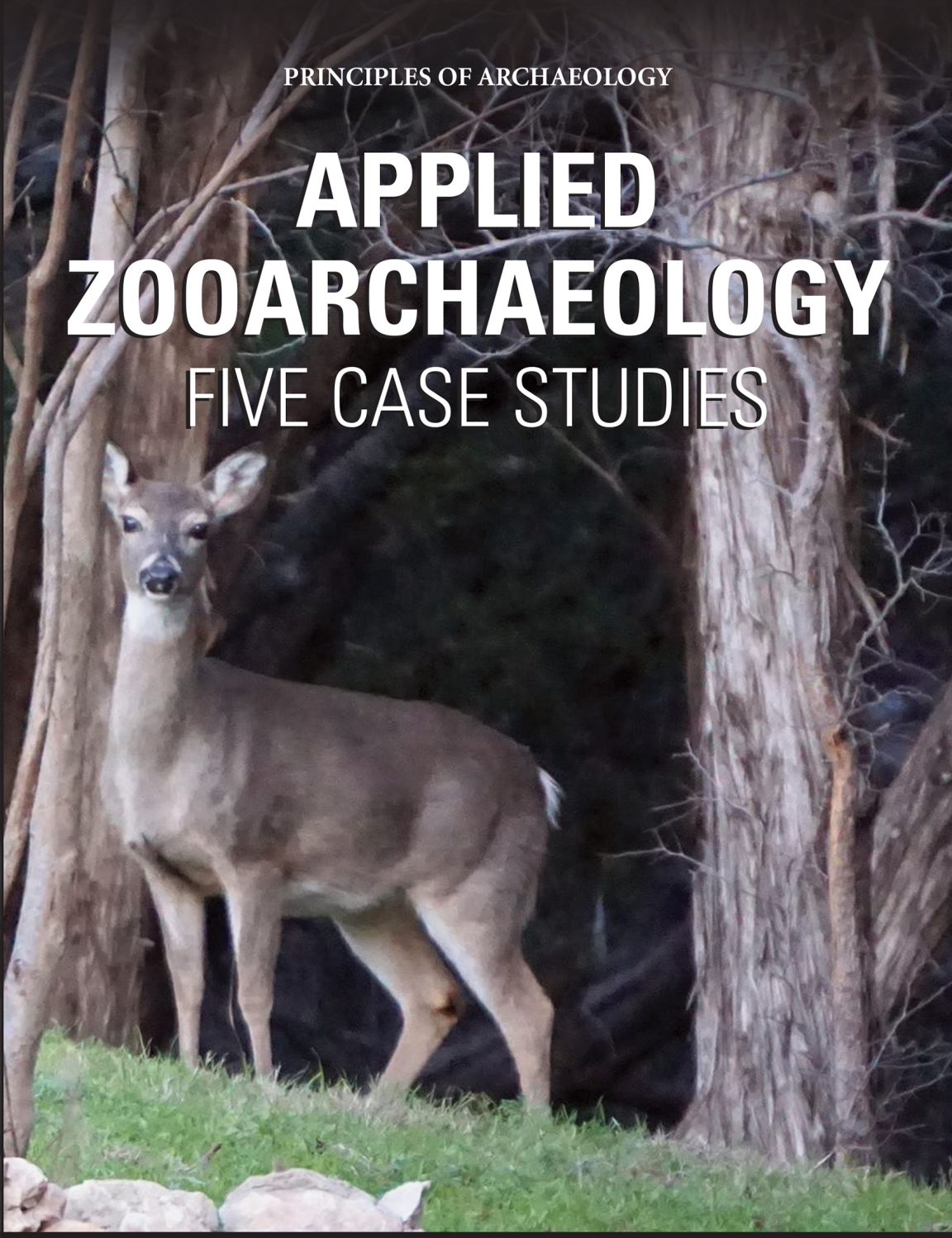
PRINCIPLES OF ARCHAEOLOGY

APPLIED ZOOARCHAEOLOGY

FIVE CASE STUDIES



Steve Wolverton
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APPLIED ZOOARCHAEOLOGY

FIVE CASE STUDIES

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FOREWORD

When the field of conservation biology first developed as a distinct discipline in the 1980s, it began as a patchwork of studies by researchers with specialties in ecology, behavior, physiology, and genetics who combined their efforts to help manage species that were in decline. It soon followed that academic programs and departments with an interdisciplinary focus appeared, new journals were initiated, and the field is now quite strong.

So it is that applied zooarchaeology is now emerging as a distinct discipline with similar roots of development underway. This new book exemplifies an integral part of this development, providing a clear understanding of this field with case examples that often began—like conservation biology—with researchers who set out with other objectives in mind.

When I began my research on fossil condors, my goal was to understand their evolutionary history and eventual extinction across most of the U.S. by the end of the Pleistocene. My work in the Grand Canyon not only offered useful information on their fossil history, but evidence for their diet and nesting habits as well. Shortly after publishing this study in 1987, in which I concluded that Pleistocene condors relied on the now extinct megafauna to survive and nest in most regions where they formerly ranged, someone came up to me and said, "Now they will never bring condors back to the Grand Canyon!"

This statement surprised me for two reasons. First, my original objective was not to offer support for reintroduction of condors in the canyon; and second, I was reporting facts from scientific evidence and could not do otherwise simply to support restoration of condors to the Grand Canyon. Ironically, years later I learned that my data were instrumental in choosing the canyon as a reintroduction locality for condors—not the reverse. While condors needed megafauna to survive there in the past, the reintroduction efforts were structured in a way to train condors to feed on

current, local food resources such as carcasses of deer, mountain sheep, and smaller game.

