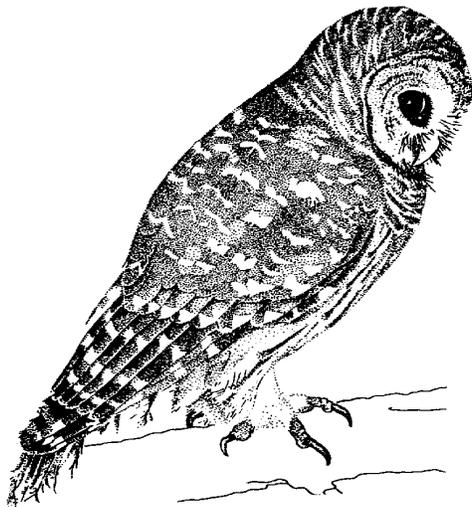


Study Guide

for Prospective
Maine
Wildlife Rehabilitators



Drawing by Josephine Ewing

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INTRODUCTION TO THE *STUDY GUIDE*, *MINIMUM STANDARDS*, AND *EXAM BOOKLET*

You have received these documents because you have expressed an interest in acquiring a permit to rehabilitate wild animals in the State of Maine. The factual and philosophical information in these documents will help you understand the nature of rehabilitation, and thereby help you decide whether or not you really wish to become involved in this activity.

It is important to remember that the information in these booklets is just the barest introduction to wildlife rehabilitation. Understanding the basic concepts will help you acquire your permit, but you will need to learn more -- by reading more detailed materials, going to conferences, and networking with other rehabilitators. Good rehabilitators continue developing their skills, no matter what their level of expertise. State, national and international rehabilitation organizations (see *Appendix One*) publish newsletters and journals, and also sponsor conferences; joining one of these organizations is one way for rehabilitators to stay current.

Using the Booklets

The *Study Guide* will serve as your primary introduction to the field of wildlife rehabilitation. Although it contains a great deal of information about the nature of wildlife rehabilitation, it is actually a highly abbreviated introduction to the field. Not all of the questions in the *Exam Booklet* are taken directly from material in the *Study Guide*, which is intended to serve only as a starting point. You certainly should read the *Study Guide* carefully and think about some of the difficult biological and philosophical issues discussed there. You should also familiarize yourself with the information in the *Minimum Standards for Wildlife Rehabilitation*, jointly issued by the International Wildlife Rehabilitation Council (IWRC) and the National Wildlife Rehabilitators Association (NWRA); you have obtained this document along with the *Study Guide* and *Exam Booklet*. In addition, however, you should purchase field guides and some of the basic references listed in *Appendix Two* to add depth and breadth to your understanding of what wildlife rehabilitation involves. Keep in mind, though, that written materials represent just one learning tool. It is equally important that prospective rehabilitators spend some time working with, and learning from, people who already hold permits to rehabilitate wildlife.

The examination to receive a permit for wildlife rehabilitation in Maine consists of 100 written questions that have been chosen randomly from the nearly 500 questions presented in the *Exam Booklet*. You must achieve a score of eighty percent (80%) or higher to pass this examination. To facilitate your studying, questions are arranged in logical categories and each question is shown with the correct answer. In many cases, there is also a brief explanation of why the indicated answer is considered correct. This format will help you understand the reasoning followed by Maine rehabilitators and the Maine Department of Inland Fisheries and Wildlife (ME IF&W).

By reading the questions in the *Exam Booklet* and studying the answers, you can learn a great deal of specific information about the biology of wild animals and the nature of wildlife rehabilitation. But you should not attempt to simply memorize the *Exam Booklet*. Rather, you should use it as a guide to understanding the subject matter. Always make sure you can explain why one answer is better than the alternatives. Achieving that understanding may require you to consult materials other than the *Study Guide* and *Minimum Standards* booklets, or to ask a rehabilitator for an explanation.

Preparing for the Maine Wildlife Rehabilitation Examination

The examination contains a great deal of specialized information, so it is unlikely that you will do well on it without quite a bit of preparation in advance. As noted in the section above, you should carefully review the *Study Guide*, the *Minimum Standards*, and the *Exam Booklet*. It will help if you purchase the *Principles of Wildlife Rehabilitation (2nd Edition)*, published by the National Wildlife Rehabilitators Association (NWRA), and perhaps one or more of the other basic rehabilitation manuals that are available. You should also purchase field guides for identification of native animals, and look up species found in Maine so that you can begin to learn more about our native wildlife. Remember that many of the questions in the *Exam Booklet* reflect information you may have to locate in sources other than the *Study Guide* and *Minimum Standards* booklets.

As you read these materials, you will discover quickly that some real-world problems may have more than one solution. However, we have tried to make examination questions as clear and unambiguous as possible, and each exam question has only one correct answer. There is no better way to familiarize yourself with the realities of rehabilitation than by spending time with practicing, permitted rehabilitators. The rehabilitation permit office of ME IF&W will assist you in finding rehabilitators in your area. Ask questions about the rehabilitators' facilities, look at the kinds of reference books they have, find out how they located veterinarians and to whom they turn when questions arise. We strongly recommend you volunteer at an existing rehabilitation facility. This hands-on experience will help you decide if you want to dedicate the time and effort required to be a good rehabilitator. If possible, attend a state or national conference for rehabilitators. Become a member of a state rehabilitation organization, such as ReMaine Wild (Maine's state organization for wildlife rehabilitators and associated professionals) and one or both of the national organizations (NWRA and IWRC), and read their publications (see *Appendix One* for contact information). ReMaine Wild regularly sponsors introductory workshops in basic mammal and basic bird rehabilitation; attending one of them is a good way to prepare yourself to become a wildlife rehabilitator.

INTRODUCTION TO WILDLIFE REHABILITATION: DEFINITION, PURPOSE AND PHILOSOPHY

Wildlife rehabilitation is defined by NWRA and IWRC as the treatment and temporary care of injured, diseased, and displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild. Wildlife rehabilitation involves activities such as rescuing, rearing young, and arranging for veterinary medical care of these animals. The goal is release to the wild: for rehabilitation to be deemed successful, these released animals must be able to function successfully as wild animals. This functionality includes being able to recognize and obtain the appropriate foods, select mates of their own species and reproduce, and show the appropriate fear of potential dangers (people, cars, cats, dogs, etc.).

Wildlife Rehabilitation in Maine

The section of ME IF&W regulations specifically pertaining to wildlife rehabilitation is reproduced in *Appendix Three*. Although ME IF&W issues wildlife rehabilitation permits, as is the case in other states, the focus of the state agency is on populations of animals. For most species, the release of rehabilitated individual animals has, at best, only a negligible beneficial impact on their populations (with the obvious exception of species listed as endangered or threatened).

However, members of the public often expect that ME IF&W will assist distressed individual animals; wildlife rehabilitators provide care for these animals, which lessens the workload of IF&W personnel.

Rehabilitators can also be an information resource for members of the public, answering some questions about wildlife (such as when "rescue" is and is not called for) and explaining why it is not appropriate for members of the public to keep and attempt to care for distressed wildlife themselves.

ME IF&W does acknowledge concerns regarding the standard of care and treatment given to animals in rehabilitation. Some rehabilitators may not provide appropriate housing, diet, or treatment for injuries or illness. Others may allow animals to become tame, habituated or even imprinted to humans, or may (without either proper facilities for long-term captivity or the permits required for education or exhibition animals) keep nonreleasable animals rather than euthanize them or transfer them to a qualified individual or facility. As time and funding permit, enforcement of the regulations may become more stringent.

State versus Federal Rehabilitation Permits

In virtually all areas of the U.S., a state permit is required to rehabilitate wildlife legally. In addition, federal permits are also required to handle migratory birds, federally endangered species, and marine mammals and reptiles (such as sea turtles). Some confusion often arises over the definition of "migratory" birds in this context. In a biological sense, a migratory bird is one that has a seasonable and somewhat predictable pattern of movement. However, in a legal sense, migratory birds are defined as all species listed in the Migratory Bird Treaty Act, which protects all wild birds in the United States except (a) resident game birds such as turkey, pheasant, grouse, and quail, which are managed by individual states; and (b) exotic (i.e., nonnative) species such as the English (or house) sparrow, European starling, and feral pigeons (rock doves). A person holding only a state rehabilitation permit may rehabilitate these exotic birds; however, a person must also have a federal permit to rehabilitate birds such as mourning doves, blue jays, crows, owls, etc., even though they spend the winter in Maine rather than migrating to the tropics.

Wildlife Rehabilitators

A wildlife rehabilitator is any person who carries out the activities described at the beginning of this section. Good rehabilitators do more than simply care for the needs of individual animals, however. They also educate the public about wildlife problems and issues, dispelling some of the fear and misinformation people have about wildlife. In order for you to educate others, you must have correct information available to you; when you don't know an answer, you must be willing and able to say "I don't know," and then find the correct answer.

Members of *ReMaine* Wild and other rehabilitators in Maine have developed an informal state-wide communication network to enhance cooperation. The presence of this network means that, if you need to obtain information or advice on a wildlife problem, you can contact other rehabilitators by telephone or e-mail. If an animal needs specialized care, this system helps to quickly move animals to the appropriate facility. Another important part of this network is the close working relationship between rehabilitators and ME IF&W, which provides relevant information on wildlife issues and directs the public to permitted wildlife rehabilitators as necessary.

A qualified beginning rehabilitator is a person who has passed the permit examination in Maine and satisfied other permit conditions. However, it is important for each newly-permitted rehabilitator to realize there is a vast amount that still needs to be learned. Some of this information will be acquired simply by getting more experience in identifying, handling, and caring for animals. But much of it must come from the rehabilitator reading, attending meetings and learning from more experienced rehabilitators. It is important, in your early years as a rehabilitator, to know your limits and where to go for help.

People's motivations for becoming involved in rehabilitation usually include the following:

- humane -- nurturing and caring for animals, relieving their pain and suffering;
- environmental -- seeing rehabilitation as a way of helping wild animals overcome problems caused by human activities;
- educational -- utilizing rehabilitation as a tool for environmental or other science education;
- scientific -- using the hands-on aspect of rehabilitation as an opportunity to gather information about the biology and biomedicine of wild species;
- egotistical -- cultivating a self-image as a "savior" or "trusted companion" of wild animals, and investing more in this image than in the animals' welfare.

Most people's reasons are probably combinations of the first four, although over time, a rehabilitator's motivations may change. For example, people who begin rehabilitating for humanitarian reasons might become convinced that the solutions to preserving wildlife species lie more in environmental education or political activity than in caring for individual animals. But those who pursue rehabilitation primarily for egotistical reasons usually do more harm than good. Animals in their care become too tame and have a poor chance of surviving in the wild. In addition, such individuals give the public the wrong idea of what a wild animal should be.

The Rehabilitator's Role

As a rehabilitator, you should be prepared to play a multi-faceted role within the wildlife professional community. Those facets include those described below.

Providing Care for Distressed Wildlife

Rehabilitators provide places for the public to bring animals in need of help. Rehabilitators then coordinate the medical and nursing care for these ailing or orphaned wild animals. A rehabilitation permit does not make a person a veterinarian, public-health official, wildlife biologist, game warden, law enforcement agent, or nuisance animal control person. But rehabilitators do work with these professionals to avoid or alleviate problems that may occur when people and wildlife come into conflict.

Wildlife biologists and game wardens working for ME IF&W and other state and federal agencies are charged with maintaining healthy wildlife populations and with preserving the natural habitats those animals need to survive. Department of Health personnel are concerned with any diseases that wildlife might spread to people. An effective rehabilitator must understand and balance the concerns of these and other agencies with concerns for the individual animals in their care.

Educating the Public

As a wildlife rehabilitator, one of your most important roles is as an "Ambassador of Wildlife." In many cases, you will be the first contact the public has with the professional wildlife community. What you say to the public, both on the phone and in person, may be crucial to the way a person views wild animals and conservation problems forever after -- don't take this responsibility lightly! In general, members of the public are relatively unsophisticated about the realities of wildlife biology, management, and rehabilitation; one of your main duties is to educate them to the extent that you are able.

Rehabilitators must serve as a conduit of accurate biological and legal information, but must also be sensitive to the concerns of the person on the other end of the telephone. Instead of telling people that

their concerns are trivial or unimportant, you should use opportunities to make them aware of how we all affect the natural communities around us. Every time you speak to someone on the telephone, or address a school or civic group, you need to keep in mind that, if you do your job well, these people may expand their environmental concerns in the future -- and if you do it poorly, they may never listen to your message again.

