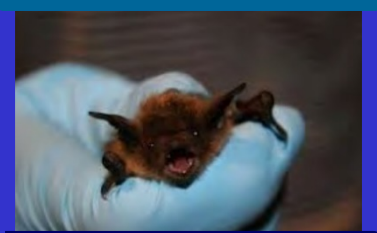
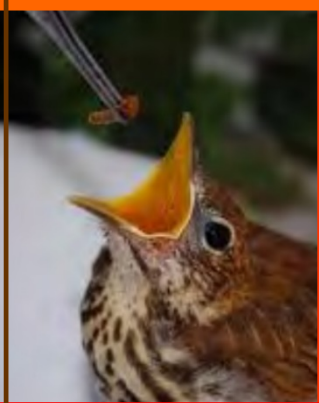




Commonwealth of Massachusetts
Division of Fisheries and Wildlife
Wildlife Rehabilitation State
Examination
Study Guide



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Study Guide: Third Revision
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Chapter 1: How to Use this Study Guide

In order to receive a Massachusetts wildlife rehabilitation permit, an applicant must successfully pass the state wildlife rehabilitation permit exam. This written exam is one hundred questions and covers a comprehensive range of material pertaining to wildlife rehabilitation. The purpose of this study guide is to help you prepare for this exam. This study guide is intended to outline the areas of information you will need to be familiar with in order to be a successful wildlife rehabilitator. It will also inform you where to find accurate information. This study guide is not intended to give you all the information you will need to pass the exam. It is up to you to gather additional reference materials, research the current laws, look up the Massachusetts Endangered Species List, and receive proper training on how to become a wildlife rehabilitator.

The study guide is divided into 30 chapters, each covering a major topic relevant to wildlife rehabilitation. Each chapter will begin by pointing out why the topic is important. Each chapter will provide key points within the topic that should be well understood. For example, the Wound Management chapter will highlight various injuries, including abrasions and fractures.

In order to prepare for the state exam, it is suggested that you study materials on all key points within a chapter. It is also highly recommended that you mentor with permitted wildlife rehabilitators who can share their knowledge and experiences with you and answer any questions you may have. This may involve volunteering with a local wildlife rehabilitator or spending time observing a wildlife rehabilitator at work. Most wildlife rehabilitators are happy to answer your questions and demonstrate how they work with various species.

At the end of most chapters, there are sample questions similar to those you can expect to find on the state exam. This will help you practice your testing ability.

At the back of the study guide, a list of resource materials is provided, along with a description of each. This list is a collection of references that other wildlife rehabilitators have found to be helpful. This is not meant to be a comprehensive list, as there are many other resource books, field guides, and articles available. As always, it is recommended that you only study information from credible sources, such as wildlife rehabilitation organizations. Many of these books are useful for ongoing wildlife rehabilitation, as well as for preparation for the state exam.

There may be times that the amount of information you need to learn seems overwhelming. Don't be discouraged! There will be mentors, seminars, and conferences to help you along the way.

This study guide also includes the following attachments:

1. Glossary of terms
2. Medical terms and common conversions
3. Diagrams of mammal and bird bones
4. National Wildlife Rehabilitators Association (NWRA) Code of Ethics

And just for fun....

There are wildlife tracks on some of the pages. See if you can guess which animals the tracks belong to. The answers are in the back of the study guide.



Chapter 2: What is Wildlife Rehabilitation?

Welcome to the field of wildlife rehabilitation! A wildlife rehabilitator is a person who receives a permit from the state to rescue sick, injured, debilitated, and orphaned wildlife. The goal of a wildlife rehabilitator is to provide the care required to release the animal back into the wild independent of human support. This is more than a hobby; this is a commitment to gain expertise on how to provide appropriate care for wildlife.

There are many types of people who become wildlife rehabilitators, but they all have one thing in common: a wildlife rehabilitator understands and appreciates the wild nature of an animal. People who want to play with wildlife and keep them as pets should not become wildlife rehabilitators. A true wildlife rehabilitator provides care for an animal while maintaining its wild nature so it can be released back into the wild.

