

MEDICAL MANAGEMENT OF WILDLIFE SPECIES

A GUIDE FOR PRACTITIONERS

Edited by

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Medical Management of Wildlife Species

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Preface

There have always been caring and idealistic people who wanted to help wildlife. Think of tales like Aesop's story about the lion with the thorn in his paw. I wouldn't be surprised if the origins of the domestic dog might have arisen from an early hominid child "rescuing" an "orphan" wolf pup.

This book represents an amazing example of how far wildlife rehabilitation has come. It combines the expertise of some of the top wildlife rehabilitators and goes a long way toward defining the current state of the art. Although much of the focus is clinical, there are also important chapters on aspects of population health and research.

I first got involved in rehab in 1971. Back then, rehab was almost prehistoric by today's standards. There were pitifully few organized centers and even fewer resources. There were no textbooks, no journals, and no state or national organizations holding meetings. Most rehab was carried out in the homes of well-meaning people who had little training and no veterinary support. The internet was a science fiction dream and desktop computers were not yet practical for most of us. In retrospect, it's amazing how rapidly all that changed.

It may have been the combination of several social trends in the 1960s and early 1970s that fostered the emergence of wildlife rehabilitation as an organized discipline. Rachel Carson's 1962 publication of *Silent Spring* heralded a new era of social and environmental concern and consciousness. The succeeding years brought fundamental changes in how people think of our relationships with nonhuman species and the natural world.

Society was in upheaval in the US and abroad. Women's liberation, the civil rights movement, and antiwar sentiment were galvanizing people into action. The first Earth Day in 1970 made popular the philosophical approach "think globally, act locally" (René Dubos). At about the same time the animal rights movement was gaining momentum.

Such energy and activism propelled passage of landmark legislation including the Animal Welfare Act (1966), Clean Air Act (1970), Clean Water Act (1972),

and Endangered Species Act (1973), as well as the establishment of the USEPA (1970) and passage of the Toxic Substances Control Act (1976).

Biologists and veterinarians had been involved in wildlife disease investigation for many years. The Wildlife Disease Association was founded in 1951 but it wasn't until the 1970s that some veterinary schools in the US began to introduce wildlife medicine into their curricula. The American Association of Wildlife Veterinarians was founded in 1979.

The 1970s was also the decade that saw wildlife rehabilitation evolve and begin to develop into state and national organizations. In 1972, rehabilitators in California joined to form the Wildlife Rehabilitation Council – this became the International WRC in 1986. In the midwest and east, the National Wildlife Rehabilitators Association was incorporated in 1982. And overseas the British Wildlife Rehabilitation Council was formed in 1987.

As a rehabilitator, it was encouraging to see all these advances taking place. It was especially exciting to see authors and organizations begin to publish more and more books and journals to assist rehabilitators, veterinarians, and researchers (a partial list of some early books is appended).

And that's where this book comes in. It is an encyclopedic resource that many of us will be using for years to come. In looking at the list of authors for this volume, you will see contributions from an interesting and diverse group of rehabilitators and veterinarians. Some of the vets were rehabilitators first and were drawn to veterinary medicine by their desire to do more for their wildlife patients and their passion for science. Others were environmental educators or wildlife biologists whose commitment to conservation issues introduced them to the need for wildlife care. Still others got their start in rehab through small animal medicine, zoo medicine or training in the military.

One of the lessons that most of us have learned is that academic training alone is not sufficient to make a good rehabilitator. Anyone who is serious about their wildlife interests needs to get as much hands-on experience as

they can. This can include formal coursework, internships, participating in professional meetings, and constantly picking the brains of knowledgeable, experienced rehabbers. And we've got to keep reading. The science is always advancing, so if you're still doing things the way you were 10 years ago, you're almost certainly out of date. Rehabilitators need to take advantage of a broad spectrum of literature including taxonomy and wildlife biology, zoological medicine, rehabilitation, exotic pets, and even laboratory animal medicine.

Wildlife rehabilitation is a fascinating hybrid of priorities and activities. Its origins and core values are primarily humane, with caring people rescuing animals that have no owners, providing the best possible care, and releasing these animals back to the wild. In some modest way, this helps many of us feel as though we're making up for the immense damage that our species continues to do to the natural world. One of the most important related goals of wildlife rehab is environmental education. Encouraging people to live more gently on the Earth – a topic that is the focus of many publications other than the present volume.

As the current book amply demonstrates, rehab has also grown to encompass a range of goals that focus on the health and well-being of populations of animals and their environments. Little biomedical information has been gathered and published on many of the species that rehabilitators handle. Rehab can serve an important role in filling in these gaps. If we're speaking of toxins, emerging infectious diseases, or interactions with domestic animals, wildlife rehabilitation can be an important tool for basic research and environmental health monitoring.

One important role of wildlife rehabilitation can be to advance the development of techniques for captive management. How can we improve nutrition, reduce stress, avoid the transmission of disease, and prevent the development of antibiotic-resistant microbes? We must continually challenge ourselves to do better and to come up with improved metrics for how we define "success" in rehabilitation.

Readers should appreciate this book as a marvelous resource that will improve the tools we have to help wildlife. But this book also serves two other important

functions. It challenges us all to learn more and to do better. Where is more knowledge needed and how can our efforts contribute to further advances? And finally, I hope that this book inspires us all. It's wonderfully energizing to know that there are other people who share our love, energy and dedication to helping wildlife.

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Acknowledgment

Our purpose for this book was to finally compile as much evidence-based information possible, and to capitalize on the experience of so many who work day-in and day-out in the field of wildlife medicine. We also wanted to highlight the importance of the “big picture” of wildlife rehabilitation. As humankind’s unprecedented impact on our natural world continues, what we do with every single creature will matter, but in the meantime, we hope the concepts of how this work – the rehabilitation of wildlife – impacts wildlife populations will permeate these chapters.

We owe a huge debt of gratitude to the authors who indulged our mission and shared their expertise.