One of the most sensitive public education issues concerns the negative impact of domestic cats on wildlife. Many pet-owners believe that their cats must or should spend time outdoors; they may regret the occasional mangled bird or chipmunk they find (and bring, just barely alive, to you), but not enough to restrict their pet's activities. To help convince them otherwise, it is often useful to point out the dangers of outside living to pet cats. Organizations such as the American Bird Conservancy and the Humane Society of the United States have sponsored campaigns to keep cats indoors (see *Appendix Two* for contact information).

Recognizing Endangered and Threatened Species

Appendix Four contains a listing of birds, mammals, and reptiles considered endangered or threatened in the State of Maine, as well as species that are considered endangered or threatened federally but not so listed in Maine. You should learn to recognize them as species that are especially deserving of your attention. Should you receive a member of one of these species, your permit requires that you notify the nearest Regional Headquarters of ME IF&W within 48 hours. Federal authorities must also be notified in the case of federally endangered or threatened species.

Recognizing Zoonotic Disease

A zoonotic disease is a disease transmissible from any other animal species to people. Such diseases can be caused by bacteria, viruses, parasites, or any other agent. A few examples would be rabies, tularemia, and the *Baylisascaris* parasite of raccoons. Rehabilitators can play an important role in protecting public health by being alert to these problems. No single key can alert you to zoonoses; their potential is everywhere. The rabbit you're handling could have tularemia, or a tick carrying Lyme disease might crawl onto you. The gull with diarrhea might have a *Salmonella* infection that could make you very ill.

What can you do? First, new animals should be quarantined; ideally, they should be in caging physically separated from your longer-term cases. Make sure that bedding, food, water bowls, and also your hands, shoes and clothes do not carry contamination from sick animals to healthy ones. One helpful hint is to treat sick (or potentially sick) animals last. That way, you are less likely to carry diseases to your healthy patients.

In preventing disease transmission (either among animals or to you), remember to practice good hygiene. Don't allow yourself to be bitten by your patients, especially if they are mammals. Use disinfectants properly and regularly on cages, food dishes, bedding, etc. If you can't disinfect it, throw it away! Wear disposable gloves. Don't launder your rehab clothes or animal bedding with your family clothes, especially if you have children or anyone on immunosuppressive medication in the house. If possible, get a separate washing machine for rehab materials. Do not ever go barefoot into animal areas.

Another important step is to let your family physician know what you're doing. Not only will your doctor make sure you're current on your tetanus shots, but he/she may know of specific zoonoses in your area. Should rehabilitators be prophylactically vaccinated against rabies? The human rabies vaccine is reasonably safe (although some people do have adverse reactions and side-effects) but fairly

expensive. Still, if you handle wild mammals regularly, the pre-exposure vaccination may well be worth it. Consult your personal physician about whether you should be vaccinated.

Recognizing Epizootic Disease

An epizootic disease is the nonhuman version of an epidemic; it is a disease that affects many animals of the same (or related) species at one time. Wild species transport a variety of diseases that might cause significant mortality in domestic pets or food animals. One good example is canine distemper, a disease that may cause large-scale mortality in dogs, raccoons and other susceptible species, but causes no problems for cats, birds, or people. West Nile Virus is often fatal in birds, but most infected mammals do not become ill. The presence of epizootic diseases in wild animals is another reason to practice good sanitation and to quarantine new animals entering your facility. In addition, domestic animals should be kept well away from potentially sick wild animals, their feces, or bedding. Be careful to change contaminated clothing and wash well before going into family or pet areas of your house. Also, by being alert to such issues and communicating their findings to ME IF&W and other state agencies, rehabilitators can play a significant role in protecting animal health.

Knowing Your Limits

An important part of being a wildlife rehabilitator is acknowledging that there are some things you cannot or should not do. Although it may be fun and interesting to try something new, don't try to be a hero. In the end, if you make a mistake, it will be you and/or the animal that ends up paying the price. If you don't know something, get on the telephone and ask other rehabilitators or your veterinarian.

Rehabilitators are not nuisance wildlife control personnel. You will not be certified to remove raccoons from chimneys or to live-trap skunks under porches. However, by giving the public biologically-sound information, you can prevent animals from being injured or orphaned unnecessarily. In addition, rehabilitators are not legally required to go out and pick up sick or injured wildlife, although in practice many rehabilitators do perform this service as their time and money permit.

Knowing where to get information and help is an important part of being a successful wildlife rehabilitator. All rehabilitators should have the following numbers next to their phones:

- ME IF&W (main office): 287-8000
 Rehabilitation Permit Office: 285-5240
 the ME IF&W Regional Headquarters (game wardens and biologists) nearest you

Ashland: 435-3231	Bangor: 941-4466	Enfield: 732-4132
Gray: 657-2345	Greenville: 695-3756	Jonesboro: 434-5925
Sidney: 547-5300		
- local veterinarians who will help with wildlife cases
- other area rehabilitators and their areas of expertise
- local animal control officers
- regional Department of Health nearest you
- the State Police barracks nearest you
- your physician and nearest emergency room

Often in our eagerness to help an animal, we forget the most important thing of all -- human safety. You must always protect yourself and those who work with you. With a bit of training, almost anyone can be taught to restrain birds, even large dangerous ones. You may see experienced raptor rehabilitators restraining eagles and owls without gloves or equipment, but it would be foolhardy to

think you can do this successfully the first time you try. Such skill takes experience and an intimate knowledge of that particular species' behavior. Do not be the next well-meaning person to lose an eye to the stabbing beak of a heron, or to lose the use of one hand because a great horned owl tore tendons with its talons. Mammals can be even harder to handle. Without the proper gloves, rabies poles, etc. even small mammals like squirrels can give serious bites. Unless you are properly prepared to restrain a given species, you should not allow it to be brought to you.

The same advice pertains when you are talking to someone on the telephone. If a member of the public calls you and says that she/he has found an injured animal, what do you tell the person? Certainly you want the animal to receive help, but what are the chances that this animal could hurt the person trying to catch it? Find out more about the kind of animal and how the animal is acting. Think about what "weapons" this particular animal species has and give the caller specific advice on being careful. Try to avoid having the caller actually handle larger animals. Many smaller animals can be gently pushed into a pet carrier or cardboard box with a broom. If the person gets hurt while trying to capture an animal, what are your responsibilities? No one has yet defined many of the legal liabilities for a rehabilitator, but one can easily imagine a lawsuit should a member of the public be injured while following your advice. Please be cautious.

Do You Want to be a Rehabilitator?

Although wildlife rehabilitation can be a very rewarding experience, it creates great difficulties and demands on your personal life. These need to be understood and appreciated before you become involved. Many enthusiastic beginners burn out after the first year or two of rehabilitation. To ensure that the rewards will outweigh the frustrations, it helps to have a realistic understanding of the responsibilities at the outset.

Time

Good rehabilitation will take much more time than you expect. When you have living things in your care, you must be constantly attentive to their needs. In the spring and summer, baby passerines (sometimes called "songbirds") may require feeding as often as every 15-20 minutes from early morning to evening. Nursing baby mammals need to be bottle fed every couple of hours -- then the diets must be prepared, housing cleaned, cages built, water changed -- then, it's time to feed them all again!

It won't be long before you become known as the local person who takes care of animals. This brings us to another thing that will take time: telephone calls. In an attempt to make sure that animals get to you as rapidly as possible, you will give your phone number to many local people: veterinarians, humane societies, pet stores, etc. They, in turn, will give your number to the public as someone who "knows about wild animals." This means that, irregularly, and unpredictably, you will get calls from people asking you what to do about the baby bird someone's cat just brought home, asking you to come over and remove a raccoon from a chimney, telling you that they just saw a fox hit by a car out on the highway, and so on and so on.

Very few people could respond to all these queries and still care for the animals they have, much less carry out household chores, spend time with their families, and (perhaps) work a job to pay for all this. You must decide what you can and can't do, then gently and sympathetically explain this to the person on the telephone. If you can't help, you should be able to refer the caller to someone who can. Good rehabilitation should be, in large part, preventative rehabilitation. Much of your telephone time may actually be spent trying to convince people not to interfere with wildlife (the baby bird is just fine, so

you should leave it alone; the raccoons will stop annoying you if you make your garbage cans inaccessible, and so forth).

Wildlife rehabilitation will interfere with your social and family life. You may not be able to go out, or you may have to come home early, if one of your charges needs care or feeding. How will your family react when you tell them that you can't go away on vacation because you haven't been able to find someone to care for your animals in your absence? Establishing mutual relationships with other area rehabilitators and veterinarians who treat wildlife helps minimize some of these problems.

Money

A common misconception is that "the government" pays for wildlife care. In reality, most of the expenses associated with wildlife rehabilitation are paid for by you, the rehabilitator. These costs can add up quickly to hundreds (if not thousands) of dollars per year. You must buy food for the animals, caging or materials so that you can build caging, special handling equipment and protective clothing, medications, veterinary services, etc. You will also have to bear the costs associated with increased use of your car, telephone, electricity and other utilities. Then you'll find you must buy books (lots of them!) to find answers to your problems, and you'll want to join organizations and go to conferences.

You are not permitted to charge a fee for taking care of wildlife. However, many of the larger rehabilitation facilities solicit donations from people bringing in animals or try to get support from local civic groups. If your rehabilitation facility is not incorporated, you may be personally liable for paying taxes on this money, so it would be wise to check with an accountant or tax advisor before accepting any significant amount of money. If you anticipate receiving large numbers of animals and accepting money to support your work, it may be advisable to consider incorporating your activities as a 501(c)(3) tax-exempt, non-profit organization. Remember, however, that very few rehabilitators in the U.S. receive enough in donations to cover their costs, let alone a salary or a wage.

Depending on where you live, it may be important to make sure that housing wild animals on your property does not violate local zoning regulations. Complying with these ordinances may be a significant expense, but will be particularly important if you have animals that you are keeping long term, or if you intend to rehabilitate potentially dangerous species.

Limiting personal liability is another reason to be incorporated. The question of legal liability for rehabilitators has never been adequately answered. Certainly, if you have employees or volunteers, or if you have a permit to use live animals for talks for the public, you should consult an attorney about incorporation and consider having liability insurance. It is unlikely that one of your animals will hurt someone, but what if that does happen and you are sued? You may not be covered under a home-owners' policy. It would be a good idea to explore these issues before acquiring a permit and bringing wildlife onto your property.

Death and Euthanasia

About half of the animals that come to rehabilitation centers die or must be euthanized (humanely killed) because of the serious nature of their injury or illness. You may not always recognize at the outset that an animal has little likelihood of surviving; some animals appear to do well for a day or two, but then die unexpectedly. Particularly if you stayed up late caring for the animal, spent money on its medications, and became attached to the animal, its death will upset you. You will have to be prepared for this type of thing to happen over and over again.

The worst part of dealing with death is often euthanasia. There is no way around it; if you get into rehabilitation, you will have to kill animals. Often animals arrive at your facility so badly injured that no one could save their lives. In these cases, euthanasia is not quite so difficult; at least you are saving the animal from prolonged suffering. But what about euthanizing animals that could live? On a regular basis, you will receive animals whose lives you can save, but that cannot be returned to the wild (certainly, for example, a gray squirrel with an amputated leg could live for a long time in captivity, but it would be inhumane to release it).

Your rehabilitation permit does not allow you to keep nonreleasable animals indefinitely. Occasionally, you will be able to find placements for these animals with qualified researchers or educators or in zoos that do have the permits necessary for keeping permanent cripples for research, education or display purposes. Although some people may feel uncomfortable about placing a nonreleasable animal in a research setting no matter how humane it may be, it is important to be aware that doing so makes it unnecessary for researchers to remove healthy animals from the wild (which they are legally able to do) for their studies.

For most common species, however, high-quality placement opportunities are rare. This means that you are faced with the unpleasant choice of what to do with these other nonreleasable animals. Some beginning rehabilitators attempt to keep everything alive for as long as possible. But after a while, you'll find that this only prolongs the animal's discomfort at being in captivity and your anguish over the prospect of ending a life. In addition, it creates more work for you and ties up housing. Once again, your rehabilitation permit does not allow you to become a long-term holding facility for unreleasable animals, and it is not in the animals' best interest. It is far easier to make the decision to euthanize early in the rehabilitation effort, before too much time, money, and tears are expended. Also keep in mind that, in Maine, there is a six-month limit on the length of time an animal can be kept in rehabilitation (though extensions can be granted if a longer recuperation could, realistically, result in release).