Applied zooarchaeology, then, is a relatively new field of study that bridges the gap between scientists working to understand the past and those wanting to use this information to conserve or restore species, communities, and ecosystems for the future. In addition to serving as an excellent overview for the development of this field, the five case studies documented here indicate the complexities in using data from the past to make informed decisions for management and conservation in the present.

The authors also chose examples that cover a broad range of topics—from taphonomy in freshwater mussels, to conservation and management of marine and terrestrial mammals that are either in decline (sea otters) or too abundant (deer), translocation of an insular and highly localized flightless bird (the takahe in New Zealand), and restoring the wide-ranging continental California condors to their previous habitats despite the absence of Pleistocene megafauna. All these examples represent a broad spectrum for understanding the role of applied zooarchaeology in conservation biology and the authors effectively illustrate the strengths, weaknesses, and need for more research in this dynamic field.

When I was standing at the south rim of the Grand Canyon a few years ago, my son and I saw a condor soar past—one of the first to do so in over ten thousand years. The restoration of condors to the Grand Canyon took many years and the diligent efforts of numerous biologists, land managers, politicians, and conservationists. This insightful book examines how interdisciplinary efforts like this can be effective in addressing conservation problems. It joins a growing list of resources in applied zooarchaeology and paleozoology, which form an essential database that all new disciplines must acquire.

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PREFACE

In 1996 R. Lee Lyman published a paper in *World Archaeology* challenging zooarchaeologists to realize and capitalize upon the merits of zooarchaeological data for application in biological conservation. This seminal paper accelerated the development of applied zooarchaeology, though Lyman acknowledges in a 2012 chapter in *Conservation Biology and Applied Zooarchaeology* that the applied use of zooarchaeological data had been taking place for several decades or longer. It is increasingly common to see applied zooarchaeological case studies published in mainstream environmental science journals, such as *Conservation Biology*, *Ecological Applications*, and *Environmental Management*.

Despite the upswing in applied zooarchaeological research during the last two decades, Dianne Gifford-Gonzalez pointed out in her Fryxell Symposium presentation at the 2011 annual meeting of the Society for American Archaeology that it continues to be difficult to mesh the implications of applied zooarchaeological research into conservation research, practice, and policy. She noted that zooarchaeologists must don their "anthropologist hats" to cross traditional academic disciplinary boundaries from the social sciences (e.g., archaeology) to the biological sciences (e.g., conservation biology). She meant that we must consider the cultural implications of crossing between academic disciplines when we do applied zooarchaeological research.

To cross disciplinary boundaries, it is important to address precisely what types of communication barriers develop when zooarchaeologists seek to present and publish applied ecological research. Zooarchaeologists have to become adept at self-criticism, asking "What are the limits of applied zooarchaeological data and how can we make those limits transparent?" We also must ask and communicate what makes zooarchaeological data unique and beneficial to conservation researchers. We provide examples of such in this book through detailing a series of applied zooarchaeology case studies. The result is a primer that illustrates the kinds of challenges that arise when crossing over to conservation biology, as well as how to address these challenges.

There are three major challenges that are relevant to any example of applied zooarchaeological research. First, zooarchaeologists do not necessarily agree on issues of how to accomplish data quality, how to do taphonomic analysis (or even how to define taphonomy), and/or how to quantify faunal remains. We argue that conservative approaches and clear definitions are essential for communicating the meaning of our results in conservation circles. Second, archaeology is often recognized as a social science and thus is somewhat foreign to environmental scientists. Thus, even if we are clear about our standards and conceptual definitions, it may be difficult to be heard by conservation biologists.

Third, our excitement over the applied meaning of zooarchaeological data may not make the difference that we want in conservation practice even if conservation biologists take our research seriously. This concerns political ecology, which refers to the fact that all conservation research, practices, and policies take place in a large, complex matrix of social, economic, and political factors. Implementation of conservation practice requires pragmatic consideration of numerous contingencies, and even high-quality data may be put aside to emphasize other social needs.

We have presented examples of our applied zooarchaeological research at ecological and natural science conferences and have published many studies in ecological journals. In the process we have confronted the three challenges described above, as well as a number of smaller hurdles that we describe in each chapter. This book provides a synthesis of those experiences in the hope of advancing zooarchaeological research in conservation biology. We do this by conceptualizing the ecological relevance of each case study and characterizing how our data have been received by conservation biologists. We also provide details of what worked and what did not work as we considered and reconsidered communications with conservation biologists. We challenge readers to think about similar challenges with discussion exercises at the end of each chapter.

Conservation of natural resources continues to be a global challenge facing humanity, which plays out at local scales where people interact with the biological world. Zooarchaeologists encounter a relatively complete, temporal record of human-environment interactions. Our hope is that the stories of our research presented in this primer will help advance applied zooarchaeology and conservation biology, and ultimately contribute to curtailing and reversing current global environmental and cultural crises.

We would like to thank Virginia Butler, Heather Lapham, Evan Peacock, and Charles Randklev for reading and commenting on early drafts of this book. We thank Eliot Werner for inviting us to publish this book and for his patience and support during writing, editing, and publication. We would also like to thank R. Lee Lyman for his guidance in applied zooarchaeology during our careers and are pleased to dedicate this book to him.

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