Being a wildlife rehabilitator can be challenging at times. This study guide will provide information on the general topics necessary to provide appropriate care to animals. It takes time to gain the knowledge and skills necessary to provide quality wildlife care. At times, it will feel overwhelming, but there are many resources available to assist you. Being a wildlife rehabilitator is a long-term commitment and a continual learning process, even after a state permit is received.

As previously mentioned, being a wildlife rehabilitator can be challenging. Sometimes animals die or must be euthanized regardless of how hard you try to save them. It is not always a happy ending. However, there are many times when you are successful in providing the care required for an animal to be released back into the wild; this is a rewarding feeling.

For most people, there is no substitute for experience in working with wildlife. It is strongly recommended that you work with a permitted wildlife rehabilitator and gain hands-on experience in addition to studying books and other reference materials. Consider volunteering your time to assist a wildlife rehabilitator in exchange for the ability to ask questions and learn certain techniques. For instance, try syringe feeding a baby squirrel under the supervision of a trained wildlife rehabilitator. You may discover you have a passion for this work, or you may decide wildlife rehabilitation is not for you.

What is Wildlife Rehabilitation?

There are many levels of wildlife rehabilitation. There are wildlife veterinarians who are able to do complex surgeries and diagnostic testing of injured and ill wildlife. There are many at-home wildlife rehabilitators who care for a small number of wild animals in their home. There are larger wildlife centers that care for high caseloads and a wide diversity of species from their region of the state. There are also people who specialize in caring for only one type of animal, such as squirrels or turtles.

What kind of wildlife rehabilitation would work for you? This would depend on many factors, including how much free time you have, the space you have available, and the amount of money you are willing to spend on wildlife care. Wildlife rehabilitation costs money. Some wildlife rehabilitators create non-profit organizations to raise funds to pay for various expenses such as food, medications, and caging. A licensed wildlife rehabilitator is not allowed to charge the public for any wildlife care, but donations may be gratefully accepted.

In order to become permitted by the state, you will need to pass the state wildlife rehabilitation permit exam designed by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife. This study guide is designed to help you prepare for the test and will also provide an accurate glimpse into the exciting world of wildlife rehabilitation.



What kind of tracks are these?



Chapter 3: State and Federal Regulations

Being a permitted wildlife rehabilitator is a commitment to being an advocate for wildlife. It also means that you have agreed to uphold the regulatory standards set by the state and federal governments. This chapter will give you an overview on these various state and federal regulations.

One of the attachments at the end of this study guide is a copy of the Massachusetts Wildlife Rehabilitation Regulations (321 CMR 2.13). These regulations should be well understood. You can expect there to be questions on the state exam about these regulations. Review the definitions as well as the regulations in this document.

The following are examples of how the state wildlife regulations directly impact the practice of licensed wildlife rehabilitators:

1. There are regulations differentiating between a wildlife rehabilitation permit and a wildlife possession permit for education. A wildlife rehabilitation permit allows a person to care for distressed animals for a limited amount of time. An educational permit allows a person to permanently keep one or more animals strictly for educational purposes. An educational permit is intended for people who are primarily educators, not rehabilitators.
2. There are regulations that require a wildlife rehabilitator to euthanize animals that are not releasable and cannot be placed in a licensed, educational setting.
3. There are regulations on the amount of ongoing training required for a wildlife rehabilitator. The regulations require proof of participation in an approved wildlife rehabilitation seminar, workshop, or conference (eight hours total) at least once every three years. This regulation is designed to encourage wildlife rehabilitators to achieve a higher level of professional development.
4. There are regulations on how long an injured or ill animal can be maintained at a rehabilitation facility. After a period of 365 days, a wildlife rehabilitator requires a waiver from the Division of Fisheries and Wildlife to continue to care for a mammal. Most mammals should be released in a much shorter time. For birds, the maximum time allotted for rehabilitation is 90 days.
5. There are regulations about where you are allowed to release an animal upon completion of rehabilitation. Review the regulations on "point of capture" and "promptly released" and what these terms mean.
6. There are regulations on how to submit an annual report to the Division of Fisheries and Wildlife. The report must be submitted by January 31st for the preceding calendar year. Maintaining documentation and submitting information to the state is an annual requirement for wildlife rehabilitators. This report must be signed-off by your consultant veterinarian.
7. There are regulations on what species you are permitted to rehabilitate with the basic state wildlife rehabilitation permit. For example, the state permit does not