From the practical perspective, you must consider who will do the euthanasia. Will you be killing the animals yourself? What techniques will you use? How will you dispose of the carcasses? You should have answers to these questions before you start receiving animals. Many humane euthanasia techniques require the use of injectable drugs and can only be performed by a veterinarian, so it is important to talk to your veterinarian about this issue early. If it is not practical for you to involve your veterinarian directly in every euthanasia, you will have to find a safe and humane alternative to scheduled drugs. The *Minimum Standards* booklet has some helpful discussion about euthanasia agents.

Cultivating a Relationship with your Veterinarian

A good working relationship between a wildlife rehabilitator and veterinarian is essential. Finding a veterinarian who is willing to be involved in rehabilitation may not be easy. If you already have a veterinarian for your companion animals, you might start there; talk frankly to her or him about rehabilitation before you start taking animals and find out how interested she/he is in helping. Will services be performed for free, at a reduced cost, or will you be charged the same as a regular customer? Remember that the veterinarian has to make a living, and helping your animals for free or at a discount takes money from his/her pocket. With most veterinarians, it is best to start off slowly. Don't show up at the clinic with several animals and demand that they take time to help you; you would never be welcome again. Instead, make an occasional appointment for interesting or difficult problems that may intrigue them so much that they will want to help you again in the future. And please remember to thank the veterinarian for helping you; a plate of cookies, a nice nature poster for

the waiting room, or an offer to assist with any chores around the office may help cement good relationships.

Rehabilitators are neither trained nor licensed to diagnose and treat an animal's ailments. Any medical or surgical treatment must take place under the supervision of a licensed veterinarian. In addition, the veterinarian might assist your efforts with services such as taking x-rays, doing blood work and fecal exams for parasites, performing surgery, tranquilizing animals, euthanizing animals, and disposing of carcasses. Over time, you may wish to learn how to do some of the laboratory work yourself, and your veterinarian would probably be glad to help you learn. You, in turn, might be able to help the veterinarian by accepting telephone calls from clients who want information about wildlife species or "orphaned" baby birds and mammals, and by referring new people to his/her practice.

Continuing Education and Wildlife Rehabilitation

Wildlife rehabilitation is an extremely dynamic field in which improvements and changes occur rapidly. Some practices that were considered "state of the art" only a decade ago are no longer considered appropriate treatment or nutritional strategies. In order to properly help animals, it is essential for you to keep yourself well-informed and well-educated. We have already suggested that you read books not only on rehabilitation but also on the natural history of the species with which you work. Joining organizations such as ReMaine Wild, NWRA and IWRC will help keep your knowledge base current, especially if you attend their training sessions and conferences as well as read their publications. Volunteering with a more experienced rehabilitator or with a veterinarian will give you some hands-on continuing education. Other possibilities include taking courses at local colleges on topics such as ecology, animal behavior, wildlife biology, and the "ologies" of particular vertebrate groups (ornithology, mammalogy, etc.). If you have internet access, you could join online rehabilitation discussion groups such as WLREHAB (see *Appendix Two* for subscription information), and regularly browse the IWRC and NWRA sites. There is no "quality control" over most of the web material on wildlife, but a site called Wildlife-International is an example of a high-quality resource created by and for wildlife professionals (see *Appendix Two* for site address).

ISSUES OF IMPORTANCE TO REHABILITATORS

Identification of Species

Accurate identification of animals is critical. If you don't know what species an animal is, it is almost impossible to decide on correct captive housing and diets. In addition, knowing the specific identity of an animal will give you and your veterinarian some important clues as to which parasites or diseases are to be expected.

You can learn to identify many species from the field guides and other books listed in *Appendix Two*. Experienced rehabilitators and local birders or organizations such as Maine Audubon can give you many valuable hints in identifying local species. In addition, taking trips to natural history museums or taking classes in mammalogy and ornithology can help immensely. ME IF&W biologists can also be of assistance in identifying more difficult species.

Knowing the scientific as well as the common names for particular species is sometimes useful. A complete taxonomy (class, order, family, genus, species, and perhaps subspecies) is both daunting and, arguably, of limited practical significance in most decisions rehabilitators must make. However, some acquaintance with scientific terminology can be a good tool: for example, knowing that the scientific

name for the raccoon is *Procyon lotor* may help you remember the frequently-used scientific term for the raccoon roundworm, which is *Baylisascaris procyonis*.

Individuals and Populations

Wildlife and population biologists and conservationists view animals as members of dynamic and interacting populations. This view de-emphasizes the role of individual animals and focuses on preservation of quality habitat and genetically-viable populations. Conversely, animal welfare advocates and members of the veterinary community most often focus on animals as individuals. This view does not incorporate the complex issues of long-term population persistence for animals in the wild. It is important for you to appreciate that both points of view are valid, because rehabilitators often are caught in the middle. It is also important for you to realize that returning individual animals to the wild will not solve the environmental problems faced by populations.

The degradation and destruction of wildlife habitats for the short-term benefit of a growing human population is by far the most significant threat to wildlife populations. Though very frequently the direct or indirect result of human activity, the majority of cases involving injury and death to individual wild animals are probably of little significance to the persistence of large populations of wildlife. However, large scale mortalities due to, for example, West Nile virus, lead poisoning, botulism, fowl cholera, or oil spills can threaten entire local populations of animals or even small populations of threatened and endangered species.

In the future, there may be increased interest in learning more about the fates of individual animals that have been rehabilitated and released, especially in the context of environmental difficulties such as oil spills that contaminate marine birds and mammals. Techniques for marking and tracking rehabilitated animals range from simple (e.g., aluminum foot bands for birds) to complex (e.g., radio transmitting and receiving equipment), but all of them require the cooperation of biologists or other professionals who are qualified and licensed to use particular techniques. Marking of rehabilitated animals also has considerable potential for improving our understanding of the fate of these animals and the impact of rehabilitation on the wildlife community.

Common and Rare Species

In most wildlife rehabilitation facilities, it is impossible to give the best possible care to every injured or sick wild animal that is presented. As a wildlife rehabilitator, you must decide which animals are likely to live, given the skill and technology you have at your disposal. Inevitably, people working with wildlife become drawn into discussions of why one species is more "important" or "valuable" than another. Importance is, of course, a subjective term. Some rehabilitators believe that each living creature is equally important. Others might assign a low importance to nonnative species such as the rock dove (pigeon) and European starling, or to the native herring gull, whose populations have mushroomed due to human alterations of the environment and whose numbers now threaten other species such as least terns. Rehabilitation of game species is considered by some an improper utilization of resources, as successful treatment and release may result in the animal's death during the next hunting season. But it can also be argued that, by honing one's techniques on more common species, one develops a high degree of skill that can be applied to rarer animals.

It is imperative that all rehabilitators consciously develop a set of standards and priorities that reflect their own philosophies, available facilities and the limitations of working in a field regulated by government agencies. Developing such standards will take time. However, the effort may be your key to success when dealing with a large-scale emergency situation.

Rabies Vector Species

Any mammal species can be a carrier (vector) of rabies; the wild animals most likely to be infected are raccoons, foxes, skunks and bats. Lagomorphs (rabbits and hares) rarely carry rabies, and rabies is rare among rodents with the exception of woodchucks. Some states do not allow the rehabilitation of rabies-vector species, and require any admitted into rehabilitation to be euthanized immediately. Other states authorize only a special class of rehabilitators to handle rabies vectors; typically, these rehabilitators must have the pre-exposure vaccination series, attend rabies-education workshops, and provide special housing for these species. Maine does not restrict the rehabilitation of species likely to carry rabies; it is up to you to decide whether you wish to take them in (some rehabilitators do not). If you do plan to handle these species, you should be well aware of the risks not only you to but also to your family, your volunteers, and anyone else who might come in contact with these animals. Become familiar with the symptoms of rabies (and how similar they can be to symptoms of other conditions). Talk with your physician about the possibility of getting the pre-exposure series. You should also talk with your local Health Department about the protocol for handling situations involving bites or other exposure to animal saliva.

What's Best for the Animal

It's important for all rehabilitators to be realistic about what they have to offer, especially in the early stages of their practice. If an animal's injuries are beyond your skills, it would be in the animal's best interest to transfer it to someone with more clinical experience and equipment. If your cages lack the size or specialized features that are important for a particular type of animal, it might be better to send it to someone who has a better facility for that species. Particularly in dealing with endangered or threatened species, each rehabilitator must consider whether another practice might be better equipped to maximize the chances of recovery for that individual animal. Please don't let your ego or possessiveness get in the way of giving any animal its best chance.

Releasability

Injured wildlife are treated, and orphaned wildlife are reared, with the express purpose of releasing them back into their natural habitats as soon as they are healthy and able to fend for themselves in the wild. No one wants to condemn a wild animal to life in a cage, nor do we wish to release severely disabled animals that will have little ability to compete and survive in the wild. It is important to constantly balance the likelihood of eventual releasability of an animal with an alternative of euthanasia.

A releasable animal must be able to fly, swim or run well enough to perform all the functions of a member of its species (i.e., find food, escape from predators, reproduce, migrate, etc.). Any animal that is tamed or imprinted is unlikely to breed successfully and may become a problem animal due to its lack of fear of people. A wild animal must be released in the proper habitat for any given time of year. It is also important to try to choose a location where competition or aggression from other members of its species will be minimal, to enhance its early survival. If the habitat itself has been damaged by some large-scale event (e.g., an oil spill), you should certainly release the animal elsewhere.

Releasing animals close to where they were found may be of particular importance with adult animals (they are most likely to have established territories and home ranges, and to have learned the local resources necessary for survival) and with social species, such as crows or wolves, that live in family units. You should also take into account the season -- nonmigratory species may be territorial year round, but migratory species would usually have territories only during breeding season. Release in the original location is less important for young animals of migratory species, or of species whose young

disperse over a large area. It is essential to remember that, in many cases, you cannot expect a rehabilitated animal to survive if you simply take it out into the woods and release it. Young animals or adults that have been in captivity for extended periods may need some sort of "half-way-house" support while they explore their surroundings, and figure out where to find food and shelter. Young predators, in particular, may take some time to develop their hunting/killing skills. Usually, providing food at the release site is sufficient, but the needs vary from species to species.

What if the Animal Can't be Released?

Often the kindest decision that can be made for injured wildlife is to opt for euthanasia early in the decision-making process. Remember, the purpose of treating wild animals is to release them to their normal, wild existence. Some nonreleasable animals may be placed in appropriate captive facilities. However, the decision to keep a wild animal in captivity for the remainder of its life (some animals are very long-lived) should not be made lightly. Captivity can be extremely stressful for wild animals, and death may often be preferable to having an animal live for an extended period while in terror of the people around it or chronic pain from an old injury. If you acquire a federal permit to rehabilitate birds, you will learn that federal regulations require euthanasia rather than placement for some types of injuries to birds.

Euthanasia of threatened or endangered animals can be a complex issue. In practice, state and federal officials often respect the clinical judgment of veterinary and rehabilitation professionals who possess the appropriate permits. However, you should contact the nearest Regional Headquarters of ME IF&W before euthanizing one of these species. After euthanasia, do not dispose of the body without state or federal approval. State or federal officials may wish to recover the entire cadaver.

Many schools, nature centers, museums and colleges would like to have dead wild animals for teaching, exhibit, or research. Rather than just disposing of dead animals (even common species), you might check around to see whom you can help. For example, dead loons are of great importance in an ongoing study at the Wildlife Clinic of Tufts University School of Veterinary Medicine on contamination by lead and other metals. Providing precise information about when and where the animal was found is important to scientists. In this way, you may be able to establish helpful relationships with other people interested in wildlife issues. But keep in mind that one of the conditions of your Maine Wildlife rehabilitator permit is that you can give dead wild animals only to individuals who themselves have a valid permit to possess them for educational or scientific purposes. Even giving away feathers is illegal. Further, under federal law, all dead eagles must be sent to the National Eagle and Wildlife Property Repository in Colorado (call 303-287-2110 for shipping instructions).

