

WILDLIFE FORENSICS

Methods and Applications



Jane E. Huffman
John R. Wallace

 WILEY-BLACKWELL

Developments in
Forensic Science



The Forensic Science
Society

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Wildlife Forensics

Methods and Applications

Edited by

Jane E. Huffman

East Stroudsburg University, USA

John R. Wallace

Millersville University, USA

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First Impression 2012

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.

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
Series editor

About the Editors

Dr. Jane Huffman, Ph.D. is the director of the Northeast Wildlife DNA Laboratory at East Stroudsburg University, where her work focuses on the application of genetic methods to wildlife law enforcement and conservation management. She runs wildlife DNA forensic training courses for conservation officers from New Jersey and Pennsylvania.

She, along with her students, has undertaken a wide range of applied research projects including the development of DNA profiling systems for game species in PA and NJ and microscopic hair characterization. The laboratory provides species identification tests for illegally sold wild meat. She provides forensic analysis and expert witness testimony in PA wildlife crime prosecutions

Dr. Huffman is also the graduate student coordinator for the Department of Biological Sciences at East Stroudsburg University.

Dr. John R. Wallace, Ph.D., D-ABFE, F-AAFS, is one of 15 board-certified forensic entomologists and a diplomate of the American Board of Forensic Entomology. Dr. Wallace is a Professor of Biology and focuses on teaching courses in Entomology, Aquatic Biology, Aquatic Entomology, Forensic Entomology, Forensic Science, and Ecology and Evolution. His research interests cover topics such as mosquito and disease ecology as well as mosquito and blackfly surveillance, and the role of aquatic organisms such as insects, algae and crayfish on decomposition within forensic science.

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.

Contributors

Barry W. Baker, M.A.
U.S. National Fish and Wildlife Forensics Laboratory,
United States Fish & Wildlife Service,
1490 East Main Street,
Ashland, OR 97520-1310, USA

Jason H. Byrd, Ph.D., D-ABFE, F-AAFS
William R. Maples Center for Forensic Medicine,
Department of Pathology, Immunology, and Laboratory
Medicine,
College of Medicine,
University of Florida,
Gainesville, FL, USA

Suchitra Changtragoon, Ph.D.
Forest Genetics and Biotechnology Division,
Forest and Plant Conservation Research Office,
Department of National Parks, Wildlife and Plant
Conservation,
61 Phaholyothin, Chatuchak,
Bangkok,
Thailand 10900

Elizabeth M. Erhart, Ph.D.
Department of Anthropology,
Texas State University-San Marcos,
601 University Drive,
San Marcos, TX 78666, USA

Edgard O. Espinoza, Ph.D.
U.S. National Fish and Wildlife Forensics Laboratory,

United States Fish & Wildlife Service,
1490 East Main Street,
Ashland, OR 97520-1310, USA

Jesica L. Espinoza, J.D.
Office of Law Enforcement,
United States Fish & Wildlife Service,
16507 SW Roy Rogers Road,
Sherwood, OR 97140-9292, USA

Michelle D. Hamilton, Ph.D., D-ABFA
Department of Anthropology,
Texas State University-San Marcos,
601 University Drive,
San Marcos, TX 78666, USA

Christopher R. Hardy, Ph.D.
James C. Parks Herbarium,
Department of Biology,
Millersville University,
Millersville, PA 17551, USA

DeeDee Hawk, M.S.
Wyoming Game and Fish Wildlife Forensic Laboratory,
Department 3312,
1000 E University Avenue,
Laramie, WY 82071, USA

Jane E. Huffman, Ph.D., M.P.H.
Northeast Wildlife DNA Laboratory,
Department of Biological Sciences,
East Stroudsburg University,
East Stroudsburg, PA, 18301, USA

Rebecca N. Johnson, Ph.D.
Australian Museum, Head of Research
DNA Laboratory,
6 College Street,
Sydney, NSW 2010, Australia

Shamus P. Keeler, M.Ed., M.S.
Southeastern Cooperative Wildlife Disease Study,
Department of Population Health,
College of Veterinary Medicine,
University of Georgia, Athens, GA 30602
Department of Infectious Diseases,
College of Veterinary Medicine,
University of Georgia, Athens, GA 30602, USA

Lisa Knecht, M.S.
Northeast Wildlife DNA Laboratory,
East Stroudsburg University,
East Stroudsburg, PA 18301, USA

Irving L. Kornfield, Ph.D.
Molecular Forensics Laboratory,
University of Maine,
Orono, ME, USA

David L. Martin, Ph.D.
Canorus Ltd.,
5669 Snell Ave. #297,
San Jose, CA 95123,

David S. Martin
James C. Parks Herbarium,
Department of Biology,
Millersville University,

Millersville, PA 17551, USA

Sabrina N. McGraw, D.V.M., M.S.
Southeastern Cooperative Wildlife Disease Study,
Department of Population Health,
College of Veterinary Medicine,
University of Georgia, Athens, GA 30602
Department of Pathology,
College of Veterinary Medicine,
University of Georgia, Athens, GA 30602, USA

Michael McMaster, J.D.
20234 E Lake Cir,
Centennial, CO 80016-1281, USA

M. Katherine Moore, M.S.
Marine Forensics Program,
Center for Coastal Environmental Health and Biomolecular
Research,
National Centers for Coastal Ocean Science,
National Ocean Service,
National Oceanic and Atmospheric Administration,
219 Fort Johnson Road,
Charleston, SC 29412 USA

Robert Ogden, Ph.D.
Program Director,
TRACE Wildlife Forensics Network,
c/o The Animal Conservation and Education Department,
Royal Zoological Society of Scotland,
134 Corstorphine Road,
Edinburgh EH12 6TS, UK

Douglas E. Roscoe, M.S., Ph.D.
New Jersey Division of Fish and Wildlife,

Office of Fish and Wildlife Health and Forensics,
P.O. Box 394,
Lebanon, NJ 08833, USA

Eric G. Roscoe, J.D., LL.M.
5415 Connecticut Ave. NW,
Washington, DC 20015, USA

Jill C. Ross, B.S.
Department of Biology,
Millersville University,
Millersville, PA 17551, USA

Michelle R. Sanford, Ph.D.
Department of Entomology
2475 TAMU
College Station, TX 77843-2475, USA

William Stansley, M.S.
New Jersey Division of Fish and Wildlife,
Office of Fish and Wildlife Health and Forensics,
P.O. Box 394,
Lebanon, NJ 08833, USA

Lerah K. Sutton, B.A.
William R. Maples Center for Forensic Medicine,
Department of Pathology, Immunology, and Laboratory
Medicine,
College of Medicine,
University of Florida,
Gainesville, FL, USA

Jeffery K. Tomberlin, Ph.D., D-ABFE, F-AAFS
Forensic & Investigative Sciences Program,
Department of Entomology,

2475 TAMU,
College Station, TX 77843-2475, USA

Pepper W. Trail, Ph.D.
U.S. National Fish and Wildlife Forensics Laboratory,
United States Fish & Wildlife Service,
1490 East Main Street,
Ashland, OR 97520-1310, USA

John R. Wallace, Ph.D., D-ABFE, F-AAFS
Department of Biology,
Millersville University,
Millersville, PA 17551, USA

B.S. Weir, Ph.D.
Department of Biostatistics,
University of Washington,
Seattle,
WA 09195-7232, USA

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
Wildlife Forensics Lab is Solving Crimes and Saving*

Endangered Species
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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