

# WILDLIFE FORENSICS

Methods and Applications



Jane E. Huffman  
John R. Wallace

Developments in  
Forensic Science



The Forensic Science  
Society

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# Wildlife Forensics



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## Methods and Applications

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*This book is dedicated to all wildlife agents/investigators for their outstanding service in protecting and conserving wildlife resources.*

*We remember those wildlife conservation officers who gave the ultimate sacrifice so that others may enjoy the beauty and bounty of wildlife.*





# Contents

Developments in Forensic Science	xiii
About the Editors	xv
List of Contributors	xvii
Foreword	xxiii
Acknowledgements	xxv
<b>1 Wildlife Ownership</b>	<b>1</b>
<i>Eric G. Roscoe and Michael McMaster</i>	
Introduction	1
Ancient Rome and the Concept of <i>Res Nullius</i>	2
Common Law England: The King's Ownership	3
The New World: Hunting for the Market	5
Management: The Property Right of States	8
Federal Law and the Regulatory State	10
Globalization: Working toward Worldwide Conservation Practices	11
Conclusion	13
Cases Cited	13
References	13
<b>2 Society for Wildlife Forensic Science</b>	<b>15</b>
<i>DeeDee Hawk</i>	
Introduction	15
Formation of the Society	19
The Code of Ethics	22
Membership of the Society	24
Member Labs	25
Proficiency Program	25
Scientific Working Group for Wildlife Forensic Sciences (SWGWILD)	29
Conclusion	32
References	33
<b>3 The Application of Forensic Science to Wildlife Evidence</b>	<b>35</b>
<i>John R. Wallace and Jill C. Ross</i>	
Introduction	35
Overview of Forensic Science	37

History of Wildlife Forensics	39
Enforcement of Wildlife Protection Policy	44
Development of Wildlife Forensic Laboratories	45
Current Perceptions	47
Conclusion	48
Acknowledgements	49
References	49
<b>4 Defining a Crime Scene and Physical Evidence Collection</b>	<b>51</b>
<i>Jason H. Byrd and Lerah K. Sutton</i>	
Introduction	51
Definition of a Crime Scene	51
Questions to Be Asked	52
Scene Priority	52
First Responding Officer	53
Securing the Scene	53
Chain of Custody	55
Processing the Scene	55
Initial Documentation	56
Scene Documentation	58
Remains in an Aquatic Environment	60
Collection of Evidence	61
Review of Scene Processing	62
Final Inspection	62
References	63
<b>5 Forensic Evidence Collection and Cultural Motives for Animal Harvesting</b>	<b>65</b>
<i>Michelle D. Hamilton and Elizabeth M. Erhart</i>	
Introduction	65
Wild Animals as Pharmacopeias	66
Trade in Wild Animals	67
Recovering Evidence at Poaching Scenes	68
Locating the Burial: Anomalies on the Surface	71
Acknowledgements	76
References	76
<b>6 Forensic Entomology and Wildlife</b>	<b>81</b>
<i>Jeffery K. Tomberlin and Michelle R. Sanford</i>	
Introduction	81
Application of Forensic Entomology to Wildlife Crimes	82
Arthropods Commonly Encountered	86
Diptera	88
Coleoptera	95
Sampling	98
Conclusion	100
Appendix	101
Acknowledgements	102
References	102

<b>7 Wildlife Forensic Pathology and Toxicology in Wound Analysis and Pesticide Poisoning</b>	<b>109</b>
<i>Douglas E. Roscoe and William Stansley</i>	
Introduction	109
Wound Analysis	109
Wildlife Poisoning by Insecticides	121
Wildlife Poisoning by Rodenticides	123
References	125
<b>8 The Use of Hair Morphology in the Identification of Mammals</b>	<b>129</b>
<i>Lisa Knecht</i>	
Introduction	129
Types of Hair	130
Hair Structure	131
Techniques for Studying Hair Structure	140
Conclusion	142
References	142
<b>9 Plants and Wildlife Forensics</b>	<b>145</b>
<i>Christopher R. Hardy and David S. Martin</i>	
Introduction	145
Plants as Trace Evidence	145
Poisonous Plants	149
The Basics of Collecting and Preserving Botanical Evidence	153
Finding a Forensic Botanist	156
Conclusion	156
Acknowledgements	157
References	157
<b>10 Identification of Reptile Skin Products Using Scale Morphology</b>	<b>161</b>
<i>David L. Martin</i>	
Introduction	161
International Trade in Reptile Skins	162
Challenges to Species Identification of Reptile Skin Products	166
Species and Products Represented in the Reptile Skin Trade	168
Reptile Scale Morphology Basics and Current Limitations	170
Identifying Features of Major Reptile Groups	178
Conclusion	194
Acknowledgements	195
References	195
<b>11 Best Practices in Wildlife Forensic DNA</b>	<b>201</b>
<i>M. Katherine Moore and Irving L. Kornfield</i>	
Introduction	201
The Need for Appropriate Standards	203