A project of this scope cannot be completed without the support of family members, as everyone knows that most of the work associated with producing a textbook is squeezed in “here or there.” My husband, Michael Yabsley, deserves a lot of thanks, not only because he spent endless days with the other editors and me editing and organizing, but he also held the fort as I disappeared for days to meet with the rest of the group. This project, from conception to reality, went on longer than we expected, in no small part because of the birth of no fewer than four children among us, job changes, promotions, and generally busy lives! I was merely a facilitator, and the other editors (Barron, Yabsley, Miller, and Aguilar) deserve praise for their persistence in aiming for excellence.

The real thanks should go to the thousands of individuals who dedicate their lives to the care of wildlife every day. Most of those people are underpaid and undervalued but are fueled by their passion to help in some way, however small. We hope this book helps them to help wildlife!

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*Sonia M. Hernandez
Spring 2019*

Section I

General Topics

1

Regulatory and Legal Considerations in Wildlife Medicine

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Introduction

In virtually all instances, licensed veterinarians can lawfully admit and treat a wild animal that requires medical attention. Except for a few circumstances discussed below, state or federal wildlife regulations do not prohibit such “Good Samaritan” action by a veterinarian. However, once an animal has been medically treated and stabilized, further steps are governed by myriad state, federal, and local regulations, statutes, and ordinances, depending on species and locale. These regulations may be more or less restrictive depending on the government agency imposing them. A veterinarian should not be deterred by this, but should be well informed in advance of administering medical assistance and understand what other actions are allowed regarding wild animals.

Perspective

The information discussed in this chapter is intended for the veterinarian who is licensed to practice veterinary medicine in the United States, but who does not hold any type of license or permit (hereafter referred to simply as “permit”) that authorizes possession of wildlife species, such as zoological, alternative livestock, animal sanctuary, falconry, or rehabilitation. It is assumed that holders of those permits are already aware of the requirements granted under those permits regarding the medical treatment of wildlife species that are privately owned or otherwise authorized to be in private possession. In this chapter, wildlife is defined as free-ranging wild animals and migratory birds that prior to admission for medical attention were not under private ownership or otherwise authorized to be in private possession.

Lastly, this chapter is not a definitive source of regulatory requirements or legal advice, but serves as a guide

for the types and sources of information a veterinarian should be knowledgeable about if asked to treat any wild animal. Any specific regulation, statute or legislative act discussed or referenced in this chapter is current at the time of publication and is subject to change in the future. It is therefore prudent to stay apprised of any changes that may occur to existing regulations and statutes, and to be alert to newly enacted related regulations or statutes that might affect the rehabilitation of wildlife.

Federal Regulations Pertaining to Wildlife Rehabilitation

The US Fish and Wildlife Service (USFWS) is the federal agency that has responsibility to implement provisions of the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA) and the Endangered Species Act (ESA) that specifically address authorized activities for these species, including rehabilitation of migratory birds and eagles. Where the BGEPA and ESA are focused on conserving at-risk species, the MBTA protects all migratory birds, regardless of their conservation status. Another federal agency, the National Marine Fisheries Service (NMFS), has promulgated policies, standards, and best practices that govern marine mammal stranding response, rehabilitation, and release.

USFWS – Migratory Birds, Bald Eagles, and Golden Eagles

The federal regulation that addresses criteria for the rehabilitation of migratory birds is 50 CFR §21.31 (Federal Register 2003). The list of migratory birds includes almost all bird species in North America except for invasive species such as European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), Eurasian

collared dove (*Streptopelia decaocto*), rock pigeon (*Columba livia*), and certain game species governed by state regulations, such as quail (Odontophoridae), pheasant (*Phasianus colchicus*), grouse (Tetraonidae), domestic chicken (*Gallus gallus*), and wild turkey (*Meleagris gallopavo*). The list can be found at <https://www.fws.gov/migratorybirds/pdf/policies-and-regulations/MBTAListofBirdsFinalRule.pdf>. However, under §21.12(c), permit exemptions, licensed veterinarians are not required to obtain a federal migratory bird permit to temporarily possess, stabilize, or euthanize sick and injured migratory birds. According to federal regulations, “a veterinarian without a migratory bird rehabilitation permit must transfer any such bird to a federally permitted migratory bird rehabilitator within 24 hours after the bird’s condition is stabilized, unless the bird is euthanized” (50 CFR 21.12(c)). “Stabilize” is not legally defined since each medical case presents differently. The veterinarian and the rehabilitator should work together to determine when a bird’s condition no longer requires direct veterinary care and it can be moved to the rehabilitator’s facility. If a veterinarian is unable to locate a permitted rehabilitator within that time, they must contact the Regional Migratory Bird Permit Office for assistance in locating a permitted migratory bird rehabilitator and/or to obtain authorization to continue to possess the bird.

In addition, veterinarians must: (i) notify the local USFWS immediately upon receiving a threatened or endangered migratory bird species, or bald eagle or golden eagle; (ii) euthanize migratory birds whose injuries are as described in §21.31(e)(4)(iii) and §21.31(e)(4)(iv) (Figure 1.1), although the regulation also establishes criteria for exceptions; (iii) dispose of dead migratory birds in accordance with §21.31(e)(4)(vi)(A–D); and (iv) keep records for five years of all migratory birds that die while in care, including those that are euthanized. The records must include the species of bird, type of injury, date of acquisition, date of death, and whether the bird was euthanized or transferred to a rehabilitator. Euthanasia of any eagle should be coordinated with USFWS permission.

Nonreleasable migratory birds may be placed in educational programs or used for foster parenting, research projects, or other permitted activities with persons licensed, permitted or otherwise authorized to possess such birds, with prior approval from the issuing Regional Migratory Bird Permit Office.

Veterinarians may conduct necropsies on certain species but, prior to conducting the necropsy, they should check first with USFWS because some species may need to be sent to regional or federal diagnostic laboratories. If factors such as oil or chemical contamination, electrocution, shooting, or pesticides are suspected, USFWS law enforcement officials must be contacted immediately.