The decision to place a permanently nonreleasable animal in captivity should be based on three factors: facility, temperament and rarity. Such animals may only be given to individuals who have been issued valid state and federal permits to possess them for education or display. Determine if a permitted facility you are considering has the caging, expertise, etc. to give the animal proper care for a long period of time. Ideally, an animal in captivity will become part of an organized educational, breeding or research effort. The temperament of an individual animal must be suited to a life in captivity. Although such personality traits are difficult to assess for amphibians and reptiles, there is a great deal of individual variation among birds and mammals. Some high-strung wild animals will never adjust to life in captivity. They will be under constant stress from confinement and the presence of people and may exhibit stereotypical or self-destructive behaviors. It is not humane to condemn these individual animals to such a fate, and euthanasia should be given serious consideration. However, the rarer the species, the greater the effort that should be made to find that individual a suitable captive situation, and the more value that animal may have for breeding or research.

HUSBANDRY

Housing

The *Minimum Standards* booklet contains a summary of housing considerations, including tables of suggested sizes of cages for housing wild birds and mammals. These standards have been written into Maine law, so you should consult them before you start planning to build cages. Do note that you will need several different sizes of cage even for a single species: the cage size criteria are based on the medical (and age) status of the animal. Smaller cages are appropriate for animals that are younger and/or recovering from injuries. However, when a healthy, mature animal is nearing release, it needs more exercise; for these cases, it may often be beneficial to have much larger enclosures than those suggested in the guidelines as minimum sizes.

In addition to the size of an enclosure, there are many other factors to be considered. There is no such thing as a cage that is appropriate for all species of birds or mammals. In designing a cage, it is useful to have a specific type of animal in mind and talk to people who have worked with those species before. If outdoors, the cage must include an area that shelters the animal from the elements and provides shade during the hot summer months. In winter, fresh, ice-free drinking water should be available at all times for most species (an exception might be raptors, which obtain most of the water they need from their prey). Bird-bath heaters or heaters designed for outdoor dog bowls may be lifesavers in the winter. Discs that have been heated in a microwave (e.g., Snuggle-Safe™) hold heat for several hours, and may also be used to keep water bowls as well as foods from freezing.

Cages can be made of many materials, and what you choose depends on what species you wish to house. In general, wire caging is not appropriate for most birds and especially raptors, which will often damage their feathers and beaks by flying onto the wire to such a degree that they cannot be released. If wire is used in the construction of flight cages, a layer of netting should be added to the inside so that birds cannot come into contact with the wire. By contrast, however, many mammals often do well in wire cages. Upright portions of cages may be made of wood, metal, fiberglass or other materials. If a species tends to chew on its caging (rabbits, rodents, etc.), use nontoxic materials. The *Minimum Standards* booklet provides much more detail on cage design. The flooring of the cage must be made of something that can be cleaned. Concrete is easy to clean, but is very cold in winter and can be very hard on animals' feet. Soil or sand floors can be excellent, but the top few inches will become contaminated with feces and parasites and must be shoveled and/or sifted out regularly (how often will depend on how many animals of which species are housed in the cage -- you may need to replace the substrate weekly, or only a couple of times per year). Because of the dangers associated with the *Baylisascaris* parasite of raccoons, no other species should ever be housed in a cage that raccoons have occupied, with the exception of stainless steel cages that can be heat-sterilized with a blowtorch.

Cages must also afford psychological well-being for an animal. You must provide sight and sound isolation from things that might frighten and stress the animal. For example, exposure to people and pets needs to be minimized. You would never want to place a prey species (e.g., a rabbit) in a cage where it could see or hear one of its natural predators (e.g., a great-horned owl). Such exposure could literally frighten the prey animal to death, or provoke attempted attacks by the predator species.

Always keep in mind the risks from outside predators. It is likely that raccoons, foxes, opossums, owls and other predators and scavengers will wander about your cages at night. They would be only too willing to injure or eat one of your rehabilitating animals. Raccoons, in particular, can become quite adept at reaching into cages, pulling animals over to the bars, and crippling or killing them.

If you are going to house digging species (e.g., woodchucks, foxes, etc.), it is important to make sure that the walls of the cages extend well below ground level -- preferably 3 feet. It is also helpful to have the below-ground portion of the caging angle in towards the cage. Alternatively, the entire bottom of the cage could be wired (below the cage substrate).

Some animals require soft bedding, which prevents some pressure-type ulcers (bedsores) and can help insulate and keep the animal warm. Many materials are available, but it is important to avoid any that can unravel and become tangled around an animal's tail, limbs, tongue, digits, etc., which could cut off circulation and cause serious problems. Great caution must be exercised in using hay for bedding. Many wild animals are extremely sensitive to fungal respiratory diseases in captivity, probably because they are so stressed. Many aquatic birds and raptors are especially vulnerable. Mold spores are often abundant in hay, and if hay is used for bedding, many of your patients may die from the fungi. A good rule is never to bring hay into any indoor animal facility. Animals that need hay for food, such as ungulates, should be housed some distance from your other patients.

Disinfection

An important part of caring for captive mammals and birds is environmental sanitation. When there is the potential for zoonotic diseases, strict personal hygiene and good cage sanitation are essential. For most indoor cages and smaller outdoor cages, a prompt removal of all fecal material is important. Some larger outdoor cages (e.g., flight cages) may require less frequent cleaning, depending on the type and number of animals that occupy them. Washing your hands between handling of animals or cleaning of cages is also important.

Many types of disinfectants are available; most of them don't work if there is organic material present, so scrubbing clean prior to disinfection is required. Label instructions should be followed closely to ensure use of the proper dilution and safety to the animals. Animals should always be removed from cages prior to application of the disinfectant. These chemicals should be allowed to remain on surfaces (cages, dishes, etc.) for at least 10-20 minutes to allow maximum efficacy, then the solution should be rinsed away thoroughly with several rinses of fresh water. Many disinfectants can hurt animals if they aren't rinsed away completely. Also, many products are more effective when used in hot water. It's a good idea to read the label of any disinfectant and follow the manufacturer's recommendations for use.

There are several broad categories of disinfectants, including phenolics, halogens, quaternary ammonium compounds, and biguanides. An ideal disinfectant should have properties such as broad spectrum of activity (it kills many types of disease organisms), nonirritating, nontoxic to animals and humans, noncorrosive to surfaces, inexpensive, and not readily inactivated after application. Because no single disinfectant has all of these properties, different agents may be more suitable for individual situations. Ask your veterinarian what products he/she likes. The Minimum Standards booklet contains more information about specific disinfectants.

Nutrition

Wild animals eat many different kinds of foods. Some species are broad generalists – an omnivore eats a variety of foods, both plant and animal. Raccoons, bears, skunks, and robins are omnivores, as are people. Other species are more specialized however. Categories used to describe food consumption patterns are sometimes confusing, because the same terms have been used in different ways in different sciences. In one classical system, the term “carnivore” referred to an animal that ate other animals of any kind; an “herbivore” was an animal that ate plants of any kind. A more recent system that attempts to satisfy the concerns of biologists, nutritionists and botanists uses the term

“faunivore” for an animal-eater and “florivore” for a plant-eater. In this newer scheme, the major categories of faunivores include carnivores (which here are defined as eating primarily terrestrial vertebrates), piscivores (which eat primarily fish), and insectivores (which eat primarily insects). Florivores may be herbivores (in this scheme, eaters of mostly leaves, buds, shoots, grasses, etc.), granivores (eaters of mostly grains and hard seeds), frugivores (eaters of mostly fruits), or have even more refined specializations. As the terms “primarily” and “mostly” suggest, “specialization” is sometimes relative: many birds, for example, consume some insects and some fruits or seeds, and the proportions of each may vary both seasonally and with the age of the bird.

It is more important to know what foods are consumed by the species you rehabilitate than to know the precise scientific term to use for that particular food consumption pattern. But you should master a few basic definitions and recognize, for example, that one should not attempt to feed vegetables to a strict carnivore (like a mink or bobcat), or feed insects to a strict granivore (like an adult pigeon or a mourning dove). One of the reasons species identification is so important is that, without it, you won't know what to feed the animals in your care.

A great deal is known about the nutritional needs of wild animals, and many diets for captive wildlife have been published. However, one of the most important considerations about an animal's diet is whether or not the animal will eat the food you offer. Animals in captivity are often sick or stressed, and you may need to call more experienced rehabilitators to get tips on what stimuli will work to get a particular wildlife species eating. It is sometimes necessary to feed an animal through a crop or stomach tube (gavage) if it cannot eat by itself. Passing a feeding tube is not a difficult skill, but doing it incorrectly can get fluid into an animal's lungs and be fatal. Your veterinarian, or more experienced rehabilitators, will help you to learn the technique.

In general, adult animals are much easier to feed than babies. Adults have already acquired all their skills in obtaining food, and if you supply them with a balanced diet they will eat, you should have no problem. In addition, minor imbalances in nutrition are often of little importance with adult animals undergoing rehabilitation. The animals are not rapidly growing, and they will be in captivity for only a short period. Once you know what an animal eats in the wild, it is conceptually not too hard to craft a captive diet. Carnivores, for example, can be fed smaller vertebrates. But where will you get them? It is generally not a good idea to feed dead animals you find outside (such as road-kills) to your predators. First, it may be illegal to pick up dead animals without a special permit. Second, these dead animals may have been sick or heavily parasitized and may pass those problems along to your rehab animals. Further, animals that have survived being shot may have lead pellets or fragments in their tissues; if these are consumed by an animal in your care, lead poisoning could result. Mice, quail and other small animals may be purchased from suppliers (see *Appendix Five*), but they can be expensive. Surplus laboratory rodents are sometimes available, and can be stored in the freezer until you need them. Trappers may be able to provide reasonably-safe carcasses. Some mammal species (e.g., raccoons, foxes) can eat commercial dog foods and others (e.g., bobcats) can eat cat foods. Captive wild rabbits and rodents (e.g., squirrels) can be fed foods designed for domestic rabbits or laboratory rats, respectively. A variety of fruits and vegetables can be provided as a supplement, but should not be the sole foods utilized. Good quality alfalfa hay is an excellent source of nutrition for some animals (e.g., rabbits), but should never be used if it smells musty or moldy. If you're not sure what to feed an animal, talk to your veterinarian and to other rehabilitators.

As a general rule, an adequate supply of fresh, clean water should be available at all times. The water dishes must be shaped (in size, depth, etc.) so that individuals of particular species can drink from them. Weakened, sick, or bandaged animals must be watched closely--they may fall into their water

dish and be unable to get out and drown. A baby animal should not be given water dishes until it is mature enough to eat by itself.

The next issue is whether or not you are feeding the animal enough calories daily so that it can maintain itself and recover from its injuries. Assuming that the animal is getting the appropriate kind of food, the simplest way to assess if the animal is eating the right amount is to weigh the animal regularly. Small animals should be weighed every day or two; larger animals can be weighed less frequently. As you progress in your learning, you should learn how to calculate the daily caloric requirements for the species you rehabilitate; some of the basic sources in *Appendix One* (e.g., *A Flying Chance*) contain instructions for these calculations.

Other than caloric intake, it is critical that animals get enough calcium (Ca) and phosphorus (P) and that the Ca to P ratio is about 2:1 (i.e., there needs to be about twice as much calcium in the diet as phosphorus). If a diet contains either too little calcium in an absolute sense, or too much phosphorus relative to the amount of calcium, a nutritional problem called metabolic bone disease will result in bones that are deformed or prone to fracture. Muscle and organ meats (e.g., hamburger, chicken breast, liver, etc.) and also insects are examples of foods that have extremely high levels of phosphorus relative to calcium; calcium supplements in the appropriate amounts must be given to animals whose primary diet is either of these foods. Again, as you progress, you should learn to calculate the amounts of calcium and phosphorus; until you do, however, you should not try to formulate your own diets for wild animals. Young, rapidly-growing animals are the most sensitive to Ca:P imbalances, so getting their diets right is crucial (see "Orphans" section below).

Stress

Stressors are external influences that impel an animal to either attack what they perceive as threatening (or prey) or try to escape from what they perceive as threatening ("fight or flight"); they exert stress on the animal. Physiologically, a little stress may not be harmful, but animals in captivity are often subject to so many stressors that they can actually cause harm. For rehabilitators, there are two main things to worry about. The first is that, in trying to escape or avoid the stresses, the animal will injure itself or you. The second is that increased stress may make the animal less interested in food, and definitely makes the animal more susceptible to disease. Too much stress makes an animal's immune system function less well, and weakens its ability to fight off infection.