Wildlife Forensic DNA Best Practices	206
Standards and Guidelines for Wildlife Forensics	206
Training	208
Case File	209
Laboratory Facility (QA)	213
Validation	214
Laboratory Protocols	216
Data Analysis	218
Interpretation Guidelines	220
Vouchers/Reference Samples	221
Species Identification	224
Reporting	224
Contents of the Case Report	225
Review	226
Court Testimony	229
The Way Forward	230
Note	230
Acknowledgements	230
References	231
<b>12 Statistics for Wildlife Forensic DNA</b>	<b>237</b>
<i>B.S. Weir</i>	
Introduction	237
The Central Problem	238
Genetic Sampling	241
Lineage Markers	242
Relatedness	245
Inbreeding	247
Testing for Allele Independence	248
Assignment testing	250
Conclusion	251
References	252
<b>13 Forensic DNA Analysis of Wildlife Evidence</b>	<b>253</b>
<i>Sabrina N. McGraw, Shamus P. Keeler, and Jane E. Huffman</i>	
Introduction	253
DNA Isolation and Handling	254
Polymerase Chain Reaction (PCR)	255
Sample Speciation	256
Minisatellites (VNTRs)	256
Mitochondrial Markers (mtDNA)	257
Additional Genetic Speciation Methods	259
Limitations of Genetic Speciation	260
Sample Sexing	261
Sample Individualization	262
Sample Localization	263
Validation of Wildlife Forensic Techniques	264
Court Admissibility	266
Conclusion	266

Cases Cited	266
References	267
<b>14 DNA Applications and Implementation</b>	<b>271</b>
<i>Robert Ogden</i>	
Introduction	271
History	272
Questions and Techniques: Wildlife Crime Issues	272
Species Identification	273
Identification of Geographic Origin	275
Individual Identification	279
Exclusion	280
Practical Applications	282
Sample Types for DNA Analysis	282
Laboratory Models: Individual Facilities	283
Future Developments	287
Summary	288
References	289
<b>15 Conservation Genetics and Wildlife Forensics of Birds</b>	<b>293</b>
<i>Rebecca N. Johnson</i>	
Introduction	293
Avian Genetics	295
Avian Taxonomy, Legislation and Conservation	299
Avian Wildlife Forensics: A Range of Applications	302
Conservation Genetics and Wildlife Forensics: Identification Using DNA	307
Conclusion	315
References	317
<b>16 Wildlife Forensics in Thailand: Utilization of Mitochondrial DNA Sequences</b>	<b>327</b>
<i>Suchitra Changtragoon</i>	
Introduction	327
DNA Extraction and Amplification	327
DNA Sequencing	328
Origin Identification	328
Species and Subspecies Identification	328
Results of the Investigations	330
Conclusion	338
Acknowledgements	341
References	341
<b>17 The Future of Wildlife Forensic Science</b>	<b>343</b>
<i>Edgard O. Espinoza, Jesica L. Espinoza, Pepper W. Trail, and Barry W. Baker</i>	
Introduction	343
Technical Challenges	344
Enhancing Wildlife Protection by Integrating Forensic Science and the Law	350

The U.S. Endangered Species Act and the Limits of Science	351
The Future of Forensic Scientists and the Laboratories in which They Work	353
Conclusion	355
Acknowledgments	356
References	356
<b>Index</b>	<b>359</b>

# Developments in Forensic Science

The world of forensic science is changing at a very fast pace. This is in terms of the provision of forensic science services, the development of technologies and knowledge and the interpretation of analytical and other data as it is applied within forensic practice. Practicing forensic scientists are constantly striving to deliver the very best for the judicial process and as such need a reliable and robust knowledge base within their diverse disciplines. It is hoped that this book series will be a valuable resource for forensic science practitioners in the pursuit of such knowledge.