Other situations that may be helpful to know where the “take” of migratory birds is authorized by regulation, and

Federal Regulation Excerpts

Euthanasia

You must euthanize any bird that cannot feed itself, perch upright, or ambulate without inflicting additional injuries to itself where medical and/or rehabilitative care will not reverse such conditions. You must euthanize any bird that is completely blind, and any bird that has sustained injuries that would require amputation of a leg, a foot, or a wing at the elbow or above (humero-ulnar joint) rather than performing such surgery. §21.31(e)(4)(iii)

You must obtain authorization from your issuing Migratory Bird Permit Office before euthanizing endangered and threatened migratory bird species. In rare cases, the Service may designate a disposition other than euthanasia for those birds. If Service personnel are not available, you may euthanize endangered and threatened migratory birds without Service authorization when prompt euthanasia is warranted by humane consideration for the welfare of the bird. §21.31(e)(4)(iv)

Dead birds, parts and feathers

You may donate dead birds and parts thereof, except threatened and endangered species, and bald and golden eagles, to persons authorized by permit (under §21.12) to possess migratory bird specimens or exempted from permit requirements. §21.31(e)(4)(vi)(A)

Rescue by the Public

Any person may remove a migratory bird from the interior of a building or structure under certain conditions (§21.12(d)). Good Samaritan clause—any person who finds a sick, injured, or orphaned migratory bird may, without a permit, take possession of the bird in order to immediately transport it to a permitted rehabilitator. (§21.31)

Education –Specimens /Live Birds Possession

State, federal, and municipal agencies as well as AZA accredited zoos may possess lawfully acquired migratory bird specimens and live birds for educational purposes without a permit. (§21.12(b)) All others must have a Special Purpose Possession permit for education (§21.27)

Figure 1.1 Excerpts from the Code of Federal Regulations §21 pertaining to veterinarians treating native wild animals.

thus exempt from needing a permit, include rescue of birds by the public (“Good Samaritans”) and the use of specimens or live birds for educational purposes by certain public and private institutions (Figure 1.1). “Take” has been broadly defined and may include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempts to do so.

USFWS & NMFS – Threatened and Endangered Species, Including Sea Turtles and Marine Mammals

Aside from rendering immediate medical attention to any federally listed threatened and endangered (T&E) species, sea turtle or marine mammal, it is advisable to

immediately contact the state wildlife agency or USFWS or NMFS for further instructions, especially for endangered species.

In the case of sea turtles, the USFWS has issued *Standard Permit Conditions for the Care and Maintenance of Captive Sea Turtles* (USDI/USFWS 2013) in accordance with §10(a)(1)(A) of the ESA, which includes requirements for rehabilitation. For veterinarians who will rehabilitate sea turtles, these conditions include experience requirements, keeping complete health records on each animal, a USFWS- or state-issued permit for euthanasia, submission of a gross necropsy report on each deceased animal, etc. Euthanasia of any sea turtle requires USFWS approval.

NMFS – Marine Mammals (Cetaceans and Pinnipeds)

The NMFS has issued *Policies and Best Practices, Marine Mammal Stranding Response, Rehabilitation and Release, Standards for Rehabilitation Facilities* (NOAA, NMFS 2009) in accordance with Title IV §402(a) of the Marine Mammal Protection Act that includes requirements for rehabilitation of marine mammals. Portions of this document are based on the US Department of Agriculture Animal and Plant Health Inspection Service Animal Welfare Act. To qualify as an attending veterinarian for a marine mammal rehabilitation facility, extensive training and experience are required. For the occasional case presented at a veterinary clinic, it is advisable to contact a local stranding network, facility or veterinarian who is permitted to provide rehabilitative care for consultation on diagnosis, treatment, and medical clearance for release or transport.

State Wildlife Regulations Pertaining to Wildlife Rehabilitation

Every state has its own set of regulations that govern the wildlife native to that state, but all contain a general provision that prohibits the temporary or permanent possession of almost all species of native wild animals (Musgrave and Stein 1993). Exceptions to this rule include activities such as scientific research, bird banding, translocation, animal control, falconry egg harvest, rehabilitation, and, in some states, educational animals that recover from rehabilitation but are deemed nonreleasable. These few exceptions usually require issuance of a permit, which may also include one or more state or federal permits, as discussed later.

Where most veterinarians become involved in the temporary possession of a wild animal is in participating in wildlife rehabilitation, broadly defined as providing assistance to a wild animal that is injured, diseased or

distressed, for the purpose of release back to its wild habitat. Most often, this involvement occurs as a direct contact with a rescuer from the public or in assisting a local permitted wildlife rehabilitator.

As mentioned earlier, most state wildlife rehabilitation regulations are silent on any prohibition of a veterinarian rendering immediate, emergency medical assistance to a wild animal in need (Casey and Casey 1994, 1995, 2000, 2005). Thus, it is generally accepted as being allowed. Most states have a clear requirement that the animal, once stabilized and not requiring continuing veterinary care, be transferred to a local permitted rehabilitator as soon as possible for further rehabilitation and release. If such transfer is not possible, either due to a lack of a local rehabilitator authorized for that species or if the rehabilitator's facility is at capacity, the veterinarian should contact the local state wildlife officer or state wildlife agency for guidance and authorization on any next steps, including further care and disposition for that animal.

If a veterinarian finds that wildlife is being delivered by the public on some frequent basis, especially in more urban areas and generally seasonally, and circumstances are such that frequently the local rehabilitator is unable to accept more cases, the veterinarian may consider obtaining a state wildlife rehabilitation permit. The requirements and application forms for a state-issued wildlife rehabilitation permit are available through the state wildlife agency, with many available on the agency's website.

Lastly, many states require that the veterinarian notify the state agency if the animal is a species listed as having some level of protected status, such as a state-sensitive or state T&E species, or a federally listed T&E species.

Another circumstance where veterinarians provide medical assistance on a more regular basis is through a working relationship with a local rehabilitator. States that issue wildlife rehabilitation permits require that the rehabilitator have a veterinarian of record who has agreed to provide medical assistance to wild animals undergoing rehabilitation. Rehabilitation permits do not authorize the practice of veterinary medicine, so a consulting veterinarian is a critical requirement in any successful rehabilitation process.