- allow you to provide care for venomous snakes, black bears, moose, or white-tailed deer. These species require a special permit from the Division of Fisheries and Wildlife in addition to the state permit. Did you know that Massachusetts has two species of venomous snakes (copperhead and timber rattlesnake)? Learn how to identify these species. There is also a policy that requires a wildlife rehabilitator who receives a coyote, bobcat, fisher, or river otter to report it to the Division of Fisheries and Wildlife within one business day for further instructions. Special permission is required to rehabilitate these animals.
8. There are regulations about the rehabilitation of certain avian species (raptors, waterfowl, and songbirds). In order to care for these species, you are required to obtain a federal permit from the U.S. Fish and Wildlife Service, in addition to your state permit.
 9. You should memorize which avian species can be rehabilitated by a person holding only a state permit. For example, the wild turkey, northern bobwhite quail, ring-necked pheasant, ruffed grouse, house sparrow, European starling, and rock dove (rock pigeon) are species that are not federally protected so they can be rehabilitated by a person with a state permit. The rehabilitation of these non-native species is good practice for a person interested in obtaining a federal permit and specializing in avian species.

In Massachusetts, a person is not eligible to receive a federal permit from the U.S. Fish and Wildlife Service without first holding a state permit. If you are interested in rehabilitating raptors, songbirds, or waterfowl, you need to have a state wildlife rehabilitation permit prior to applying for a federal permit. Raptors include hawks, owls, and eagles. There is no examination for the federal permit, but it requires a minimum of one hundred hours of documented training with the holder of a federal migratory bird rehabilitation permit. You will also need to obtain a letter of recommendation from a permit holder and provide documented proof of the caging and facilities you will use to care for these species.

This study guide will concentrate on the requirements for the state permit from the Division of Fisheries and Wildlife. The information on the federal permit is only to make you aware that the U.S. Fish and Wildlife Service has its own regulatory requirements.

The Massachusetts state wildlife rehabilitation permit exam consists of 100 questions that cover topics including state laws and regulations, natural history, basic animal care practices, medical math, occupational safety, species identification, and anatomy as they pertain to wildlife rehabilitation in Massachusetts. The Exam is made up of multiple choice, true/false, matching, and fill-in-the-blank questions. You are not permitted to take outside materials into the testing room with you, and the use of cell phones is prohibited. You can use a basic calculator (not scientific and not a cell phone calculator) if needed for the mathematics questions.

To receive your state permit, you must pass the exam with a score of 80% or better. This is difficult test, and many people do not pass on the first attempt. If you do not pass on your first try, do not give up! You are eligible to take the test again two months after your initial test date. Use this time to study and review the material.

The exam is proctored and graded by personnel from the Massachusetts Division of Fisheries and Wildlife. You must contact them to schedule a time to take the exam at one of their offices.

To be eligible to take the test you must be a minimum of 18 years old, have a legal residence within the state of Massachusetts, and have no prior convictions for crimes relating to animal cruelty or abuse.

Here is an example of the types of questions you can expect to find on the state wildlife rehabilitation exam:

1. You have been rehabilitating an eastern cottontail rabbit that is almost ready for release. There is a spring fair next week where you plan to educate the public about living with cottontails. You currently hold a state wildlife rehabilitation permit. It would be legal for you to bring your eastern cottontail to the spring fair since you have been rehabilitating it. True or False?

Answer: False. Animals being held for rehabilitation may not be displayed to the public, and if you do not hold a separate wildlife possession permit for education, you cannot use the animal for educational purposes.

2. Circle the wildlife species that you would be permitted to rehabilitate while holding only a state wildlife rehabilitation permit.

Moose European starling Meadow vole Raccoon Striped skunk

Answer: You would be permitted to rehabilitate everything except the moose.