The Forensic Science Society is the professional body for forensic practitioners in the United Kingdom. The Society was founded in 1959 and gained professional body status in 2006. The Society is committed to the development of the forensic sciences in all of its many facets and in particular to the delivery of highly professional and worthwhile publications within these disciplines through ventures such as this book series.

Dr. Niamh Nic Daéid  
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As a forensic entomologist, Dr. Wallace has participated in criminal investigations all over the country since 1995. He has taught forensic entomology courses at the University level and workshops at various universities to law enforcement throughout the United States, published more than 45 articles or book chapters in National/International journals. He is a Fellow of the American Academy of Forensic Science and an active member since 2002. Dr. Wallace is a co-founder and past President of the North American Forensic Entomology Association (NAFEA) in 2005 as well as the editor-elect for the NAFEA newsletter.



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# Foreword

Killing wild animals is big business. While much wildlife trade is legal, a massive black market exists. The species and products involved run the gamut from tarantulas to tigers. The rarer the animal, the more people want it. As a result, wildlife trafficking targets those species already under threat and least able to withstand the losses.

Laws to protect wildlife can be found in international treaties, like the Convention on International Trade in Endangered Species (CITES), and in national legislation, such as the Lacey Act and Endangered Species Act in the United States. Yet, to be effective, those laws require enforcement.

Enforcement involves not only catching poachers and traffickers but also prosecuting and convicting them. For that, one must link a suspect to his or her crime. The problem is, when an animal is hunted down and killed, there aren't any eyewitness accounts. The victims' relatives and neighbors can't talk. And once the victim leaves the poachers hands, it's sliced and diced and processed until it's eventually transformed into a host of consumable products – from trinkets and high fashion accessories to traditional medicines. Its identity is lost. That makes the prospects for prosecution slimmer and slimmer.

Wildlife forensics changes that. By identifying the victim and allowing the evidence to speak, it connects suspects to their illegal actions.

Wildlife forensics, like human forensics, uses science to answer a legal question. For wildlife forensic scientists, however, most of the time that legal question is to identify the victim. For wildlife crimes, figuring out *what the victim is* is essential to establish that a crime even took place. That's because some species are protected and others are not. For instance, a wool shawl made from cashmere goats is legal but one from Tibetan antelopes is not. Traffickers know the differences in the laws so that, when caught, they often claim that the item they smuggled is legal because it's from an unprotected species. Unless an investigator proves otherwise, the suspect goes free. That's where wildlife forensics comes in: proving the crime.

Identification of a species from a part or product is extremely complicated. For example, take an item like a feathered headdress. Normally, ornithologists have a lot to go on when they identify a bird: its size, shape, plumage pattern,

geographical location, habitat, vocalizations, flight pattern, diet and other behavior. But when a forensic ornithologist receives that item in his or her lab, (s)he has just a fragment of that information to go on – often just an isolated feather.

Most birds have about 5,000 feathers. Within the same species, those feathers will vary depending on their location on the bird and whether they are from males or females, or juveniles or adults. To complicate matters, feathers from one part of the bird – like the wing or tail – might exhibit diagnostic characteristics, meaning something unique to that species, while feathers from another part of that same bird – like the chest – might not. The same thing happens with claws or teeth. A single species can display significant variation, and there may or may not be distinguishing traits for each variation.

Now, imagine you don't even know what the part is. Imagine the evidence is a tooth or tusk that's been carved, so that you no longer have the size or shape to go on. Or a rhino horn or bear gall bladder that's been ground up into a medicine. For each species, wildlife forensic scientists must find some sort of identifying characteristic. Not only that, but they have to do it for each part of each species, and they need to account for the many different ways a part might be processed or manufactured.

The complexities don't stop there. Wildlife forensic scientists have to be ready to answer new types of legal questions as they occur. Sometimes that will still mean answering the "what is it?" question but for species that are newly protected. Other times, it will mean focusing on a different question, like "where did it come from?" When trade is permitted for distinct populations of otherwise protected species, as has happened with the recent one-off sales of elephant ivory from southern African stockpiles, the ability to tell where a sample came from is critical. The "where did it come from?" question of geographic origin is also a critical question to determine whether an exotic pet was captive-bred, which typically is legal, or wild-caught, which is not. For each part of each species, and for the legal question involved, the characteristic might be different, and the method for finding them may also vary.