This partnership may take the form of an informal arrangement between the veterinarian and rehabilitator, or it may be more formal, such as using a written agreement. If a veterinarian agrees to be the veterinarian of record for the rehabilitator, some form of agreement should be clearly discussed and understood, whether formal or informal, written or oral, that articulates the roles, responsibilities, and expectations of both parties. While some states require the rehabilitator to list the name of the consulting veterinarian on the rehabilitation permit, other states require the veterinarian to complete

and sign a form specifying and agreeing to the type of services that will be provided for wildlife.

Such discussions of services should clarify if the veterinarian will provide professional services and out-of-pocket costs free of charge, or what portion, if any, are expected to be paid or reimbursed by the rehabilitator, most of whom are volunteers. They also should clarify what initial and continuing medical treatment procedures or supportive care the rehabilitator is authorized to perform under the training and supervision of the veterinarian, such as basic first aid, routine wound management, fluid therapy, and administering prescribed medications. Further details on the communication between the wildlife rehabilitator and the veterinarian can be found in Chapter 8.

Most medical procedures should be performed by the veterinarian and not delegated to the rehabilitator. These would include surgeries, radiography/imaging, stabilization of fractures, and administration of controlled substances such as strong analgesics or euthanasia agents. Correspondingly, the trained and experienced rehabilitator, because of permit requirements, is likely to better understand the captive care and husbandry requirements of a specific species, including diets, enclosure requirements, and pre-release conditioning and considerations. Even when working frequently with a rehabilitator who seems to know and understand all the rules and regulations that may apply, it is good practice for the veterinarian to obtain a copy of regulations to personally understand the rules and arrive at independent interpretations. It is also important to obtain copies of the rehabilitator's state and federal permits.

A few other provisions that often appear in state wildlife rehabilitation regulations that are sound practices for veterinarians to follow include separation of wildlife from domestic animals, prohibition from public display, including social media, and release restrictions. Any wild animal admitted for treatment should be confined and housed separate from all other domestic species in the clinic. This reduces captivity stress on juvenile and adult animals, provides for quarantine against possible transmission of pathogens and parasites, and helps prevent habituation of young animals. Any form of public display of the animal should be prevented, including from curious clinic staff not involved in direct treatment, members of the public, and the media.

The regulations of some states have strict requirements as to when and where animals can be released. Rehabilitators are responsible for preparing and assessing the wild animals for release, and conducting the release. On rare occasions, a brief period of quiet recuperation may be sufficient for the animal to recover and be ready for immediate release. In these cases, the veterinarian

may want to consult with a rehabilitator to confirm the appropriateness of the release.

Some states require that the animal be released as close as possible to or within a specified distance from the point of original capture. Other states may require the release location to be chosen in consultation with a wildlife officer, especially involving any state or federal T&E species. States may also outright prohibit the release back to the wild of certain animals, such as those considered to be invasive or nonnative.

Some states may have departments (other than the wildlife agency) that have some level of involvement, jurisdiction, or oversight involving the state's wildlife. For example, some state health departments have reporting requirements for any type of wild animal bites (e.g., rabies vectors) or known or suspected exposure to a zoonotic disease. If involving a rescuer from the public, this notification requirement is most likely the responsibility of the rescuer, if they know to do so. There may be a requirement or strong expectation from the state that the veterinarian who has knowledge of any such occurrence also should report the incident, including the names of any members of the public known to have been exposed.

Additionally, some states have active commercial alternative livestock operations, often governed by a department of agriculture. They may involve wildlife species such as deer and elk, and may have reporting requirements for any of those species that may arrive for rehabilitation, especially if unusual circumstances are suspected or if the state is concerned about the spread and transfer of communicable diseases such as chronic wasting disease.

Local Municipal and County Considerations

Some state wildlife rehabilitation regulations require that rehabilitation must not be in conflict or violation with any local rule or ordinance. While this requirement applies directly to the facility of the rehabilitator, it may create restrictions or a prohibition for wild animals to be housed, even temporarily, within a veterinary facility. Planning and zoning codes and ordinances of some counties and municipalities may prohibit any wild animal species or any species they define as "dangerous" (e.g., venomous snakes) from being kept onsite. Others may allow certain species of wildlife that are not defined as "dangerous" but only if certain conditions are satisfied (e.g., possession of a current state wildlife rehabilitation permit). These restrictions at the local level, if they exist, most likely pose a very low risk to a veterinary clinic for

the infrequent squirrel, rabbit or songbird that may be admitted. However, they could pose more significant risks if the veterinarian is admitting wildlife on a more regular basis, or admitting larger carnivore species or those species considered to be disease vectors, especially if any adverse incident should occur involving the public or clinic staff.

Surveillance Reporting

Some public health or wildlife agencies have reporting and surveillance requirements for cases of various diseases observed or suspected. Those of public health importance may include rabies, plague, tularemia, or hantavirus and state wildlife agencies may request information on cases of parvovirus, white-nose syndrome, West Nile virus, highly pathogenic influenza virus, Newcastle's disease virus, etc. Those agencies should be contacted in advance for their reporting and surveillance requirements and that information should be maintained in a readily accessible location. It is almost better to err on the side of more frequent communication, particularly with pathogens that affect public health.

Carcass Disposal and Submission

There are few specific instructions in state-level rehabilitation regulations regarding carcass or animal parts disposal. As a result, it may be reasonable to assume that any form of carcass disposal conforming to local ordinances used on a regular basis by the veterinarian is likely acceptable. A few states do have specific requirements (e.g., incinerate) if poisoning is suspected or euthanasia has involved chemical agents. At times, when the veterinarian is reasonably sure that harmful chemicals, pathogens, disease agents, or drug residues are not present, a carcass may be used as feedstock for wildlife being rehabilitated.

At the federal level, there are certain species for which carcasses and parts are required to be submitted to federal facilities. Carcasses and feathers of bald eagles and golden eagles must be submitted to the National Eagle Repository located in Commerce City, Colorado. Certain marine mammals and sea turtles may need to be submitted to the offices of the NMFS. To assist in the legal acquisition of federally regulated migratory bird feathers, two programs, listed at the end of this chapter, have been established for the distribution of noneagle feathers and carcasses for tribal religious, medical, and ceremonial purposes.