Chapter 4: Endangered Species

The federal Endangered Species Act (ESA) and the Massachusetts Endangered Species Act (MESA) are designed to provide extra protection for species in jeopardy. Some wildlife species are listed as endangered or threatened at the federal and/or state level, while others are listed as species of special concern within Massachusetts. All three of the categories represent species that are rare, declining, or are facing some threat to their continued survival. Wildlife rehabilitators are part of the safety net of protection for these vulnerable species of wildlife. The state definitions of these categories (321 CMR 10.03) are as follows:

Endangered - in danger of extinction throughout all or a significant portion of its range, or in danger of extirpation as documented by biological research and inventory.

Threatened - likely to become endangered within the foreseeable future throughout all or in a significant portion of its range, or to be declining or rare as determined by biological research and inventory and likely to become endangered in Massachusetts in the foreseeable future.

Special Concern - has suffered a decline that could threaten the species if allowed to continue unchecked, or occurs in such small numbers, with such a restricted distribution, or that occurs in such small numbers or with such a restricted or specialized habitat requirements, that it could easily become threatened within Massachusetts.

As a permitted Massachusetts Wildlife Rehabilitator, you are required to be familiar with the species on the Massachusetts Endangered Species List. It is imperative that a wildlife rehabilitator be able to properly identify species they receive and recognize whether they are an endangered or threatened species. Any delay in the identification of an animal on the Massachusetts Endangered Species List may significantly decrease the animal's chance for survival. Having good field guides on birds, mammals, and reptiles will help with prompt identification of an unknown species. If you are presented with an orphaned, ill, injured, or deceased animal that is endangered, Fish and Wildlife regulations require that the wildlife rehabilitator notify the nearest Division of Fisheries and Wildlife office about the listed species immediately.

The regulation (321 CMR 2.13) specifically states the following:

The acquisition of endangered, threatened, or special concern wildlife, as listed in 321 CMR 10.60, whether dead or alive, shall be reported immediately to the Division for special instructions relative to the disposition of such wildlife [see 321 CMR 2.13 (22)(c)]. In the case of an acquisition on a Saturday, Sunday, or legal holiday it shall be reported on the workday, Monday-Friday, immediately following.

It is the responsibility of the wildlife rehabilitator to give careful thought and act swiftly when presented with an injured or ill animal on the Endangered Species List. Wildlife rehabilitators need to know what resources are in their areas to help with endangered species, especially on weekends. This could include having contact with an experienced licensed wildlife rehabilitator

with expertise in a particular species or being able to transport the species to the Tufts Wildlife Clinic in North Grafton, MA. It is appropriate to provide initial first aid and to try to stabilize the animal until you can get instructions or can transfer the animal to the Tufts Wildlife Clinic. If you are unsure of what type of care is appropriate or if veterinary intervention is necessary to stabilize the animal, please consult with your veterinarian of record before acting.

You can access the Endangered Species List by going to the Massachusetts Division of Fisheries and Wildlife (MassWildlife) website and looking at the Natural Heritage and Endangered Species section. It is important to memorize the vertebrates (except fish!) on this list in preparation for the wildlife rehabilitation exam. This list is updated about every few years. The web address for the Natural Heritage and Endangered Species Program is:

<https://www.mass.gov/orgs/masswildlifes-natural-heritage-endangered-species-program>

The web address for the List of Endangered, Threatened, and Special Concern species is:

<https://www.mass.gov/info-details/list-of-endangered-threatened-and-special-concern-species>.

The following is a sample question to help you prepare for the state wildlife rehabilitation exam:

1. You are presented with a turtle that appears to have a shell injury. Since you don't recognize the turtle, you immediately check one of your field guides. The field guide indicates it is a Blanding's Turtle. It is Monday afternoon, and your first telephone call is to:
 - a) Your local veterinarian
 - b) A licensed wildlife rehabilitator
 - c) The Division of Fisheries and Wildlife
 - d) Your local animal hospital

Answer: c) You contact the Division of Fisheries and Wildlife for further instructions since this turtle is a threatened species.



What kind of tracks are these?



Chapter 5: Role of the Veterinarian

Working with wildlife without the assistance of a veterinarian is like learning to walk a tightrope without a safety net; it just doesn't make any sense. This chapter will cover the reasons why a consultant veterinarian is a requirement for all wildlife rehabilitators.

