

Field Manual of Wildlife Diseases



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Cover: Molting black brant captured on the Arctic coast of Alaska for avian influenza screening and ecological investigations.
Photo by Heather Wilson, U.S. Fish and Wildlife Service.

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U.S. Geological Survey, U.S. Fish and Wildlife Service, and National Park Service

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Foreword

The production of the third edition of the “Field Manual of Wildlife Diseases” is an opportunity to reflect on changes in wildlife health over the past 27 years since this manual was first published. In the foreword to the second edition, Professor Thomas Yuill asks the question “Do Wildlife Diseases Really Matter?” It is clear that today we no longer have to ask this question. A large body of evidence now illustrates the role of pathogens and pollutants in the decline of wildlife populations. Furthermore, there is increasing evidence of the subsequent impacts on human and ecosystem health. In recent times, there has been an unprecedented increase in the number of emerging infectious diseases, of which a majority is of wildlife origin (Taylor and others, 2001). Examples of drivers of these diseases include climate and landscape changes, human demographic and behavior changes, global travel and trade, microbial adaptation, and lack of appropriate infrastructure for wildlife disease control and prevention (Daszak and others, 2001). The consequences of these emerging diseases are global and profound, with increased burden on the public health system, negative impacts on the global economy, declines and extinctions of wildlife species, and subsequent loss of ecosystem integrity. Examples of health threats to biodiversity include the near-extirpation of the black-footed ferret from canine distemper and sylvatic plague (for a review see Abbott and others, 2012), and threats to Hawaiian forest birds from introduced pathogens such as avian malaria and avian pox (van Riper and others, 1986, 2002). Contaminants also threaten the persistence of wildlife species; for example, lead continues to be an impediment to the recovery of the California condor (Finkelstein and others, 2012). Furthermore, some diseases such as chronic wasting disease in elk and deer represent a significant threat from the adverse economic impact of these diseases on the ability of wildlife management agencies to manage and conserve wildlife due to negative public perception of infected wildlife (Almberg and others, 2011; Zimmer and others, 2011). There are also several newly discovered pathogens or diseases that have resulted in population declines and global extinctions of several species. Examples include *Batrachochytrium dendrobatidis*, which causes a cutaneous fungal infection of amphibians and is linked to declines of amphibians globally (Kriger and Hero, 2009), and the more recently discovered *Pseudogymnoascus (Geomyces) destructans*, the etiologic agent of white nose syndrome, which has caused precipitous declines of North American bat species (Blehert and others, 2011). Novel emergent pathogens such as these two recent examples are of particular concern because they were not anticipated, they quickly spread over large geographic areas, they have been particularly devastating to wildlife populations, they are challenging to manage, and they may result in ecological ripple effects that are difficult to predict.

What has not changed is the primary role of the wildlife manager and field biologist. Professor Daniel O. Trainer, in the first edition of this field manual (Trainer, 1987), stated:

“Wildlife managers and biologists are the key to what is happening in the field, be it in health surveillance, the detection of a disease problem, or disease control. To successfully fulfill this key role, the managers or biologist must understand and feel at ease with the subject matter.”

A dozen years later in the foreword to a revised and greatly expanded “Field Manual to Wildlife Diseases,” Professor Yuill, in stressing the need for greater ecological understanding of wildlife disease, also turned to the role of agency and other field biologists by stating:

“...the wildlife field biologist is in a position to provide valuable information that goes beyond the collection of samples from sick and dead individuals. [For,] the occurrence of disease must be put into ecological perspective. A careful description of the ecological setting in which the disease is occurring, and any changes that have occurred over time, are ultimately as important as a careful description of the lesions observed in the individuals, if...that disease is to be understood and...prevented through sound wildlife management practices” (Yuill, 1999).

Now, 15 years after the publication of the second edition, further expansion of the field manual content is being provided with issuance of this third iteration. The primary audience for this version remains the field managers and biologists with stewardship responsibilities for the Earth’s wildlife resources. It is our collective hope that the information provided will further serve to enhance the understanding and comfort level of biologists when addressing wildlife disease called for by Professor Trainer, and, in doing so, help to enhance the general ecological understanding of wildlife disease called for by Professor Yuill.

As described above, wildlife disease issues are not restricted to the concerns of conservationists alone, for many of the diseases involved may also impact human and (or) domestic animal health. With the increasing magnitude and complexity of addressing wildlife diseases, a new and greatly expanded iteration of the U.S. Geological Survey-National Wildlife Health Center’s previously published field guides addressing disease in migratory birds seems warranted. This version is enhanced by being a collaborative effort coedited by wildlife disease specialists from the U.S. Geological Survey-National Wildlife Health Center, the U.S. Fish and Wildlife Service, and the National Park Service, with specific chapters developed by subject matter experts within and external to these agencies. This approach draws upon the best perspectives and information available for assisting field biologists and others addressing disease issues in free-ranging wildlife. In fact, perhaps the challenge we face in the 21st century is how to coordinate the efforts of multiple disciplines and agencies—working locally, nationally, and globally—to attain optimal health for people, animals, and our environment. The One Health concept recognizes that human, domestic animal, and wildlife health are all interconnected within the context of ecosystem or environmental health and provides a useful framework for creating the robust partnerships necessary to address these urgent issues of concern for us all.