Lastly, it is always good practice to contact the state or local USFWS office to inquire if there are requirements to submit species that are either state or federally listed as T&E.

Law Enforcement

On rare occasions, a veterinarian may be asked to assist in a law enforcement action, at a local, state, or federal level. Examples of this include unlawful take and possession of wildlife, intentional injury to wildlife not covered by legal hunting regulations, unlawful transport or sale of wildlife, and if the nature of the wildlife injury is related to gunshot, poisoning, electrocution, or oil or chemical exposure. The veterinarian's involvement may include a medical assessment of any confiscated wild animals, providing medical assistance or euthanasia, and temporary possession pending transfer to a rehabilitator or other final destination. There are often evidentiary and chain of custody procedures that require strict adherence (Byrd and Sutton 2012). Complete medical records, radiographs, photographs, and other types of evidence, including gunshot or other objects removed from the affected wildlife species, may be required in a form that is later admissible and defensible in a deposition or court of law. The various law enforcement officers involved in any legal action should provide specific and clear guidance to the veterinarian as to any evidentiary requirements and procedures to be followed.

USFWS regional law enforcement offices can be found at <https://www.fws.gov/le/regional-law-enforcement-offices.html>. A list of state and territorial fish and wildlife offices can be found at www.fws.gov/offices/statelinks.html.

Legal Liability Exposure

Situations that involve physical contact between a human and a wild animal can end badly. A study of rescuers revealed that because of the very strong emotional response that humans demonstrate for animals experiencing pain and suffering, especially young animals, rescues were regularly attempted despite risk of serious injury or disease exposure to the rescuer (Siemer and Brown 1992). When a well-meaning member of the public who is untrained in wild animal capture, restraint, and transport attempts rescue of a wild animal that appears to need help, a plethora of adverse outcomes are very possible, including death or further injury to the wild animal or rescuer.

In the case where clinic staff have advised or coached a rescuer over the phone on capture, restraint or transport, the veterinarian's potential liability exposure begins even before the animal arrives at the clinic. As such, some clinics have chosen to provide no guidance and simply state that the animal will be seen if brought to the clinic. Other clinics simply refer the rescuer to a local experienced rehabilitator or animal control agency to determine if rescue is needed, and if so, to provide for safe methods of capture and transport. This option generally gives the rescuer a more informed source of guidance and instruction, transfers liability away from the clinic, and may result in the rehabilitator offering to perform the tasks for the rescuer in difficult situations. If the veterinarian should decide to provide this type of advice over the phone, very specific training should be given to those clinic staff assigned to speak with rescuers, such as advising the rescuer that particular situations may be unsafe and could result in personal injury and in these cases a rescue should not be attempted.

Once the animal arrives at the clinic, other potential liability exposures are created with clients and clinic staff. To minimize risks to clients, many clinics receive rescued wildlife through an alternative entrance, thus preventing contact with clients or their companion animals. A more real and pronounced set of risks of injury involve clinic staff that assist in the medical treatment of injured or diseased wild animals. Only staff who understand the differences between the behaviors of domestic and wild animals, are trained in safe restraint of wild animals, and in some cases have preexposure rabies vaccinations, should be involved in assisting the veterinarian in any examination, diagnostic or medical procedures.

A thoughtful approach to risk management for the veterinarian and the clinic can mitigate the effects of most of these risks in reducing the likelihood of creating a cause for legal action. Components of a sound defense might include proof that documented policies, procedures, and training were followed to insure the safety of all parties.

The American Veterinary Medical Association (AVMA) suggests that a clinic should have a stated wildlife policy that stipulates whether or not the clinic will accept various wild animal species for treatment. If the clinic does accept wildlife, then clear roles and responsibilities of all staff should be documented and communicated, as well as a list of contacts for referrals and regulatory agencies that may need to be notified (Figure 1.2). The veterinarian should verify that a professional liability insurance policy provides coverage for wildlife treatment, handling, and confinement. If the policy does cover wildlife and classifies them as "small animals" (as opposed to equine or food animal categories), the policy needs to be reviewed to understand if

Contact Information Checklist	
Governing Authorities:	
State Wildlife Agency	# _____
Local Wildlife Officer	# _____
Local USFWS Agent	# _____
Local Animal Control	# _____
State Veterinarian	# _____
USDA APHIS Area Vet.	# _____
Local Public Health Dept.	# _____
Regional CDC office	# _____
Local Wildlife Rehabilitators:	
Name _____	# _____
Name _____	# _____
Name _____	# _____
Wildlife Referrals to other Veterinary Clinics:	
Clinic _____	# _____
Clinic _____	# _____
Clinic _____	# _____
<small>(Adapted from "Managing Wildlife Emergencies" prepared by the AVMA –www.avma.org/wildlife)</small>	

Figure 1.2 Sample format for a list of helpful contact numbers for veterinarians treating native wildlife. US Fish and Wildlife Service (USFWS) regional law enforcement offices can be found at <https://www.fws.gov/le/regional-law-enforcement-offices.html> and a list of state and territorial fish and wildlife offices can be found at www.fws.gov/offices/statelinks.html.

certain species or groups of species may be excluded from coverage, such as carnivores, ungulates, raptors, venomous snakes or rabies vector species.

Summary

The successful practice of wildlife rehabilitation has been made possible by the generous support of time, effort, and expertise of countless veterinarians over many decades. This chapter could be interpreted as all the reasons, regulatory hurdles, and legal risks why a veterinarian might hesitate to become involved and volunteer their services, and some will choose to not work with wildlife. However, experience has shown that far more veterinarians will willingly involve themselves, but hopefully do so equipped with knowledge of the rules, regulations, and laws that govern the activity. Just as it is prudent to understand the licensing requirements, laws, and skills needed to operate, for example, a mobile veterinary practice, the same holds true for working with wild animals. Every locale is different, so the veterinarian will need to become familiar with the general set of rules that apply federally, and in their state and local area.