As a wildlife rehabilitator, you will be asked to help with animals that appear injured or ill. There will be some common illnesses and minor injuries that you can handle by yourself. Most wildlife rehabilitators can bandage an abrasion or remove a tick. But the time will come when you need the expertise of a veterinarian. It is important for wildlife rehabilitators to recognize when an animal's problem is beyond the scope of what a rehabilitator can handle and requires the attention of a veterinarian.

The following are examples of the services a veterinarian can offer a wildlife rehabilitator:

1. The veterinarian can perform diagnostic tests, such as radiographs, fecal examinations, and possibly blood tests.
2. The veterinarian can perform surgeries, splint fractured limbs, stitch up wounds, and assist with dental problems.
3. The veterinarian can prescribe antibiotics and other medications to the wildlife rehabilitator and explain how to use them correctly.
4. The veterinarian can help with differential diagnosis on complex cases.
5. The veterinarian can perform humane euthanasia on wildlife using a controlled drug.

The job of a wildlife rehabilitator is to act on behalf of the state and their patients and carry out a treatment plan that is set forth by a licensed veterinarian in the state of Massachusetts. Wildlife Rehabilitators play a critical role in this partnership, but depend on a licensed veterinarian (usually their vet of record) to do the following:

1. Make a diagnosis for an animal and develop a therapeutic plan for treatment: Only a veterinarian can make a formal diagnosis and treatment plan. The plan is then carried out by the wildlife rehabilitator according to the vet's instructions and updates are furnished to the veterinarian throughout the process of care.
2. Prescribe medications: Only a veterinarian can prescribe a medication to an animal. As a wildlife rehabilitator you will need your vet to provide prescriptions for each individual patient that requires any controlled drug, biologic, or compound to aide in treatment. Over time, you and your vet will likely develop mutually agreed upon treatment protocols for common afflictions, which will make this process much quicker and more efficient.
3. Perform surgery, chemical euthanasia, and IV injections: In the state of Massachusetts, only a licensed veterinarian can perform these actions. More information can be found in the Massachusetts General Laws: Part I, Title XVI, Chapter 112, Section 58 (<https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter112/Section58>)

The wildlife rehabilitator and the veterinarian make a good team. The wildlife rehabilitator has the expertise on wildlife husbandry and an extensive knowledge of natural history that is important for wildlife care. The veterinarian has knowledge about diseases, wound management, and use of medications for wildlife care. Wildlife rehabilitation is most successful when the rehabilitator and veterinarian work together.

Not all veterinarians are interested in working with wildlife. Some veterinarians are willing to work with wildlife but have little or no experience with wild animals. It is important for the wildlife rehabilitator to meet with local veterinarians and learn whether they would be willing to be part of a wildlife support system for you and the public. Sometimes a veterinarian is willing to learn and grow with the wildlife rehabilitator as a shared experience. It is important to establish a relationship with the veterinarian to show that you are a professional working with wildlife.

As part of the process to obtain a state permit for wildlife rehabilitation, you must identify a consultant veterinarian. The veterinarian must sign off on your initial permit application to indicate they are willing to provide you with their support. The veterinarian must also sign off on the required annual report at the end of each year.

Wildlife rehabilitators who work with multiple species may need to find several veterinarians to cover the expertise of the various species. You may find a veterinarian who does great work with squirrels but has limited expertise with avian species. Additionally, you may find a veterinarian who wants to work with you, but not with rabies vector species, which add a risk factor to their veterinarian practice.

Most local veterinarians close their practice from noon on Saturdays until Monday morning. It is very helpful to have a relationship with a veterinary hospital open twenty-four hours to assist during the times your regular veterinarian is closed.

Wildlife rehabilitators know a professional relationship with a veterinarian is one of communication and respect. Always ensure that the veterinarian gets a telephone call requesting help prior to the arrival of a wildlife patient. There may be times that the veterinarian is too busy with his/her own practice to provide needed assistance to you. Help the veterinarian by taking care of simple wildlife cases. Be prepared with names of other veterinarians and wildlife rehabilitators in case you must make a referral for an animal. Appreciate any veterinarian who is willing to help wildlife and let them know how valued they are as a member of your team.



Chapter 6: Is this Animal Really Orphaned?

