lab, the Wildlife Forensics Lab utilizes a number of standard police forensic lab techniques (such as the comparison of fingerprints, footprints, tire tracks, bullets, tool marks and questioned documents) to assist wildlife law enforcement officers in resolving the classic investigative questions of who, what, when, where, why and how.

In fact, in terms of linking suspect, victim and crime scene together, the only significant difference between the Wildlife Forensics Lab and, for example the United States FBI Crime Laboratory (other than size, of course) is that in wildlife forensics, the victim is always a non-human animal. And something that wildlife forensic specialists must always keep in mind: every now and then, the primary suspect may be non-human as well. They must be able to distinguish between the natural interaction of animals in the wild, and the activities of human violators of wildlife laws.

But if investigating wildlife crime scenes is a relatively simple and straightforward process, the task of identifying evidence seized in a wildlife crime is anything but .... which leads directly to the basic forensic problem being addressed by the scientific members of the Wildlife Forensics Lab staff.

The basic wildlife forensics problem

Simply stated, if the approximately 9,000 federal agents, wildlife inspectors, game wardens and conservation officers who constitute the Forensic Lab's primary user groups always seized whole animals (e.g. whole elephants) as evidence, the staff of the Wildlife Forensics Lab would have little difficulty in making the necessary species identifications. If nothing else, one would expect the average juror to be able to recognize an elephant if such a creature were brought into court (based upon well established elephant-defining characteristics, such as large ears, tusks, trunk, etc.). And trained biologists are certainly capable of using morphological "keys" to distinguish, for example, African from Asian Elephants, and testifying as to that identification in court.

But in reality, the wildlife investigators who submit their cases to to the Wildlife Forensics Lab rarely seize whole animals as evidence. Rather, they tend to seize wildlife parts and products in which those long-established, species-defining characteristics are no longer present. And because

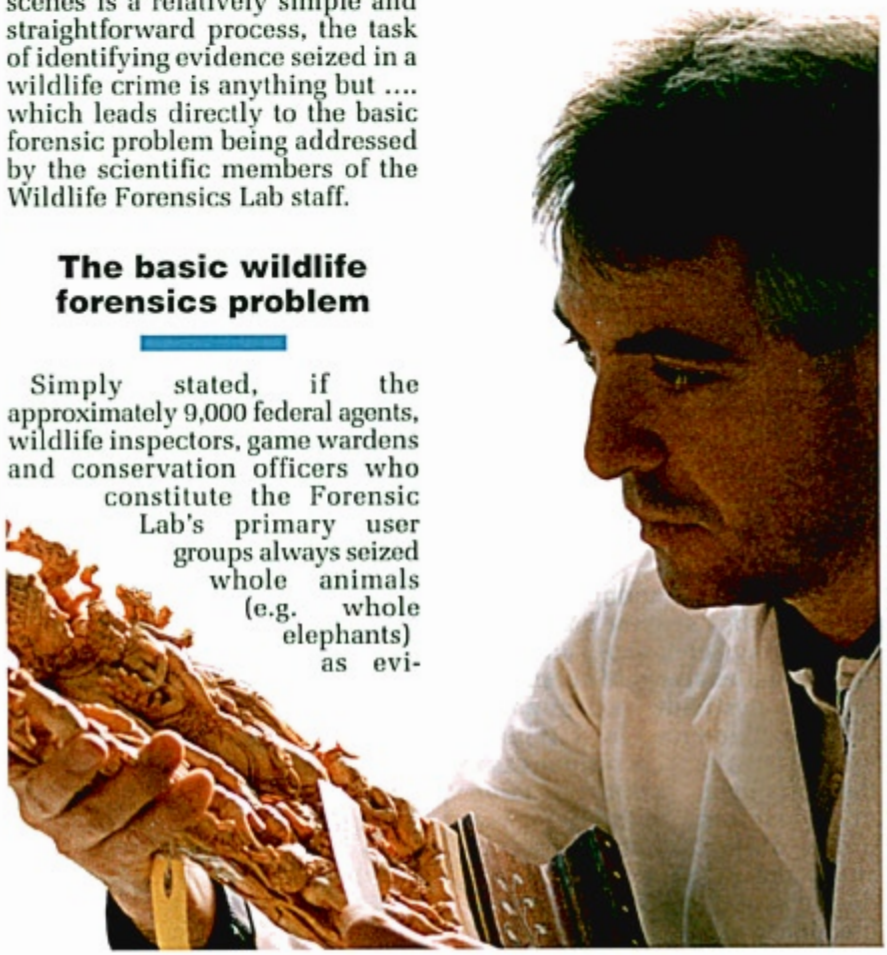

Photo National Fish & Wildlife Forensics Laboratory

Left: Measuring wolves' skulls
Above: Autopsy of an eagle
Right: The Head of the Criminalistics Section examining an ivory figure

there are few established methods for determining the species source of wildlife parts and products, it is often necessary for the Lab staff to conduct extensive research into the characteristics of a species before they can examine evidence on a submitted case.

Thus, the primary task for the Wildlife Forensics Lab is to establish and verify new species-defining characteristics that will allow them to write a report, and testify in court with absolute certainty, that a seized part or product came from a certain species, and from NO OTHER animal species in the world.