This chapter is a brief discussion to alert the veterinarian to the major considerations to be aware of, and ends with a listing of several helpful resources to further that knowledge. One or more local wildlife rehabilitators also may serve as an excellent source for this information, as they are usually required to fully understand the state and federal regulations that govern wildlife rehabilitation as a primary condition of obtaining and maintaining their permit. Lastly, when in doubt, contact the appropriate governing agency or seek legal counsel.

Resources

- 1) State wildlife agencies in all 50 states, often within the Department of Natural Resources
- 2) USFWS offices in all 50 states (www.fws.gov/offices)
- 3) USFWS Regional Migratory Bird Permit Offices (eight regional offices) (<https://www.fws.gov/birds/policies-and-regulations/permits/regional-permit-contacts.php>)

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- 4) State and local health departments in all 50 states
- 5) List of licensed/permitted wildlife rehabilitators – usually available from the state wildlife agency
- 6) USDA Wildlife Services 1-866-487-3297 (www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Program_Overview)
- 7) AVMA website – *Managing Wildlife Emergencies* (www.avma.org/KB/Resources/Reference/wildlife/Pages/default.aspx)
- 8) USFWS National Eagle Repository (www.fws.gov/eaglerepository)
- 9) Sia Essential Species Repository (for noneagle feathers), Comanche Nation, OK (www.comancheeagle.org)
- 10) Liberty Non-Eagle Repository (for noneagle feathers), AZ (<http://libertywildlife.org/conservation/non-eagle-feather-repository/>)
- 11) Sea Turtle Stranding and Salvage Network (www.seaturtle.org)
- 12) USFWS National Sea Turtle Coordinator, Jacksonville, FL (<https://www.fws.gov/northflorida/SeaTurtles/seaturtle-info.htm>)
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2

Human Safety and Zoonoses

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Introduction

Working with wildlife can be a rewarding endeavor, but precautions must be taken to ensure the safety and health of the humans who care for these animals. Wild animals are often fractious and, when handled or kept in captivity, can injure themselves or the people caring for them. Additionally, wild animals can be a source of numerous zoonotic diseases, some of which may have not yet been discovered. This chapter provides information on how to reduce the probability of injury or transmission of zoonotic diseases to humans working with wildlife in a rehabilitation setting. In addition to the information found in this chapter, the National Association of State Public Health Veterinarians periodically publishes a compendium on the prevention of zoonoses in veterinary personnel; the latest version can be found on their website (www.nasphv.org/documents/Compendia.html).

Prevention of Traumatic Injury

Limited information is available on the incidence of human trauma inflicted by wildlife, and there is even less focus on wildlife rehabilitation settings (Conover et al. 1995; Bovard 2000; Saito and Shreve 2005). People who work with animals as an occupation are more likely to suffer trauma from animals than people with little animal contact. One report found that 47.6% of surveyed raptor rehabilitators had suffered wounds associated with handling wildlife (Saito and Shreve 2005). In contrast, reports in the literature consistently identify domestic dogs as the most common species that bite members of the general public (Sinclair and Zhou 1995; Moore et al. 2000); bites from other domestic animals are less commonly reported, but are still more frequent

offenders than wildlife. Certainly some species, such as carnivores and raptors, are better equipped to inflict damage to people during handling and procedures and their injuries are therefore more likely to be reported.

Specific precautions to be considered with particular types of animals are covered in other species-specific chapters in this book. For example, carnivores bite, wading birds can inflict painful stabs with their beaks, birds of prey can cause significant trauma with their talons, wild rodents and snakes are quick to bite and scratches from armadillos and other burrowing animals can be very painful. However, there are a few steps that all people working with wildlife can follow to reduce the incidence of injury.

- 1) *Clear communication*: when two or more people are examining or handling animals together, they should always communicate aloud their respective tasks. For example, when one person is taking control of a raptor foot for examination, both parties involved (the initial holder and the one about to examine) should communicate the transfer of the foot.
- 2) *Safe, species-specific handling techniques*: animals have a variety of methods to inflict injury on a handler or examiner. Handlers must be aware of the proper restraint technique for the specific animal being examined; in fact, any person working directly with wildlife should have proper training prior to handling any animal (Figure 2.1). For example, if a handler is unfamiliar with birds such as cranes or herons, he or she might not properly restrain the head and neck, increasing the risk of trauma from the bird's beak.
- 3) *Protective equipment*: to aid in the handling of different species, protective equipment such as nets, towels, gloves, or goggles may be required. The equipment needed will vary with each species.