One of your main jobs is to do whatever you can to reduce or eliminate the stress on your wild patients. Stress reduction practices include such things as minimizing handling, providing sight barriers (so that the animals cannot see other animals or people), limiting noise (from radio, stereo, televisions, etc.) and talking, not allowing your dogs and cats within auditory or visual range of your wild patients, and giving medications in the food rather than handling the animal to give injections.

SPRING "ORPHANS"

Each spring, most rehabilitators are besieged with calls from concerned members of the public who have found baby animals. Handling these calls can take a lot of your time. But in the public's mind, you are the person in your community who knows and cares about animals. It is important that you give out correct information. If you can't, make sure that you can provide telephone numbers for nearby rehabilitators or other wildlife professionals who are willing and able to answer the person's questions. In fact, most of the young animals are not truly orphaned or in need of human help. But the

way in which you convey the correct information to the public is an important tool in public education and public relations.

In educating the public, you must often convince adults and children not to try to "rescue" most wild bird babies. Rehabilitators often hear people say, "I had to chase this bird for ten minutes before I could catch it to help it -- wow, could it run!" Somehow, you have to sensitively tell these people (who just spent a lot of time and effort to catch the bird and bring it to you for help) that catching the bird might not have been the best thing, and that now they must spend more of their time to put it back! People usually understand when you explain how hard it is to raise baby birds and that no human can do as good a job as the real parents.

The young of most bird species leave the nest before they can fly or feed themselves. Precocial species (e.g., killdeer, ducks and other waterfowl) are mobile and self-feeding even earlier. They leave the nest within hours of hatching and follow the mother about. Although these young may get separated from the parent(s), they are most often picked up by children or misunderstanding adults simply because the parent(s) ran or hid when the people approached.

Young of altricial species (songbirds, raptors, etc.) may leave the nest ("fledge") a week or more before they can fly. These fledglings hide under bushes or in shrubbery, or perch on low limbs of trees; periodically, the adult birds will fly to and feed them. It is usually these young robins, blue jays, etc. that children find and "rescue" in the spring. What people don't understand is that these birds are exactly where they are supposed to be and behaving in a normal way. If left alone, the parent birds will return to feed the young within a half hour or so. The finders may assure you that they watched for parents, but that no adult birds appeared. If you question them carefully, however, they'll often admit that they were "watching" quite close to the nest. It's hardly surprising that the adult birds would not visit the nest with these large predators nearby. In the great majority of cases, the appropriate action is to put the baby bird back exactly where it was found and go away. Any "watching" of the youngster should be from an unobtrusive distance, perhaps with binoculars. However, the caller must also be advised to keep the family cat(s) indoors for at least a couple of days -- until the bird begins to fly.

What about the situation in which a younger, unfeathered or partly-feathered bird (a "hatchling" or a "nestling") has fallen out of the nest well before it was ready to fledge? Assuming that it's active and not injured or hypothermic (very cold), the right answer is to put it right back into the nest as soon as possible. It is a myth that birds will smell your touch and reject the baby; birds have a very poorly developed sense of smell. If the caller can't find the nest, it may be okay to put the baby into another nest of the same species (if the young are not too much different in age); most adult birds will readily "adopt." Your local scout troops, nature centers and birdwatchers may be able to help you locate nests. This technique often works beautifully for hawks and owls as well as songbirds, and can greatly decrease your work-load and level of stress. However, putting several babies into a nest that already contains several might put too much of a strain on the parents, who may not be able to feed a clutch that has suddenly doubled in size.

If a nest with young has fallen out of a tree due to a storm or overzealous pruning, the nest can be secured back in the tree as close as possible to its original location (a few feet one way or the other won't matter). If the nest was destroyed, a reasonable substitute can be made by lining a wire frame or plastic berry basket with twigs and dry grasses (or whatever types of materials were used in the original nest), then securing this substitute nest in the tree, out of direct sunlight. Do not use a solid container like a plastic margarine dish, as it will collect water and drown the young.

Certainly, there are times when nestling or fledgling birds should be rescued. If a family or neighborhood cat that has discovered a fledgling cannot be kept inside until the bird is fully flighted, intervention may be called for. Of course, if a baby bird on the ground is cold, obviously injured, or if the caller is sure that the parent(s) is/are dead or have not tended the baby for a prolonged period, it should be retrieved and brought to you. If the finders cannot get the bird to you right away, they should be advised to put it in a warm, quiet place away from pets and children. Most young birds that are gaping (opening their mouths to solicit food) can safely be fed pieces of kitten or cat chow that have been soaked in water until they are soft. Baby birds should not be fed hamburger, bread, or milk.

Many of the same rules that apply to baby birds also apply to baby mammals. Most are not orphaned and can be put back where they were found. Some species are altricial (e.g., fox) and some are precocial (e.g., hare). They need to be kept warm and quiet, until they can be delivered to you.

Care of Young Birds

Birds have relatively high body temperatures (104-108° F), and without feathers, they cannot keep themselves warm. Room temperature is not warm enough unless the bird is a fledgling (i.e., quite well feathered and almost mature enough to fly). An incubator (such as is sold for raising baby parrots) may be a good investment, if you are going to regularly have unfeathered baby birds in your practice. A heating pad or an infra-red ceramic cone can also provide warmth (if there is a way to keep that warmth contained around the nestling), but may not provide the humidity that most young birds also need. Some other supplies (and suppliers) that you should have on hand are described in *Appendix Five*.

Most of the young birds received by rehabilitators are “passerines” – that is, birds in the Order Passeriformes, which means, literally, “sparrow-shaped.” Passerines are commonly referred to as “songbirds,” even though not all “sing” in the usual sense. Many captive diets have been described for young passerines, but not all of them meet the birds' nutritional needs. Regardless of the feeding strategy of the adult, most passerines feed their nestlings insects, which are high in protein but low in fat and carbohydrate. Recent research indicates that traditional rehabilitation formulas based on dog kibble with added baby cereal or egg do not meet the protein requirements of growing songbirds. Hand-rearing formulas for psittacines (birds in the parrot family) are also much too low in protein for most wild birds, despite claims on some product labels. A good songbird formula could be based on high-quality kitten kibble with extra protein from animal sources such as egg white or meat baby foods; the formula must also be balanced for calcium. *A Flying Chance* (see *Appendix One*) has an excellent discussion of passerine nutrition, and the *NWRA Principles of Wildlife Rehabilitation (2nd Edition)* has some nutritionally-sound formulas for young songbirds. Typically, passerines need to be fed all they will consume *at least* once per hour (younger birds should be fed more often) from dawn to dusk.

Nonpasserine species such as woodpeckers and swifts are also insect eaters and should be fed an insect-replacer formula such as described above. Pigeons and doves (Order Columbiformes) have very different nutritional needs, however. As hatchlings, they are fed a secretion from their parents called “crop milk,” which is very high in protein and fat but contains almost no carbohydrate. As the babies get older, their parents feed them increasing amounts of regurgitated seeds. Hatchling pigeons and doves in rehabilitation should be fed a crop-milk replacer such as the one described in *A Flying Chance*; nestlings should be fed a seed-replacer formula such as Kaytee Exact®.

If young birds do not gape (open their mouths) for food, you may be dealing with a species that doesn't normally gape (such as a dove); alternatively, the baby could be hypothermic or ill. If hypothermia is the problem, 15-20 minutes of gentle warming should markedly improve the activity and attitude of the nestling.

Syringe-feeding baby birds a thick liquid formula takes a little practice; you have to make sure you deliver small amounts of formula to the back of the mouth -- beyond the glottis -- so they do not inhale it. Wait for them to swallow before giving additional formula. Other techniques for feeding nestlings (e.g., from an artist's brush) may be quite messy, and excess formula must be cleaned from around the mouth of the bird. It is rarely necessary to give a healthy baby bird extra water; their food should provide all the necessary fluids. However, a nestling that has been on the ground on a hot day may be dehydrated by the time you admit it; in these cases, rehydration with electrolyte solutions such as Lactated Ringers® or Normasol® would be appropriate. Feeding tubes (which may be rubber, vinyl, or stainless steel) can be used to deliver fluids directly into the crop. One rule of thumb for crop capacity is the number of milliliters that is approximately 5% of the bird's weight in grams. Most small birds will defecate just after each feeding. The fecal material should be removed immediately to prevent the young bird from soiling itself.

Young raptors and waterfowl, particularly those younger than a week or two, present special challenges because of the potential for improper imprinting (see section below). It is in their best interest to be reared at a facility that has conspecific surrogate parents. Older nestlings may not be as likely to imprint improperly, but still benefit from being raised with conspecific adults. If you have to care for one of these orphans for a short time before transport can be arranged, a more experienced rehabilitator can explain proper feeding and handling procedures.

Care of Young Mammals

Although all baby mammals are fed milk, the composition of milks varies considerably among species both in terms of relative amounts of macronutrients (protein, fat, carbohydrate) and in terms of the percent of solids (the thickness of the milk). Cow's milk (including evaporated and condensed versions) and human infant formulas with soy protein do not meet the nutritional needs of infant wild mammals. Milk replacers for domestic puppies (Esbilac®) and kittens (KMR®) have been traditional rehabilitation formulas for, e.g., squirrels and raccoons, respectively. However, milk substitutes for a variety of wild mammals are now available in PetAg's Zoologic® Milk Matrix and also in Fox Valley's Day One® Formula Milk Replacers. For many species, these products offer better matches to the composition of mothers' milk than can be provided by milk substitutes formulated for dogs and cats. Charts showing recommended formulas, plus the amount and frequency of feeding based on the animal's weight, are available in sources such as *NWRA Principles of Wildlife Rehabilitation (2nd Edition)*. Sources for replacement milks and nursing supplies are given in *Appendix Five*.

Orphaned mammals should be weaned onto a balanced diet that is appropriate for the species. In many cases, commercial products such as dog (e.g., for raccoons) or cat (e.g., for bobcats) kibble, or rodent block or lab chow (e.g., for squirrels) form the best staple of the weaning diet because they are balanced for calcium. An animal that is weaned exclusively onto high-phosphorus foods such as muscle meats, insects, or nuts is at risk for metabolic bone disease unless calcium supplements (in the right amounts) are given.

It is important to remember that most baby mammals must be stimulated by the mother to urinate and defecate. After each feeding, the genital and anal area should be gently rubbed with a cloth or gauze pad moistened with warm water. This will stimulate the babies to urinate and defecate. Without such

stimulation, baby mammals sicken quickly and die. Under some conditions, a baby may need to be stimulated before nursing to empty its bladder; otherwise, it may not suckle. In general, stimulation will become unnecessary at about the time the animal opens its eyes -- but make sure the animal is eliminating on its own before you stop routine stimulation. Don't allow your pets to lick these wild babies.

Taming, Habituating, and Imprinting

It is well known that the more comfortable a wild animal is around people, the less likely it is to survive and function well in the wild. Wild animals that consistently seek out human contact will be hit by cars, shot, or considered pests. Naturally, you, as a rehabilitator, may be torn; one of the rewards of doing wildlife rehabilitation is getting to experience close contact with the animals, but the more inappropriate contact you have, the worse it often is for your charges.

Taming is a process by which wild animals learn not to fear humans, and possibly also to form some social attachment to humans. Habituation is a process by which an animal learns not to respond to stimuli to which it is frequently exposed without any particular consequences. Animals in rehabilitation may become habituated to the human activity around them. Because you will be in daily contact with the animals you rehabilitate, some taming and habituating may be unavoidable, particularly when you are hand-raising young birds or mammals. However, you should not allow animals in rehabilitation to become habituated to the presence of your pets, which may be predator species in the wild. You can avoid taming by making sure you raise animals with others of their own species, and by minimizing handling or exposure to people, especially once the young are feeding independently. Taming and habituation can be reversed by limiting exposure to humans as the animal nears release.

Imprinting is a process by which the young of some animals learn what species they are as a result of being exposed to the sights and sounds of their parents and their siblings. It occurs rapidly, during "critical periods" in development, and is considered irreversible (it persists for the life of the animal). True imprinting may not occur in young mammals, and some researchers believe that, among birds, it is a more rapid and powerful process in waterfowl and raptors than in passerines. In general, precocial species imprint much more rapidly and at a much younger age than altricial species.