Current capabilities of the Wildlife Forensics Lab

The Criminalistics Section

To date, the criminalistics section of the Wildlife Forensics Lab has had some of the more notable successes, in that they have developed firstly, a method of identifying the species source of all ivories; secondly, a non-destructive means of distinguishing African and Asian elephant carvings from mammoth and mastodon carvings when the ivory in question is NOT fossilized (for obvious reasons, it is not illegal to kill a mammoth or mastodon); thirdly, a chemical means of distinguishing bear gallbladders from visually identical pig gallbladders; finally and most recently, a means of utilizing fractal mathematics and chaos theory to computerize the striation aspects of a bullet match.

In recent months, the criminalistics section has begun conducting chemical and instrumental analyses of submitted poison, pesticide and gunshot residue evidence. In a typical example of a gunshot residue case, the staff might examine the tissue of an excised wound where a hunter during the bow season is suspected of using a gun to kill deer, and then pushing a broadhead arrow into the wound.

Photo National Fish & Wildlife Forensics Laboratory

The central store where all seized items are kept — over 200,000 in all.

The Serology Section

During the last five years, the Serology Section of the Wildlife Forensics Lab has made tremendous progress in utilizing both protein analysis and DNA analysis techniques to identify the species source of blood and tissue samples from any animal source in the world.

In general, using DNA and protein analysis, the serology staff hope to be able to answer a number of basic questions typically asked by wildlife investigators on the points listed below.

Species identification. This is the most basic question of wildlife forensics, and is usually resolved in the serology section by a combination of protein and DNA analysis techniques.

Gender identification. An example of this type of case would be the situation in which a hunter spots a doe during buck season, determines that no one is looking, kills the doe, removes the head and genitals, and then attempts to bring a "generic" deer past the check-point. Wildlife Forensics Lab serologists have discovered a DNA "probe" which seems to be capable of resolving this gender identification issue for a large number of species. However, because a DNA analysis can typically take 10 days from start to finish, and because the cost of such a test involves about $50 worth of supplies, the Lab staff are now trying to refine and automate the procedure so that hundreds or thousands of "gender" samples can be analysed during open hunting seasons. The ultimate goal, of course, is to develop a test kit that would give the wildlife officer in the field probable cause to seize a questioned carcass.

Matching of individual characteristics. This is, perhaps, the most significant advance made by the Wildlife Forensics Lab staff to date. In summary, using DNA technology, it is at least theoretically possible to match tissue from a kill site (i.e. "gut pile") with absolute certainty to meat from a freezer, or blood from a vehicle or a suspect's clothing. While this may sound more like science fiction (or at the very least, wishful thinking) to many field investigators, the Wildlife Forensics Lab is now capable of making such "individual matches" for all cervids (except moose), and for bear, wild sheep, walrus, and a limited number of bird species. As the Lab staff continue on with their DNA research into the priority wildlife law enforcement issues, it is anticipated that this list will

continue to grow, much to the delight of the Lab's user group investigators.

Determining the number of animals involved. Using a combination of protein analysis techniques (which can provide species identifications) and DNA analysis (which can identify individual characteristics), scientists at the Wildlife Forensics Lab can determine how many individual animals are involved in a seizure of, for example, dozens of wrapped meat packages from a suspect's freezer.

The Morphology Section

The Morphology Section of the Wildlife Forensics Lab is responsible for visual and microscopic identifications of submitted wildlife parts and products, which are based upon long-established morphological characteristics. The section is divided into three units: mammals, birds and reptiles.

A considerable proportion of the Section's effort is directed toward the development of a comprehensive collection of vouchered or "known" specimens. To do so, the Lab's scientists are actively engaged in co-operative efforts with museum and zoo experts throughout the world. In addition, a large number of our known specimens are collected and submitted to the Lab by game wardens and conservation officers throughout the United States, as well as the CITES signatory countries.

The Technical Support Section

The Technical Support Section of the Wildlife Forensics Lab consists of:
- a photo/video unit with the capability of processing and printing a wide variety of film formats, as well as of video recording and editing;
- a computer support unit involving 45 in-house and networked computers, a node-connection to Internet and the World Wide Web, and a growing number of link-ups with external databases;
- an electronics support unit involving the use of transmitters, receivers, recording devices;
- and radio communications in the field; and a graphic arts unit which creates court room displays to support testimony by the Lab's experts.

The primary mission of the Technical Support Section is to assist the Lab's forensic experts to document their research and casework, and make their presentations in court. The future role of this Section will be to establish a robotics capability within the Lab, to increase the number of samples which can be analysed with a fixed number of scientists, and to minimize the hazards to Lab staff in dealing with potentially lethal pesticide and poison evidence.

The Evidence and Property Section

The Evidence and Property Section of the Wildlife Forensics Lab consists of:
- an evidence control unit which receives, logs, tracks, packages and returns evidence on submitted cases;
- a central repository currently holding over 200,000 seized evidence items;
- an eagle repository which receives and transfers bald and golden eagle carcasses to American Indians;
- a crime scene unit which, in addition to going out and collecting evidence in the field, processes latent print and impression evidence;
- a lab maintenance unit which maintains the facility;
- veterinary services unit which includes a veterinary pathologist and a veterinarian who conducts necropsies, determines causes of death, and deals with situations involving live animals in field.

Photo National Fish & Wildlife Forensics Lab

In summary

All in all, in the first five years of operation, the staff scientists of the National Fish and Wildlife Forensics Laboratory have made tremendous advances in their individual areas of forensic research, and have managed to transfer a great deal of that technology to the agents, game wardens and conservation officers in the field. By continuing to work together with state, federal and international wildlife officers, the Lab hopes to be able to report similar accomplishments and have a similar impact on their user groups in our next five years. ■