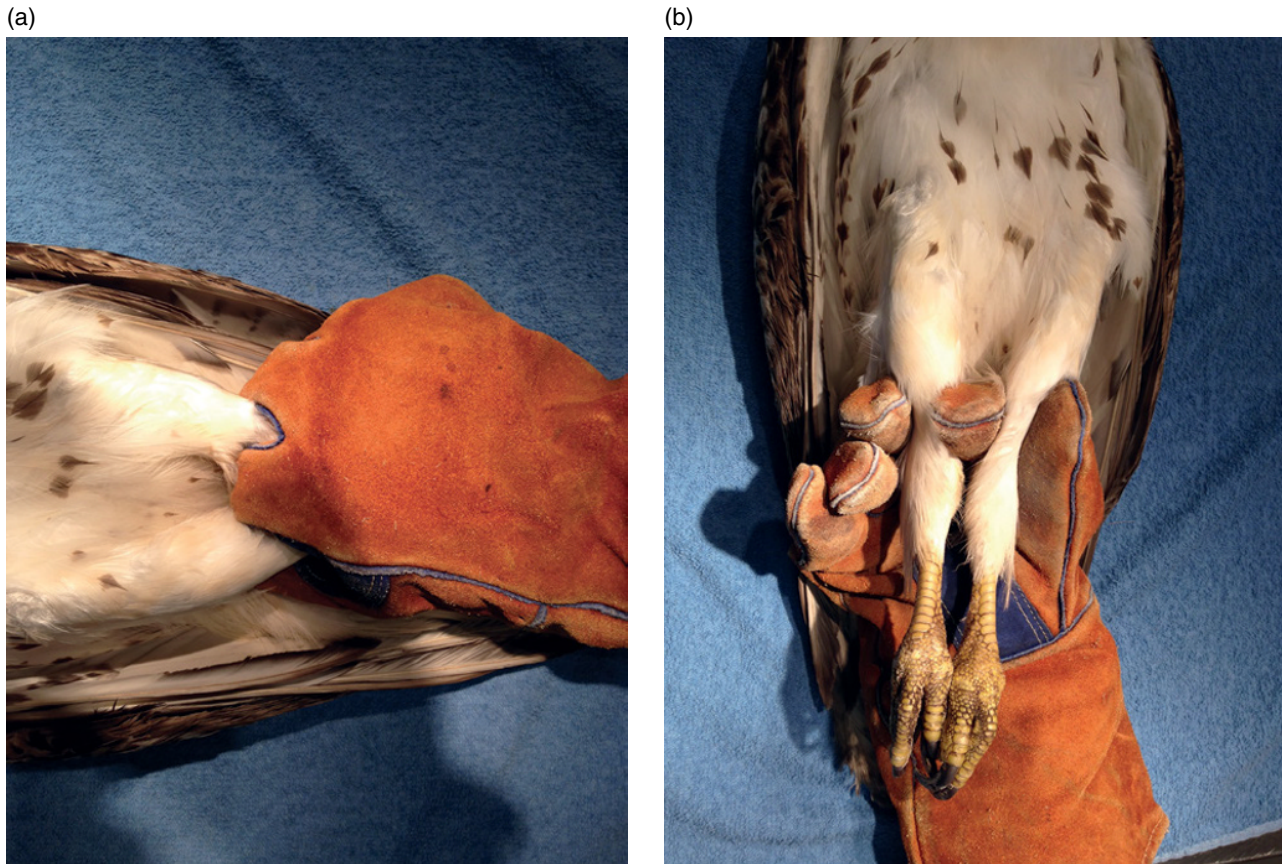


Figure 2.1 Thick gloves should be worn when handling raptors. The raptor's feet should be restrained to prevent talons from causing trauma to individuals working with the bird. When inexperienced individuals are working with raptors, an overhand hold (a) of the feet is recommended to reduce the likelihood of accidental trauma. An underhand hold (b) can be used with experienced individuals or when examining the feet.

4) *Chemical immobilization*: sedation or immobilization with various drug protocols might be the only way to safely handle some animals. Additionally, chemical immobilization of most wild animals will likely be required for diagnostics and other clinical procedures. Sedation or immobilization of animals can not only reduce the likelihood of injury to humans, but also reduce the stress inflicted on the animal.

Routes of Zoonotic Disease Transmission and Steps for Prevention

With the ever-increasing number of emerging infectious diseases identified in wildlife, it is impossible to know every potential pathogen carried by wildlife that could be zoonotic (Taylor et al. 2001). Additionally, collection of biological samples and case data from rehabilitation centers can be time- and cost-prohibitive, although involvement of universities and public health departments, and

the use of electronic record keeping, may improve data collection and review (Stitt et al. 2007).

One of the best disease risk reduction methods for wildlife rehabilitators is knowledge about the routes of exposure to infectious agents and general methods of prevention. One report found that while 88% of rehabilitators wore gloves to prevent injury from raptors, only 45% always or sometimes washed their hands after handling or treatment (Saito and Shreve 2005). Thorough hand washing is a necessary step in disease prevention in both human and veterinary medicine and should always be performed after handling an animal or its waste. Recommendations for prevention of exposure to pathogens vary depending on the typical route of transmission and the animal, but basic precautions like hand washing are always warranted.

Fecal–Oral Transmission

The transmission of infectious agents through the fecal–oral route is one of the most common and easily prevented. People can become infected after handling

an animal (dead or alive) that has fecal material on it, cleaning an enclosure, or eating and drinking in areas where animals are housed or examined. Highlighting the importance of the risk of fecal–oral transmission, one study found that 31% of animals in a rehabilitation hospital sampled were shedding at least one zoonotic pathogen, such as *Salmonella* or *Escherichia coli*, in their feces (Siembieda et al. 2011); other zoonotic bacteria, some resistant to common antibiotics, were also isolated from the feces of various animals in rehabilitation centers (Steele et al. 2005; Jijon et al. 2007). In a recent report, raccoons were identified as the source of an outbreak of *Campylobacter* spp. in rehabilitation facility staff in Minnesota (Saunders et al. 2014); a case was characterized as someone who experienced fever and diarrhea or diarrhea lasting three or more days. In addition to zoonotic bacteria, many parasites are also shed in the feces. The recent expansion of the range for the raccoon roundworm (*Baylisascaris procyonis*) warrants extra precaution when working with raccoons, even in areas outside its historical range (Blizzard et al. 2010).

Fortunately, there are a number of simple steps that can be followed to reduce risk of contracting an infectious organism through the fecal–oral route.

- 1) Enforce a strict hand-washing regimen after handling any animal or samples from animals, or after cleaning animal enclosures. The Centers for Disease Control and Prevention (CDC) recommend using running water and soap to lather and scrub for at least 20 seconds followed by rinsing and drying. Antibacterial soap is not needed. Additional information and free educational posters for printing at the clinic or rehab center are available on the CDC's website: www.cdc.gov/handwashing.
- 2) Wear appropriate protective equipment such as disposable gloves to reduce contamination of the hands with fecal or other contaminated material. Even when wearing disposable gloves, hand washing is still a necessary step in disease prevention.
- 3) Designate areas for staff to eat and drink away from animals and prohibit eating/drinking in areas where animal care occurs to reduce the likelihood of food becoming contaminated with fecal material. Although space in some facilities may be limited, this is a crucial step to reduce consumption of contaminated food or drink.