As a wildlife rehabilitator, you will receive phone calls from the public about baby animals they have found. You may be asked to rescue an orphaned fawn found in a field, or you may be asked to take home baby bunnies found in an abandoned nest in a back yard. Are these animals really orphans?

Wildlife rehabilitators have a responsibility to ensure that baby animals are orphans before taking the babies into care. A wildlife rehabilitator knows that parent animals provide the best care for their babies. A wildlife rehabilitator can raise a baby raccoon but can't communicate where the food sources are in that area. A wildlife rehabilitator can't communicate with a baby pigeon about a hawk flying in the skies. Keeping baby animals with their parents is a primary goal of a wildlife rehabilitator.

How does one know when an animal really is an orphan and needs help? Some of the cues come from understanding the natural history of each species. The following are a few examples:

A white-tailed doe will instruct her fawn to lie down in a field and remain in that spot until she returns. The mother leaves the immediate area to browse for food. A hiker comes across the baby fawn with no mother in sight. Is this animal an orphan or just waiting for the mother to return? If the baby fawn looks healthy, it is highly likely that the mother is nearby. It is a normal natural history of white-tailed deer for fawns to be left alone. Therefore, the fawn should be left alone, and the hiker should leave the area, so the mother feels safe to return.

Eastern cottontail rabbits often make their nests in backyards where they are discovered by people or pets. You receive a phone call about six little bunnies in a nest and with no mother in sight. The caller has watched the nest for two hours and believes the nest is abandoned. Do you take the bunnies into care? Natural history indicates it is normal for a mother rabbit to stay away from her nest for long periods of time. To stay on or near her nest would place her babies at greater risk of predation. The mother rabbit only visits her nest two or three times per day, generally in the pre-dawn and dusk hours. Therefore, the public rarely sees the mother rabbit on or near the nest and assumes it has been abandoned. If the bunnies are healthy, they should be left alone in the nest, but an effort should be made to keep pets away from the nest. As always, babies are meant to be raised by their mothers.

Many songbird babies leave their nests before they can fly. These birds are in the "fledgling" stage of development and will continue to be fed by their parents on the ground. These baby birds are not orphans, but are vulnerable to free-ranging cats, so try to keep pets out of the area. Avian development will be discussed further in Chapter 25.

Wildlife rehabilitators save more animals by giving sound advice to the public than by actual rehabilitation. We save many baby animals by simply educating the public to leave them alone or put them back in their nest.

Sometimes it is not clear whether a baby animal is really an orphan. Wildlife rehabilitators know that a baby animal that appears cold, weak, and lethargic has probably lost its mother. This study guide will cover the topics of emaciation and dehydration, both of which are common indicators that an animal needs help.

The following are some areas to study for the wildlife rehabilitation exam:

1. Learn the natural history of bird, mammal, and reptile species. Specifically, study how the parents raise their young in the wild. Do both parents feed the babies? What do the nests look like? Are babies normally left alone for long or short periods of time?
2. Learn what a healthy baby looks and acts like for the various species. How can you tell when an animal is at normal weight versus emaciated?
3. Learn some ways you can “test” a nest to see whether the parent is around and caring for the babies. For example, there is an easy way to check if a bunny nest has been abandoned. Someone can put a “tic-tac-toe” design over the nest using dental floss, string, or natural weed material. The nest is left alone for 12-24 hours and rechecked the next day. If the testing material has been re-arranged, it is likely the mother rabbit came back to feed her babies. Learn some other tricks by talking to other wildlife rehabilitators
4. Learn the ages when a young animal may go exploring without a parent in sight. For example, it is not uncommon for fox kits to be seen exploring outside the den without their mother when they reach the age of five or six weeks. However, a baby squirrel out of the nest at six weeks old has probably lost its mother and requires help.
5. Remember that some species, such as turtles and snakes, are born ready to fend for themselves without the help of any parent. These babies are not orphans!

Here are examples of similar questions you might find on the state wildlife rehabilitation exam:

1. It is mid-summer, and a caller has observed a small, feathered bird hopping on the ground unable to fly. There is another bird feeding the smaller bird. The smaller bird is probably injured and needs to be rescued. True or False?

Answer: False. The smaller bird is likely a fledgling that is being fed by its mother. Many songbirds leave the nest and are fed on the ground by their mothers for about a week before they can fly. The caller should be instructed to leave the parent and baby alone.