Imprinting is a natural and normal process that is important to the survival of wild species, but problems can occur if animals imprint on inappropriate "parents." Improper imprinting can easily occur in rehabilitation; animals exposed to human caretakers during their critical periods learn that their "parents" are human and develop a human identity for themselves that persists into adulthood, when they may attempt to socialize and even mate with humans rather than with members of their own species. Although this may sound amusing, such animals are often killed, because unknowing people think they are being "attacked" by a wild animal. In addition, improperly imprinted animals are not effective members of their species because they cannot reproduce.

Taming and imprinting are separate processes. If a bird was raised by its parents through its critical period for imprinting, subsequent rearing by a human rehabilitator may result in taming (or habituation), but not inappropriate imprinting. Conversely, a bird that has been raised by humans during its critical period for imprinting may, if subsequently given very limited contact with people, become wild. But human imprinting will become evident in the breeding season, when the bird will display courtship and mating behaviors toward people.

Intentionally or unintentionally taming or imprinting wild animals to humans is not appropriate and should not be allowed to occur in your rehabilitation practice. A human-imprinted animal is not releasable; because of the limited opportunities for placement, most of these animals must be euthanized. Imprinting to humans can be avoided by making sure that the young of species that are particularly prone to imprinting (owls, for example) are raised in the company of adults or at least other youngsters of their own species. Some centers in Maine that have permits for permanent residents remove these animals from display or the program circuit during "baby season" so that they can be surrogate parents for youngsters.

Regardless of the importance of imprinting for a given species, being properly socialized can make the difference in the eventual outcome for that animal. Some novice rehabilitators may initially think it's "cute" to have the tame blue jay they raised riding around on their shoulders after its release, but they often learn the hard way (e.g., when the bird was shot by a neighbor who noticed it "acting funny" and was afraid it had a disease) that a bird like this does not have the behavioral skills necessary to survive after release. If you admit a single orphan, ask around and find out who has others; someone might be willing to give you another orphan of the same species, or you could give yours to the other rehabilitator (in trade, perhaps, for another animal). *ReMaine* Wild has an electronic "singles service" that can help you locate other orphans.

REPTILES

The reptiles most frequently admitted to rehabilitation in Maine are turtles; the two most common are painted turtles and snapping turtles. Painted turtles have a smooth carapace (top shell); they get their name from the red and yellow stripes that run longitudinally from neck to nose, and from the red pattern along the margin of the carapace. Snappers may be recognized by the prominent jagged edge along the rear of the carapace and their tendency to bite or "snap." The tail of a snapping turtle is usually at least as long as the carapace, and has a saw-tooth-shaped bony ridge. Large snappers can be safely picked up by grasping the carapace at the rear, with one hand above each back leg (pointing the head away from you). Alternatively, they can be gently pushed into a box.

The most common reason for a turtle coming into rehab is that it has been hit by a car. Turtles may be crossing a road for a variety of reasons, but many cases are females looking for a place to lay eggs. If a female carrying fertilized eggs is killed, her eggs may remain viable for several hours. A more experienced rehabilitator or herpetologist (biologist who studies amphibians and reptiles) can coach you through the removal and incubation process.

If a turtle is admitted with a cracked shell, pick out debris and gently clean the area. Minor cracks can heal on their own; major cracks should be repaired by someone more experienced. Shell repair should be postponed until danger of infection is past; pack antibiotic ointment into the cracks and cover them with Tegaderm® for at least the first few days. Change the dressing regularly, and make sure there are no maggots in the wounds.

Painted and snapping turtles are both aquatic turtles; they will not eat unless their heads are underwater. Injured turtles may be placed in a container with water just deep enough to cover their heads for a few hours each day to drink and feed (they may be offered commercial turtle foods, mealworms, or small fish); otherwise, they should be kept warm and given opportunities for exposure to ultraviolet light. If possible, a recovered turtle should be released in its home lake or pond.

Learn to recognize painted and snapping turtles; if an escaped exotic species comes into your practice, it should not be released. Note that several turtle species are endangered or threatened in Maine (see *Appendix Four*); be sure to notify ME IF&W if any of these are admitted.

TRIAGE AND FIRST AID

Triage is the process of sorting out the medical priorities of your patients to decide which cases will be treated first (because their injuries are urgent and life-threatening), which can be treated later (because their injuries are minor), and which will not be treated at all (because their injuries are too severe to be repaired). As hard as it is, you will occasionally have to make conscious decision not to treat a problem, or even euthanize an animal, because there are other higher priorities. Volunteering at an established facility is the best way to gain experience regarding (a) the kinds of injuries that will render an animal nonreleasable no matter how expert the care, and (b) how best to treat injuries from which an animal may recover.

When you admit a wounded animal, it is always tempting to treat the most visible injury right away. However, in reality, a broken limb or even a fairly large wound is not often immediately fatal. In many cases, the best initial treatment might be to simply put wounded animals in a quiet and relatively dark place, where they can recover from the stress of being captured and transported, before you treat their injuries. Some conditions do need to be dealt with right away, though. Major bleeding must be stopped; manual pressure directly over the wound (ideally, with a sterile bandage between your hand and the wound), will usually make bleeding stop within a couple of minutes. The other problem that requires immediate attention is shock, which would be suspected if the animal is cold, immobile, and its gums and the mucous membranes on the inside of its mouth are much whiter than normal. Animals in shock, or at risk for shock, need to be warmed and given electrolyte fluids such as Normasol®, Lactated Ringers®, or unflavored Pedialyte®. Beginners will most likely know how to deliver fluids only orally, through a feeding tube (make sure you have been shown and have practiced this technique on cadavers before you try it on one of your patients). As you progress in your skills, you will learn how to administer subcutaneous or even intravenous fluids; these deliveries are preferred if an animal is in shock.

Use common sense when you treat wounds. Don't touch open wounds with ungloved hands; the bacteria on your skin can cause nasty infections. Any open wounds need to be covered with moist, sterile dressings (you can use warmed, sterile saline to wet the gauze and apply antibiotic ointments to the wound before you bandage it).

The animal must be handled in such a way that its injuries don't become any worse. Don't apply force to fractured limbs; immobilize them with flexible wraps such as VetWrap® or CoFlex®. If there is an open fracture (the broken bones are protruding through the skin), the exposed bone ends must be kept moist; pack them with antibiotic ointment and bandage them before you wrap the limb. As you progress in your skills, you will learn how to palpate (feel) limbs for closed fractures, and how to splint broken bones into the position required for healing. But this is not something you'll want to attempt as a beginner. Until you learn the proper procedures, it's best to simply keep the animal in a darkened, warm, quiet location for an hour or two until a more experienced rehabilitator or your veterinarian can examine it.

Animals that are emaciated (starving) almost always need to be warmed. They should not be given solid food right away. An emaciated animal is in a catabolic state; the patient is deriving energy from

stored reserves or, in extreme cases, from muscle mass. If food abruptly shifts the patient's physiology to an anabolic state (in which energy is available from ingested nutrients), it will precipitate a clinical condition called Refeeding Syndrome. This potentially fatal condition is characterized by derangements in electrolytes and fluid balances as well as multi-system, multi-organ dysfunction. Emaciated animals should be given fluids first, then ramped up to simple foods – e.g., commercial human liquid diets such as Ultracal®, Isocal®, and Ensure® (vanilla flavor is the safest). Some animals, such as strictly faunivorous birds and mammals, may lack the digestive enzymes necessary to assimilate sucrose, a complex sugar. A better choice for them might be another human product called Vital High Nitrogen®, which contains more simple sugar and less sucrose than other products. Gradual introduction of solid foods is the final step in the process. Rehydration and emaciation protocols are things you will learn as you become more advanced; in the beginning, it would be best to transfer an emaciated animal to a veterinarian or more experienced rehabilitator, and ask them to teach you the appropriate steps to follow.

ZOONOTIC AND EPIZOOTIC DISEASE

Wildlife are susceptible to a number of diseases, some of which may be spread to humans. A good discussion of many diseases may be found in the Veterinary Section of the *NWRA Principles of Wildlife Rehabilitation (2nd Edition)*; only a very brief overview will be presented here. Zoonotic diseases that may affect wildlife rehabilitators include Lyme Disease (spread by a tick from reservoirs such as mice and deer), Aspergillosis (caused by a fungus particularly common in the respiratory systems of aquatic birds) and Tularemia (caused by bacteria common in rabbits). Two additional zoonoses of which rehabilitators must be particularly mindful are rabies and visceral larval migrans.

Rabies

Rabies is caused by a virus; all mammals can transmit the disease, but the major reservoirs are foxes, skunks, raccoons, bats and coyotes. Animals that are rarely infected include deer, lagomorphs (rabbits, hares), and rodents with the exception of woodchucks. Because birds are not mammals, they are not susceptible to rabies. Never forget, however, that even a low-risk mammal may have rabies (e.g., a fawn admitted with wounds could have been bitten by a rabid coyote). Birds and reptiles are not considered susceptible to rabies. Transmission typically occurs when the saliva of an infected animal contacts the nerve tissue of another animal -- most often by a bite, but possibly through cuts on human hands. Rabies is very difficult to diagnose in an animal by symptom picture: the signs may include unusual disposition (which could manifest either as atypical aggressiveness or friendliness), increased salivation, poor coordination, and paralysis. However, neurologic signs that resemble those of rabies are found in other wildlife diseases, such as distemper, larval migrans, and lead poisoning. Definitive diagnosis requires post-mortem examination of brain tissue. Rabies is considered to be 100% fatal in humans. People who plan to rehabilitate rabies-vector species should talk with their local public health official, their veterinarian, and their personal physician about issues such as risk of exposure to members of the public (who might try to capture an infected animal) as well as to rehabilitators, proper protocol for reporting and treating bites (or other contact of saliva with unprotected skin), and the possibility of pre-exposure vaccinations.

Visceral Larval Migrans

This is a condition that results when the eggs of certain animal parasites are shed in feces and subsequently ingested by another species; when the eggs hatch, their larvae penetrate the digestive tract and migrate to other bodily systems, where they can cause damage that may be fatal. The most widely-known agent is the roundworm parasite of raccoons, *Baylisascaris procyonis*. Although

prevention may seem very straight-forward (do not ingest raccoon feces!), it must be kept in mind that the eggs remain viable for extraordinary lengths of time and despite conventional cleaning and decontamination procedures. A cage that has once housed raccoons should not be used subsequently for any other species.

West Nile Virus

WNV produces illness primarily in birds. Although it is widely agreed that this epizootic disease is spread among birds by mosquitoes, other means of transmission are possible (infected birds may shed virus in saliva and feces). WNV has been identified in over 100 species of birds, with those in the corvid family (crows, blue jays) being particularly susceptible. Among raptors, great-horned owls and red-tailed hawks seem to have been affected in large numbers. Mammals (including humans) may also be infected, but are less likely to become ill and generally do not accumulate sufficient virus to be infective.

WNV causes encephalitis (inflammation of the brain). If a high-risk bird demonstrates neurological dysfunction in the absence of evidence of injury, then WNV should be suspected, particularly if body temperature is elevated. Other signs include anorexia and weight loss, excessive sleeping, head tremors, lack of awareness of surroundings, ataxia, and seizures. Some infected birds recover with supportive care (fluids, good nutrition, and warmth). Information about WNV is growing as rapidly as the virus is spreading; rehabilitators should consult professional websites that are updated frequently (see *Appendix Two* for suggestions).