Transmission through Bites and Scratches

Bites and scratches can lead to tissue damage, but infectious organisms can also be transmitted into the tissues through breaks in the skin. Rabies is one of the most

common agents associated with bites, but other organisms such as bacteria (*Pasteurella*, *Staphylococcus*) found in the oral cavity or on the nails/talons can also be transmitted (Kunimoto et al. 2004; Carrasco et al. 2011; Hansen et al. 2012; Goldstein et al. 2013). A review of the animal bite literature was recently published by Goldstein and Abrahamian (2015). Much of this review focused on bites associated with keeping animals as pets, and increased pet ownership of traditional animals (dogs, cats) and less traditional pets (exotic species) will likely lead to increases in the number of bites overall. This review also discussed encounters with various wildlife that resulted in bites or other trauma, but the encounters were not specific to individuals who work with animals as an occupation.

Depending on the severity of the trauma and the organism transmitted, infection resulting from a bite or scratch can range from mild and local to systemic and possibly fatal. When a bite or scratch occurs, the area should be immediately and thoroughly washed with soap and water; if there is a concern about rabies exposure, the wound should also be flushed with a povidine-iodine solution (CDC 2015c). Additional information on a useful protocol for thorough wound flushing that has been found to decrease the probability of infection with rabies can be found at www.cdc.gov/rabies/index.html. A mild bite wound that only damages the skin with no deeper tissue affected can often be flushed as described; systemic antibiotics are likely not needed. If the wounds are more severe and include significant tissue damage and/or deep puncture wounds, the individual should seek medical advice from a professional, which may lead to surgical intervention and/or systemic antibiotics.

Additionally, if working in a rabies-endemic area, all staff who handle animals should receive preexposure prophylaxis. If an injury leads to exposure, the animal should be tested to determine its rabies status and the individual injured should be referred to a medical professional immediately for further evaluation and, if deemed necessary, postexposure vaccination. Although wildlife, specifically bats, account for a few human cases of rabies annually in the United States (CDC 2015c), bites from domestic animals, especially dogs, make up the majority of cases in which humans receive postexposure prophylaxis in Tennessee and likely nationwide (H. Henderson personal communication, 2015). Postexposure prophylaxis is not reportable in most states, so exact numbers of people treated, particularly after exposure to wildlife, are difficult to obtain. No reports of rabies specifically in a person who works with wildlife can be found. Recommendations for pre- and postexposure prophylaxis can be found in more detail on the CDC's website (CDC 2011).

Transmission Through Inhalation

Inhalation of infectious agents typically leads to respiratory disease and ranges in severity from mild flu-like symptoms to respiratory failure and death. Infectious organisms are typically shed in the feces, urine, and respiratory secretions of live animals and can be found throughout many tissues in dead animals. These organisms become aerosolized once the biological vehicle has dried and becomes disturbed, often through cleaning of the environment or an enclosure. For example, individuals with hantavirus pulmonary syndrome often become infected after cleaning/dusting/sweeping or camping in buildings that have been infested with mice. The mice shed virus in their urine, which dries in the environment; once disturbed through cleaning or other activities, humans can inhale the virus and become ill. One report found that several wildlife rehabilitation staff became infected with *Chlamydia (Chlamydophila) psittaci* after handling infected birds (Kalmar et al. 2014). Other organisms such as avian influenza virus, *Yersinia pestis*, and *Francisella tularensis* can also be transmitted by aerosol and lead to grave consequences in infected humans.

When cleaning enclosures or performing a necropsy, the use of a fit-tested mask will reduce the likelihood of inhalation of infectious agents. Surgical masks that are typically used in veterinary medicine are not adequate to prevent inhalation of infectious agents. Masks such as N95 or N99 specifically fitted for the individual should be used (Figure 2.2). Additionally, an enclosure or carcass can be misted with water or a liquid disinfectant prior to cleaning or handling to reduce aerosolization of infectious particles.



Figure 2.2 Masks with N95 or N99 specifications should be worn to reduce the risk of contracting airborne zoonoses.

Cutaneous Transmission

In veterinary medicine, transmission of infectious organisms directly from contact with the skin is less common than some other routes, although ringworm (dermatophytes) and *Sarcoptes scabiei* are common examples. No reports of cutaneous transmission of disease from wildlife are available, and one recent study found that adult white-tailed deer were unlikely to be a source of cutaneous fungal infection for humans (Hall et al. 2011). To prevent cutaneous transmission, exposed skin that comes into contact with animals should be washed with soap and water. Gloves, lab coats, overalls, or other clothing with long sleeves can also be worn to reduce exposure.

Transmission by Biological or Mechanical Vectors

Arthropods, such as mosquitos and ticks, are common biological vectors for many zoonotic diseases, including West Nile virus (WNV), Rocky Mountain spotted fever, and Lyme disease. Fleas may also play a role in the transmission of certain zoonoses including *Y. pestis* and some species of *Bartonella* (Chomell and Kasten 2010). Wildlife may act as reservoirs for a number of these diseases and as hosts for the arthropod vectors responsible for transmission, but typically do not directly transmit the pathogens to humans. One study found that 21% of surveyed raptor rehabilitators experienced symptoms of WNV infection at the same time that a large number of raptors at their facility were diagnosed with WNV infection; however, confirmation of the diagnosis was not made in any of the humans (Saito and Shreve 2005). No risk factors evaluated in this study were found to be significant for illness in people, and the small sample size makes it difficult to determine if there was an increased risk for these individuals compared to the general public. Prevention of these infections is through control of the arthropod vectors. Arthropods, including cockroaches and house flies, can also act as mechanical vectors by transporting an infectious agent on their mouth parts, feet, or other body part to another site.

Reducing arthropod populations in areas where people work and live can reduce exposure to a number of zoonotic organisms. Tick exposure can be reduced by (i) wearing light-colored clothes, including long sleeves and pants, (ii) applying appropriate tick repellants, such as DEET or permethrin, (iii) performing tick checks regularly, and (iv) having landscaping features that discourage ticks and wildlife that carry ticks. For more information, visit the “Stop Ticks” webpage on the CDC web page (2015a).

Similarly, mosquito exposure can be reduced through appropriate clothing, repellants, and enclosure material