2. A caller tells you that a baby chipmunk has been found shivering on the ground in their yard. They did not observe any adults caring for the baby. What should you instruct the caller to do?
 - a) They should leave the baby chipmunk alone.
 - b) They should bring the baby chipmunk to you for rehabilitation.
 - c) They should observe the baby chipmunk for 24 hours before calling you back.
 - d) They should find a burrow and put the baby chipmunk back inside.

Answer: b) Baby chipmunks live in burrows and should not venture out without a parent nearby until they are old enough to take care of themselves. The public would generally find a baby chipmunk out of the burrow when the mother fails to come back and the baby is starving to death. This baby needs help.



Chapter 7: Reuniting Wildlife with Parents

In a previous chapter, you learned that animals are more successful in the wild when they have been raised by their wild parents. No matter how experienced you become as a wildlife rehabilitator, you will never be able to provide the same great care as the animal's natural parents. Therefore, it is the responsibility of wildlife rehabilitators to help wild baby animals remain with their wild parents whenever possible.

Sometimes wildlife rehabilitators receive phone calls from the public about orphaned baby animals that have been placed in a box. The caller typically wants you to either rescue this baby animal or raise it as a pet.

After asking the caller a few questions, you determine the likelihood that the baby animal was kidnapped from its parents by a well-meaning adult or child. In some cases, it is possible to reunite the baby with the parent. In other cases, this is not a likely event. It is the responsibility of the wildlife rehabilitator to know which species have a good success rate when reuniting with their parents and which species require the care of a wildlife rehabilitator.

In order to make the right decisions about orphans, a wildlife rehabilitator should learn the following key points:

1. Learn how reptiles are raised differently from bird and mammal species. For example, baby turtles hatch from their eggs and are independent of their parents from the moment they are born. Therefore, a baby turtle found by the public should be left alone since it is not an orphan. In contrast, a songbird is born naked and helpless (altricial) and needs the constant support of their parents to survive. A featherless baby bird that fell from its nest will need human intervention.
2. Learn the techniques for reuniting baby birds with their parents. It is possible to make a substitute bird nest when a storm has damaged the nest made by the parent birds. There are many articles written on how to use a wicker flower basket or a berry basket as a substitute nest. This works well when all the babies are placed in the new nest. However, naked baby birds can't be alone in a substitute nest when the mother bird is brooding the rest of her babies in another nest. That baby would freeze to death. Also be aware that some bird species are cavity nesters or chimney nesters and need a different form of intervention.
3. Learn how to identify a fledgling bird that has been mistaken for an injured bird. Many times, a fledgling can be brought back to the area of capture and reunited with the parents within twenty-four hours of displacement. It is seldom necessary to raise a baby hawk or owl. Younger raptors can be returned to their nest or placed in a basket in a tree nearby. Older "branchers" just need to be put into a nearby tree or on a nearby building roof with enough shade. Raptors generally make good "foster parents", and their babies can often be placed into the nest of the same species if the ages of the young are similar. Hawks and owls do not recognize their own young and will readily feed a chick from a different brood once it starts food begging.

4. Learn the techniques for helping a kidnapped white-tailed fawn to be reunited with its parent. This may be as simple as returning the baby to the exact same spot where it was found and returning several hours later to see if the reunion was successful.
5. Research what time periods are optimal for reuniting an orphan with its mother. A mother animal generally looks for her missing young for a period of 12-24 hours, but depending on the species, this period may be longer. Many times, the baby animal will cry out for the mother and attract it back to the location. Other species, such as many waterfowl, are difficult to reunite even if only separated from their mother for a few short minutes or hours.
6. Learn which baby animals need immediate intervention if found away from their parents. For example, a baby Virginia opossum found in a yard is an orphan and needs immediate intervention. In contrast, baby squirrels can sometimes be reunited with their parent if their nest is destroyed.
7. Understand that the condition of the baby animal may not allow for reuniting or fostering. A baby animal with a serious injury (i.e. leg fracture) would need the help of a wildlife rehabilitator. A baby animal that is emaciated might be too weak to eat on its own even if offered food by the mother. A baby animal with an infection or illness would need medication that the natural parent could not provide. The animal must be healthy for reuniting or fostering to be successful.