In my view, *Wildlife Forensics: Methods and Applications* will go a long way toward helping share information and advancing the field of wildlife forensic science. Every step – whether it's a new case that results in uncovering an identifying characteristic for a species' part or a budding scientist exploring these issues – pushes the science forward. The end result will be more and more heroes able to link suspects to their crimes – and ultimately a slowdown in the extent of wildlife trafficking.

Rhinos can't call 911. Instead, law enforcement agents, and the wildlife forensic science that support them, give them a voice – one that grows stronger every day. This book will help in that vital mission.

Laurel A. Neme, Ph.D.

Author, *ANIMAL INVESTIGATORS: How the World's First  
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# 1

## Wildlife Ownership

### How the state became responsible for management

Eric G. Roscoe and Michael McMaster

#### Introduction

Forensic techniques that identify wildlife, and assist in linking wildlife crimes to the responsible party are invaluable to the legal community. This book has been devoted to assisting law enforcement in the identification of individuals responsible for wildlife crimes. The identification techniques provided by forensic science are even more important in the courtroom. Oftentimes law enforcement has a good idea as to who committed a crime, and simple investigative techniques will reveal the most likely suspect. However, once that suspect is identified, focus turns to providing enough admissible proof in court so that a conviction can be obtained. DNA identification has permitted attorneys to quantify facts that in the past were left up to impressions. Proof that meat found in a suspect's freezer matches with 98% certainty a carcass found in the woods removes the factual issue from the table. The judge or jury only needs to consider whether the law, as applied to the fact that the freezer meat matched the carcass, requires that the suspect be found guilty or not. There may be due process problems inherent in jurors' willingness to accept DNA evidence as infallible without being able to properly weigh the effects of mishandled evidence or improper gathering techniques, however, that is beyond the scope this book (DeWitt, 1996).

The question of the law is separate from the factual question in the case. In criminal proceedings the prosecutor decides which law is to be applied, meaning which law has been violated. The prosecutor and, if there is a jury, the judge will

explain the law that the suspect is accused of breaking, and what facts the state will prove in order to find the suspect guilty.

The purpose of this section is to address the question of law. State authorities draft most laws regulating the taking of wildlife in the US. The federal government tends to regulate broader issues that concern the transportation of wildlife across state lines as well as internationally. State and federal governmental authority to regulate the taking of wildlife is derived from a legal history stretching nearly 2,700 years. The first half of this section follows the development of wildlife regulation from the property rights of ancient Rome through the royal prerogatives of King Charles' England to the unlimited resources of Colonial America. The second half focuses on present-day state, federal, and international regulations affecting the taking, transportation, and management of wildlife.

## Ancient Rome and the Concept of *Res Nullius*

Ownership is a pivotal concept in understanding the Roman citizen's relationship with wildlife. Some of the earliest legal writings, dating back to the time of the Sumerians in ancient Mesopotamia, recognize the ability of humans to own or possess animals (Wise, 1996). The concept of wildlife as property allows separation between what is mine and what is yours. This is my dog, not your dog. In the legal realm, ownership is incredibly important when determining schemes of compensation. Laws based upon the economics of owning property allow compensation for damaged or stolen property (ibid.). You have killed my dog so you must give me your dog or financially compensate me. Ownership of the dog as if it were property allows the law to create a resolution to situations in which one suffers a loss. If I could not own the dog, then I would suffer a loss for which there is no compensation if the dog is killed or stolen by another.

The Romans divided property into three main categories: *res publicae*, *res communes*, and *res nullius* (Blumm and Lucus, 2005). *Res publicae* refers to things owned by the state such as roads, ports, rivers, and public buildings. *Res communes* includes things that belong to the community like air, running water, and the sea. *Res nullius* are things owned by no one such as unoccupied lands, property of the enemy captured in battle, and wildlife. Things labeled as *res nullius* only belonged to no one as long as no one had taken possession of the item through *Occupatio* (Wise, 1996). An individual could own wildlife only after physically capturing the animal (Blumm and Lucus, 2005). If the animal escaped the cage, then it became *res nullius* again, if the animal fell dead on neighboring property, the property owner maintained the right to prevent a hunter from trespassing to retrieve the game (Wise, 1996).

Roman law saw wildlife in the open as owned by no one until it was captured. English law took a different perspective. Wildlife was property under English common law, but instead of being owned by no one, it was owned by the king.