GLOSSARY

- Acute: happens suddenly
- Accipiter: genus and common name of type of a diurnal raptor (the true hawks) that has short rounded wings and long tails, with flight specialized for maneuvering through trees; mostly bird-eaters
- Altricial: bird hatched in helpless condition, usually naked, eyes closed, cared for by parents in nest
- Anemia: deficiency of red blood cells, characterized by weakness and pale mucous membranes
- Anesthetize: produce a local or general insensibility to pain by drugs
- Anorexia: lack of appetite
- Antiseptics: chemical agents applied to living tissue (such as wounds) to prevent growth of microorganisms
- Apnea: cessation of breathing
- Aspirate: to inhale fluid into bronchi and lungs
- Ataxia: incoordination or lack of controlled movements
- Autecology: the natural history of a species, or the ecology of an individual, breeding pair, etc.
- Bactericide: chemical agents that kill bacteria
- BID: twice daily; every 12 hours
- Brancher (slang term): young bird not fully fledged, out of nest and hopping on branches
- Brood: birds hatched from single clutch of eggs; also, a verb meaning to provide warmth and shelter for young birds
- Bumblefoot: foot abscess sometimes seen in raptors (and other types of birds)
- Buteo: genus and common name of a diurnal raptor (also properly called “buzzards” though referred to as hawks in common usage) with long broad wings and short tails, with soaring flight; mostly rodent-and herptile-eaters
- Candidiasis: infection by fungi of the genus *Candida*; also known as “thrush”
- Carapace: the dorsal shell (top) of a turtle
- Carnivore: in some dietary pattern schemes, an animal that eats other animals of any type; in other schemes, an animal that eats terrestrial vertebrates
- Carrion: dead and decaying animals
- Carrying capacity: estimate of the population size of a species that can be supported by a specified area of a fairly stable habitat
- Cast: undigested parts of prey (hair, bones, claws, teeth, etc.) eaten by raptors, which are egested (regurgitated) in the form of a pellet [also see "pellet"]; also used as a verb ("cast a pellet")
- Cere: fleshy base of upper mandible in some birds (raptors, pigeons)
- Cestodes: flatworm parasite; tapeworms are cestodes
- Chronic: continuing for a long time
- Closed fracture: when the bone at the fracture site has not broken through the skin
- Clutch: the eggs laid in a single nesting
- CNS: central nervous system
- Comminuted fracture: fracture in which the bone is splintered into more than two pieces
- Community Ecology: ecological study of groups of species populations
- Conspecifics: other individuals of the same species
- Coprophagy: ingestion of their own feces; this is normal and necessary in rabbits and some rodents
- Crepuscular: animals that are most active around dusk and dawn
- Crop: an enlargement of the esophagus in the neck area in some birds; a temporary food-storage area

Cyanotic: bluish/purple color of mucus membranes due to low oxygen levels in the blood

Dehydration: state of deprivation of water

Disinfectants: chemical agents applied to inanimate objects or surfaces to kill disease causing microorganisms; this includes bacteria, fungi and at least some viruses

Dispersal: movement of individual animals from where born to the site of first breeding (not necessarily migration)

Distal: away from the center of the body (e.g., in a distal fracture of the femur, the fracture occurs in section of femur farthest from the hip)

Diurnal: animals that are most active during the daylight hours

Dorsal: pertaining to, or situated on, the back

Ecology: the scientific study of the interactions that determine the distribution and abundance of organisms

Ectoparasite: parasite found on the outside of the body (e.g., fleas, lice)

Edema: swelling or thickening caused by fluid leaking from blood vessels

Emaciated: thin, starved

Endoparasite: internal parasites (most types of worms)

Enteric: pertaining to the intestines or gastrointestinal tract

Epizootic: disease that rapidly spreads and affects many animals (essentially, an epidemic)

Ethology: the study of the behavior of animals

Euthanize: to put to death humanely

Fever: elevation in body temperature due to disease

Fledgling: a baby bird that has matured sufficiently to leave the nest; however, still may not be able to fly

Frugivore: animal that eats primarily fruit

Fungicide: chemical agents that kill fungi

Gavage: force feeding through a flexible tube placed down the esophagus

Germicide: a broad term applied to chemical agents that kill microorganisms

Gestation: time period from conception to birth of young mammals

GI: referring to the gastrointestinal tract through which food passes

Gizzard: muscular portion of stomach in birds; specialized for grinding food

Glottis: opening to the trachea

Granivore: animal that eats primarily grains and hard seeds

Habitat: the native environment of an animal

Hacking: a technique for gradually returning animals to the wild; usually involves making food available to newly-released animal [see also "soft release"]

Hatchling: a newly hatched baby bird (or one no more than a few days old)

HBC: hit by car

Hemorrhage: bleeding (usually refers to profuse bleeding)

Herbivore: in some dietary classification schemes, an animal that eats plants of any kind; in another scheme, a plant-eating animal that feeds primarily on leaves, buds, shoots, grasses, etc.

Herpetology: the study of amphibians and reptiles

Home range: area of general movement and activity of an individual animal; not the same as territory

Hyper: more than normal

Hyperthermia: having an abnormally elevated body temperature, usually from being kept in too warm an environment and not being able to cool itself adequately; not the same as fever

Hypo: less than normal

Hypothermia: having an abnormally low temperature; such animals should be warmed before any food is given

Hypovolemic: abnormally low blood volume

Immature: usually refers to animals that are old enough to be independent of their parents, but not yet old enough to reproduce

Imping: repairing of damaged feathers using undamaged feathers from another bird

Imprinting: process usually occurring early in a bird's life in which the bird learns to identify with and relate to its parental species

Incubation: the action of warming eggs to the temperature necessary for embryo development

Indigenous: originating in, found only in, and characteristic of an area of reference; not the same as native

Insectivore: animal that eats primarily insects

Juvenile: young bird out of the nest and able to care for itself but that has not completed its post-juvenile molt

Kcal (or kilocalorie, or Calorie): an energy unit equivalent to 1000 calories (the "calorie" on most food labels refers to Calories = Kcal)

Keel: the protruding part of a bird's breastbone (sternum) to which the large flight muscles attach

Lagomorph: members of the order *Lagomorpha* (rabbits and hares)

Lateral: denotes a position towards the side of the body

Litter: a group of young mammals born together

Mammalogy: the study of mammals

Marsupial: pouched mammals (kangaroo, opossum, etc.)

Medial: situated towards the midline of the body

Nares: nostrils

Native: found naturally (without human intervention) in area of reference; not the same as indigenous

Necropsy: autopsy or post-mortem; an examination of the body after death

Necrosis: death of individual cells or a localized area (decay)

Nematodes: unsegmented worm with cylindrical body, often parasites

Neonate: a newborn

Nestling: a baby bird too young to leave the nest, still dependent on parents, often unable to maintain its body temperature without parents incubating

Nocturnal: animals that are most active at night

Omnivore: an animal that eats both animals and plants

Open fracture: bone at the fracture site has broken through the skin

Ornithology: the study of birds

Parasite: an animal that gains some advantage by living on or in another species

Parenteral: term used for the delivery of medications by routes other than oral; e.g., subcutaneous, intramuscular or intravenous

Paresis: severe weakness or partial paralysis of a limb

Passerine: birds belonging to the Order Passeriformes (literally, "sparrow-shaped"); largest order of birds (more than 5000 species); passerines are also sometimes referred to as "song-birds"

PCV: packed cell volume, volume of red blood cells in blood

Pectoral muscles: one of two sets of major flight muscles in birds, breast muscles

Pellet: roundish mass of bone and fur egested (regurgitated) by raptors [also see "cast"]

Peristalsis: contraction and relaxation of GI muscles forcing food downward

Photoperiod: the proportion of hours of light to hours of darkness in the daily cycle

Piscivore: animal that eats primarily fish

Plastron: the ventral (bottom) shell of a turtle

Plumage: entire feathery covering of a bird

Population ecology: the ecology of a group of individuals of one species living in a specified area

Precocial: birds that leave the nest soon after hatching, usually have strong legs, open eyes and are more responsive to external environment (quail, ducks, killdeer, etc.)

Predator: an organism that kills and eats other organisms

Preening: use of the bill or beak to clean and align feathers

Proventriculus: portion of a bird's stomach that partially digests food before it moves to the gizzard

Proximal: close to the body (e.g., a proximal fracture of the humerus is a fracture of the section of the humerus close to the shoulder)

Rodent: member of the order *Rodentia* (includes rats, mice, squirrels, beavers, porcupines).

QID: four times daily; every six hours

Radiograph: x-ray

Raptor: animal with taloned (raptorial) feet that are used to kill prey

Rehab: a slang term used for anything related to wildlife rehabilitation

Refeeding Syndrome: a clinical condition characterized by electrolyte and mineral imbalances; occurs when nutrients are introduced prematurely to an emaciated patient

Rehydration: the process of restoring body fluids to normal levels

Roost: sleep; also used as a noun to mean location where birds congregate to sleep

Septicemia: invasion of bacteria in the blood stream

Shock: collapse of circulatory function due to severe blood loss, toxins, etc.

SID: once daily; every 24 hours

Soft release: slow, gradual release of animals back into the wild [also see "hacking"]

Sterilization: process of complete destruction of all forms of microbial life

Talons: specialized claws of a raptor

Territory: any area defended by an animal, pair of animals, pack, etc.

Thermoregulate: an animal's ability to maintain its normal body temperature

Thiamine: vitamin B₁ (should be supplemented in birds that are fed dead fish)

TID: three times daily; every eight hours

Trachea: passageway of air to and from lungs for breathing

Trematodes: parasitic flatworm with suckers (synonymous with fluke)

Triage: process of setting medical priorities -- deciding what cases should to be treated immediately, later, or not at all (because they cannot be helped)

Trichomoniasis: disease of upper digestive tract of bird caused by the protozoan *Trichomonas gallinae*; also known as "frounce" or "canker"

Tube feeding: same as "gavage"

Uropygial gland: oil gland above the base of the tail in most birds

Vaccination: injection of a preparation of killed or altered microorganisms that is intended to provide immune system protection from an infectious disease or parasite. Modified live vaccines are produced by chemically altering the microorganism so it is no longer capable of producing disease. Because the microorganism is still living, on occasion, some modified live vaccines have produced disease in vaccinated animals. Killed vaccines cannot produce disease, but often may not be as effective at stimulating the immune system.

Ventral: pertaining to the belly or underside

Virucide: chemical agent that kills viruses

Weanling: a young mammal that is of the appropriate age to begin eating solid foods

Zoonoses: diseases of animals that may be transmitted to people

APPENDICES

Appendix One: Organizations

ReMaine Wild is Maine's state organization for wildlife rehabilitators and associated professionals. For membership information, write to ReMaine Wild, P.O. Box 113, Newcastle, ME 04553 or contact one of ReMaine Wild's co-chairs, Lynne Flaccus (lflaccus@chewonki.org, 207-882-7323) or Kate Ziminsky (kziminsky@hotmail.com, 207-837-2725). ReMaine Wild's website may be found at www.remainewild.org.

Two other organizations have national/international memberships; both publish peer-reviewed journals as well as newsletters, and both sponsor yearly conferences. They are:

National Wildlife Rehabilitators Association
(NWRA)
14 North 7th Avenue
St. Cloud, MN 56303-4766
phone: 320-259-4086
e-mail: nwra@nwrwildlife.org
website: www.nwrwildlife.org

International Wildlife Rehabilitation Council
(IWRC)
P.O. Box 8187
San Jose, CA 95125
phone: 408-271-2685
e-mail: iwrc@inreach.com
website: www.iwrc-online.org

Appendix Two: Sources of Information

New information of value to rehabilitators is published every day. To stay current, read the publications of the organizations listed in Appendix One. The websites of NWRA and IWRC have listings of their publications, including articles published in their journals. Another publication for rehabilitators is *Wildlife Rehabilitation Today* magazine. The resource page at its website (www.wildliferehabtoday.com, referred to below as "WRT") has excellent listings of new books as well as older classics.

BASIC REHABILITATION

In addition to the references listed below, several other guides to general rehabilitation may be found on the WRT website; however, not all of them have not been revised recently and some contain information that is out of date. The *NWRA Principles of Wildlife Rehabilitation (2nd Edition, 2003)* is, at this time, the most up-to-date description of basic and general information about rehabilitation. The IWRC text accompanies a basic skills course, but can be ordered independently of the course. For those who wish to rehabilitate passerines, Eilertson & MacLeod's *A Flying Chance* (2001) is an excellent source. At present, there is no general mammal counterpart to *A Flying Chance*. However, many books or booklets on individual mammal species (squirrels, skunks, foxes, etc.) may be found on the WRT website.

Moore, A. & Joosten, S. (Eds.) (2003) *NWRA Principles of Wildlife Rehabilitation* (2nd edition). Available through NWRA.

White, J. (1996). *IWRC Basic Wildlife Rehabilitation IAB*. Available through IWRC.

Eilertson, N. & MacLeod, A. (2001). *A Flying Chance: A Manual for Rehabilitating North American Passerines*. Phoenix, AZ: East Valley Wildlife. [Note: As of 2004, this text has been sold out of its first printing; however a revision is in progress, and a new edition should be available through WRT and The Squirrel Store in 1995.]