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August 2014

Preface

Since publication of the first edition of this field manual in 1987, much has changed in the disciplines of wildlife health, biology, and publishing. Many, if not most, of the users of this publication likely consider themselves to be somewhat knowledgeable in the ways of biology and the functioning of biological systems. That background embraces transition in the context of life and death processes associated with adaptive change in response to challenges for maintenance, advancement, or survival. These same principles extend to the social community we live in and how we function within the changing world. We humans are the major force influencing the types of changes taking place and when those changes occur. Our development and use of technology, as an extension of our unexceeded “brain power” serves as an expression of that which we can conceive. Depending on the nature of change, and one’s age (which is associated with values involving tradition in how things are to be done), we may be eager to embrace specific change or we may use our “resources” to try and cling to our traditions.

I freely admit to being a selective Luddite (one who is opposed to technological change), especially in my desire to hold a book in my hands rather than read it on a screen. Alas, one only has to look at the fate that has fallen upon many fine newspapers of the past and the demise of the Eastman Kodak Company’s once iconic camera and film products to recognize the inevitable. Nevertheless, I am not so entrenched in my ways as to be unable to see the benefits provided by electronic publication. Thus, I choose to participate in developing this field manual because of the benefits associated with text linkages and timely updates, among other attributes.

Unlike the previous printed versions of this field manual, electronic publication facilitates the use of online linkages to existing USGS and other supplemental information. An electronic format also expedites the timely posting of important new information as it becomes available, thereby facilitating a more time-relevant publication. These and other value-added attributes provided by electronic publication result in a more dynamic platform for information transfer and should greatly enhance the value of the ongoing field manual revision.

Milton Friend

References Cited

- Abbott, R.C., Osorio, J.E., Bunck, C.M., and Rocke, T.E., 2012, Sylvatic plague vaccine: A new tool for conservation of threatened and endangered species?: *EcoHealth*, v. 9, no. 3, p. 243–250, <http://dx.doi.org/10.1007/s10393-012-0783-5>.
- Almberg, E.S., Cross, P.C., Johnson, C.J., Heisey, D.M., and Richards, B.J., 2011, Modeling routes of chronic wasting disease transmission: Environmental prion persistence promotes deer population decline and extinction: *PLoS One*, v. 6, no. 5, <http://dx.doi.org/10.1371/journal.pone.0019896>.
- Blehert, D.S., Lorch, J.M., Ballmann, A.E., Cryan, P.M., and Meteyer, C.U., 2011, Bat white-nose syndrome in North America: *Microbe*, v. 6, no. 6, p. 267–273.
- Daszak, P., Cunningham, A.A., and Hyatt, A.D., 2001, Anthropogenic environmental change and the emergence of infectious diseases in wildlife: *Acta Tropica*, v. 78, no. 2, p. 103–116.
- Finkelstein, M.E., Doak, D.F., George, D., Burnett, J., Brandt, J., Church, M., Grantham, J., and Smith, D.R., 2012, Lead poisoning and the deceptive recovery of the critically endangered California condor: *Proceedings of the National Academy of Sciences of the United States of America*, v. 109, no. 28, p. 11449–11454, <http://dx.doi.org/2010.1073/pnas.1203141109>.
- Kruger, K.M., and Hero, J.M., 2009, Chytridiomycosis, amphibian extinctions, and lessons for the prevention of future panzootics: *EcoHealth*, v. 6, no. 1, p. 6–10, <http://dx.doi.org/2010.1007/s10393-009-0228-y>.
- Taylor, L.H., Latham, S.M., and Woolhouse, M.E., 2001, Risk factors for human disease emergence: *Philosophical Transactions of the Royal Society B, Biological Sciences*, v. 356, no. 141, p. 983–989, <http://dx.doi.org/10.1098/rstb.2001.0888>.
- Trainer, D.O., 1987, Foreword, *in* Friend, M., (ed.), *Field guide to wildlife diseases: General field procedures and diseases of migratory birds*: Washington, D.C., U.S. Department of the Interior, U.S. Fish and Wildlife Service, Resource Publication 167, p. v.
- van Riper, C., III, van Riper, S.G., Goff, M.L., and Laird, M., 1986, The epizootiology and ecological significance of malaria in Hawaiian land birds: *Ecological Monographs*, v. 56, no. 4, p. 327–344.
- van Riper, C., III, van Riper, S.G., and Hansen, W.R., 2002, Epizootiology and effect of avian pox on Hawaiian forest birds: *The Auk*, v. 119, no. 4, p. 929–942.
- Yuill, T.M., 1999, Foreword, *in* Friend, M., and Franson, J.C. (eds.), *Field manual of wildlife diseases: General field procedures and diseases of birds*: U.S. Geological Survey Information and Technology Report 1999–001, p. v.
- Zimmer, N., Boxall, P.C., and Adamowicz, W.L., 2011, The impact of chronic wasting disease and its management on hunter perceptions, opinions, and behaviors in Alberta, Canada: *Journal of Toxicology and Environmental Health, pt. A, Current Issues*, v. 74, no. 22–24, p. 1621–1635, <http://dx.doi.org/10.1080/15287394.2011.618988>.