ADVANCED REHABILITATION AND VETERINARY REFERENCES

Many such texts are available; they tend to be oriented toward particular species or groups of species, and they are often fairly expensive. As a beginning rehabilitator, you will not want or need to purchase them now. However, you will see references to more advanced and specialized texts in the basic sources, e.g., the chapters of the *NWRA Principles*. As you become more experienced and decide on the species in which you will specialize, you will build your library accordingly.

FIELD GUIDES & NATURAL HISTORY

Many field guides are available, some as part of a series offered by a particular organization or publisher. Most field guides are intended to be identification manuals, and contain little information on the biology or ecology of individual species. In addition to the general sources listed below as suggestions, rehabilitators should consider consulting individual species accounts published by professional organizations, such as *The Birds of North America* series (listed below under the editorship of A. Poole) and the *Mammalian Species Series* (listed below under the American Society of Mammalogists).

Alsop, F. (2002). *Smithsonian Handbooks Birds of New England*. New York: DK Publishing.

American Society of Mammalogists (1969-2003 [ongoing series]). *Mammalian Species Series*. Individual monographs may be downloaded; go to www.mammalsociety.org and follow prompts to PDF files for the series.

Baichich, P. & Harrison, C. (1997). *A Guide to the Nests, Eggs and Nestlings of North American Birds, 2nd edition*. NY: Academic Press. Available through WRT

Burt, W. & Grossenheider, R. (1980). *A Field Guide to the Mammals (North America north of Mexico), 3rd edition*. Peterson Field Guide Series. NY: Houghton Mifflin.

Conant, R. (1958). *A Field Guide to Reptiles and Amphibians*. Boston, MA: Houghton Mifflin Co.

Hunter, M., Calhoun, A. & McCollough, M. (1999). *Maine Amphibians and Reptiles*. Orono, ME: University of Maine Press.

Martin, A., Zim, H. & Nelson, A. (1951). *American Wildlife and Plants: A Guide to Wildlife Food Habits*. NY: Dover Publications. Available through WRT; also can often be found in used bookstores.

Poole, A. & Gill, F. (Eds.) (1992-2003 [ongoing series]). *The Birds of North America*. Philadelphia, PA and Washington, DC: The Academy of Natural Sciences and The American Ornithologists' Union. The complete series is available at most university libraries. Individual monographs may be purchased from Buteo Books (www.buteobooks.com).

Sibley, D. (2000). *National Audubon Society The Sibley Guide to Birds*. New York: Alfred A. Knopf.

Sibley, D. (2001). *National Audubon Society The Sibley Guide to Bird Life and Behavior*. New York: Alfred A. Knopf.

Stokes, D. & Stokes, L. (1986). *A Guide to Animal Tracking and Behavior*. Boston: Little, Brown & Co.

Whitaker, J. (1980). *National Audubon Society Field Guide to North American Mammals*. NY: Alfred A. Knopf.

CATS INDOORS

Information about the Cats Indoors Campaign may be found at the website for the American Bird Conservancy (www.abcbirds.org) or by calling 202-452-1535.

INTERNET

The *ReMaine* Wild list was created specifically for Maine wildlife rehabilitators and associated professionals as a place to share questions and concerns about caring for the wildlife of Maine. To subscribe, contact ReMaineWild-owner@yahoogroups.com.

The Wildlife Rehabilitation Mailing List is an internet list server dealing with wildlife rehabilitation. Information about subscribing can be found at www.tc.umn.edu/~devo0028/wlrehab.htm

Wildlife-International is a website containing peer-reviewed information for wildlife professionals. This site is an exception to the rule of “no quality control over internet material.” It is located at: www.wildlife-international.org

The National Wildlife Health Center has a great deal of information about current issues and diseases; it may be found at: www.nwhc.usgs.gov

Appendix Three: Wildlife Rehabilitation Permit section of ME IF&W Regulations

Maine’s regulations for wildlife in captivity have already been sent to you with your application for a rehabilitation permit. Although rehabilitators are governed by the general provisions of these regulations, the section reprinted below deals specifically with rehabilitation.

Part IV. Wildlife Rehabilitation Permit

7.40 Issuance: Pursuant to Title 12 MRSA §7235-C, a wildlife rehabilitation permit may be issued to possess debilitated or orphaned wild animals and wild birds for the purpose of restoring them to full health and release to the wild, or to be humanely euthanized.

1. Examination: Applicants for a rehabilitation permit must successfully complete an examination prescribed by the Commissioner, which may include a written test, to show proficiency and knowledge in the area of wildlife husbandry and rehabilitation and the pertinent laws of the State and rules of the Department.

2. Expenses: The permittee is responsible for rehabilitation, including food and shelter, veterinary care, any labor or consultation charges, transportation, and any other costs or charges associated with

the rehabilitation of wildlife. Permittees may not charge any third party for such costs unless said permittee is a licensed Maine veterinarian. Voluntary contributions to rehabilitation facilities or organizations may be accepted.

3. All rehabilitation activities must meet minimum standards as published by the International Wildlife Rehabilitation Council, and/or National Wildlife Rehabilitation Association.
4. Dependency: Every measure shall be taken to prevent wildlife dependency on humans.
5. Disposition of all Wild Animals or Birds Subject to Rehabilitation: All wildlife subject to rehabilitation must be released to the wild at the earliest appropriate time, or humanely destroyed, and may not be kept in captivity beyond 6 months. The Commissioner may, upon request, extend this time period.

Appendix Four: Species Endangered or Threatened in Maine

Maine Endangered Species: Golden Eagle, Peregrine Falcon, Piping Plover, Roseate Tern, Least Tern, Black Tern, Sedge Wren, American Pippit, Grasshopper Sparrow, Blanding's Turtle, Box Turtle, Black Racer Snake.

Maine Threatened Species: Bald Eagle, Razorbill, Atlantic Puffin, Harlequin Duck, Arctic Tern, Upland Sandpiper, Northern Bog Lemming, Spotted Turtle, Loggerhead Turtle.

Federally Listed Endangered or Threatened Species, currently or historically occurring in Maine but not listed under Maine's Endangered Species Act: Eskimo Curlew, Gray Wolf, Eastern Cougar

Appendix Five: Basic Supplies and Suppliers

FOOD AND FEEDING

- Replacement Fluids for Dehydrated Animals (Electrolyte Solutions): Lactated Ringers® or Normasol R® can be obtained through your vet; unflavored Pedialyte® can be purchased in any pharmacy.
- Liquid Diets for Emaciated Animals: Products such as Ultracal®, Isocal®, and Ensure® are available in any pharmacy; vanilla flavor is the safest. Note, however, that some animals lack the digestive enzymes necessary to assimilate complex sugars such as sucrose. A more expensive but higher-quality alternative is Vital High Nitrogen®, a partially hydrolyzed (essentially, "predigested") product containing less sucrose (and more simple sugar) than other products. Vital HN® is available through The Squirrel Store. Other products that may be considered for some species are available through your veterinarian: Hills a/d® and Eukanuba MaxCal®.
- Feeding Syringes: O-ring syringes last the longest; they are available through The Squirrel Store and MedCare.
- Feeding Tubes: Flexible tubes that fit onto syringes to deliver fluids or liquid diets can be delivered directly into the crop or stomach; available through Upco. Also, for birds, curved stainless-steel tubes

with small ball tips for safety (sometimes called feeding "needles") come in a variety of sizes and last forever; made by LaFeber; also available through Pet Warehouse.

- Calcium Carbonate: Important ingredient in home-made formulas and foods to bring the calcium:phosphorus ratio to the 2:1 required for growing bones and to balance the phosphorus in foods such as insects, muscle meats and nuts. Available through health food stores (e.g., Now® brand).
- Mammal Nursing Supplies: Catac® nipples fit onto syringes or bottles for feeding small orphaned mammals; available through The Squirrel Store. Nursing bottles, syringes, etc., are available through The Squirrel Store and Upco.
- Milk Replacers for Mammals: Zoologic Milk Matrix®, available through PetAg; Day One® Milk Replacers, available through Fox Valley. Milk replacers are also available through The Squirrel Store.
- Live Insects (mealworms, crickets, waxworms, etc.): Grubco, Fluker Farms, Nature's Way
- Feeder Animals (mice, quail, etc.): Mice Unlimited, Gourmet Rodent, Northwest Gamebirds.
- Passerine Nestling Formulas: none that meet the nutritional needs of growing wild passerines are currently available commercially (do not use formulas marketed primarily for companion birds). For research-based home-made formulas ("MacDiet" and "FoNS"), see *NWRA Principles (2nd Edition)* or contact ReMaine Wild for further information.
- Columbidae Nestling Formulas: formulas marketed for companion birds (e.g., Kaytee Exact©, which is available at pet stores) are appropriate for young pigeons and doves.

MEDICAL SUPPLIES

- Wound Ointments: Bacitracin®, Neosporin®, etc., available at pharmacies.
- Wound Flush: Betadine® liquid, available at pharmacies.
- Wound Dressings: Tegaderm®, gauze sponges, cotton balls, tape, cotton-tip applicators, etc., available at pharmacies or through MedCare.
- VetWrap® or CoFlex®: available through your vet, through MedCare, or The Squirrel Store.

EQUIPMENT AND MISCELLANEOUS SUPPLIES:

- Snuggle-Safe® (the "pink flying saucer"): after a few minutes in the microwave, holds heat for several hours. Good for car trips or any situation where electric heat is impractical. Available at Agway, pet stores, etc., and also through The Squirrel Store.
- Incubator: for newborn animals that cannot thermoregulate. Several brands are available; see, e.g., the line offered by Petiatric and other brands available through Pet Warehouse. Water-lined warmers are also available through ThermoCare, Inc.

- Gram Scale: Several brands are available through Pet Warehouse; kitchen-supply stores sometimes carry food scales that read in ounces or grams. Check with your local police department to see whether the narcotics division has any confiscated ones.
- Microscope: Check with local colleges and high schools to see whether an old one could be donated. Used and reconditioned microscopes are available through Connecticut AVE Service. Useful so that you can do your own checks for parasites, instead of asking your vet. Accessories such as slides, slidecovers, fecal float kits and fecal float solutions are available through MedCare or through your vet.
- Gloves: Heavy welders' gloves are available at local welding supply stores and through Animal Care Equipment Services (ACES); for Kevlar-lined gloves, contact One-of-a-Kind.
- Capture Equipment (Traps, Poles, etc.): Tomahawk Live Trap Co.; Ketch-All Co.; Avinet.
- Cages: Pet carriers are a good start -- available locally at, e.g., Pet Quarters stores, or by mail-order through Pet Warehouse. See also, e.g., Clark Cages.
- Netting for Flight Cages: Fablok Mills, Inc.; Memphis Net & Twine Co., Sterling Net & Twine Co.

SUPPLIERS

Animal Care Equipment & Services	1-800-338-ACES	www.animal-care.com
Avinet	1-888-284-6387	www.avinet.com
Clark Cages	1-800-461-9972	www.ClarkCages.com
Connecticut AVE Service	1-860-666-8660	www.ctaves.com
Fablok Mills, Inc.	1-908-464-1950	www.fablokmills.com
Fluker Farms	1-800-735-8537	www.flukerfarms.com
Foster & Smith's Pet Warehouse	1-800-443-1160	www.DrsFosterSmith.com
Fox Valley	1-800-679-4666	www.foxvalleynutrition.com
Gourmet Rodent	1-352-495-9024	www.gourmetrodent.com
Grubco	1-800-222-3563	www.grubco.com
Ketch-All Co.	1-805-543-7223	www.Ketch-All.com
KV Vet Supply	1-800-423-8211	www.kvvet.com
MedCare	1-800-633-2273	www.medcareproducts.com
Memphis Net & Twine Co.	1-901-458-2656	www.memphisnet.net
Mice Unlimited	1-800-642-3496	www.miceunlimited.com
Nature's Way	1-800-318-2611	www.TheNaturesWay.com
Northwest Gamebirds	1-509-586-0150	www.northwest-gamebirds.com
One Of A Kind	327 E. Lake St.	Horicon, WI 53032

Pet-Ag	1-800-323-0877	www.petag.com
Petiatic Supply	1-316-831-9500	www.petiatric.com
Squirrel Store	1-877-717-7748	www.thesquirrelstore.com
Sterling Net & Twine Co.	1-800-342-0316	www.sterlingnets.com
ThermoCare, Inc.	1-775-831-1201	
Tomahawk Live Trap	1-800-272-8727	www.livetraps.com
Upco	1-800-254-8726	www.upco.com