It takes time to learn the skills needed to master the variety of wildlife calls you will receive. There will be resources available to help you learn these skills. Later in this study guide, there will be more information on how to connect with wildlife mentors and wildlife organizations to help you. You will learn how satisfying it is to “save” baby animals simply by giving out good phone instructions.

Here is a sample test question on reuniting and re-nesting:

1. Circle each species that would be a good candidate for either reuniting or re-nesting with their parent.

Eastern chipmunk White-tailed fawn Virginia opossum Eastern cottontail

Answer: The white-tailed fawn is a good candidate for both reuniting with the natural parent and being accepted by a foster parent. The eastern cottontail is a good candidate for re-nesting within twenty-four hours of being removed from the nest. Circle those two species.

The eastern chipmunk found outside the burrow is probably starving and should be placed into care. The Virginia opossum that got separated from the mother is a species that cannot be reunited and should be placed into care. By knowing the natural history of animals, you can make the best decision for individual baby animals.



Chapter 8: Assessing a Wildlife Call: *Rescue or Referral?*

Wildlife baby season in Massachusetts is generally the busiest time of the year for a wildlife rehabilitator. The baby season lasts about eight months, running from March through October, but is dependent upon weather conditions and the time that various species give birth to their young. This is also the time when the public spends more time outdoors enjoying the warmer weather and encounters wildlife. You will receive many phone calls from concerned citizens about baby animals found in their yard or while hiking.

By now, you probably realize that making decisions about wildlife needing care can be complicated. In previous chapters, you have learned key points about deciding whether an animal is an orphan. You have learned that the natural history of a species will help you determine when an animal needs to be rescued and when it needs to be left alone in the wild or reunited with a parent.

Wildlife rehabilitators also receive phone calls about animals that are injured or ill. The animals may be very young or may be mature adults. This chapter will give an overview about assessing wildlife for illness or injury. There will be further discussion regarding injuries and illness in subsequent chapters. However, this study guide cannot list all the illness and injuries that occur in wildlife. Purchasing resource books and obtaining additional training is essential. It is also imperative for you to work with a veterinarian experienced in the care of wildlife.

Here are some of the key points to consider:

1. An animal that is weak, thin, and has flies circling around it should be admitted for care.
2. An animal that has sunken eyes and appears lethargic should be admitted for care.
3. An animal that has maggots on its body should be admitted for care. Learn how maggots can be both external (on the body) and internal (inside the body).
4. An animal that has a severe injury, such as a fractured limb, burns, or lacerations should be admitted for care.
5. An animal that has been attacked by a cat should be admitted for care, even for a minor puncture wound. Cat saliva contains bacteria that can cause a lethal infection in wildlife if left untreated.
6. An animal with ocular or nasal discharge is likely ill and should be admitted into care.
7. An animal with diarrhea or foul-smelling feces is likely ill and should be admitted for care. Wildlife rehabilitators should learn how to recognize normal droppings versus abnormal droppings. This helps with a preliminary diagnosis for illness.
8. An animal with neurologic symptoms may have suffered head or spinal trauma and needs to be admitted into care. A common cause of head and spinal trauma is an animal being hit by a car. Birds frequently suffer trauma from flying into windows. Neurologic symptoms can also be caused by viral infections, bacterial infections, fungal infections, parasites, or toxins affecting the central nervous system. Any rabies vector species displaying neurologic signs should be referred to a veterinarian for evaluation immediately due to the potential risk of rabies or distemper, or isolated

- until veterinary care can be sought.
9. An animal that does not have the strength to stand, run, or fly should be admitted for care unless it is still too young for these activities.

As a wildlife rehabilitator, you may determine that an animal is orphaned, injured, or ill and requires rescuing. The next question is whether you are adequately prepared to care for that animal. Most new wildlife rehabilitators are only trained to deal with one or two species of animals. Many new wildlife rehabilitators have minimal experience with wound management and, for their first year or two, are only prepared to properly care for healthy orphaned babies. It is poor judgment to keep an animal for care unless you are ready to provide the quality care needed for that animal.

Here are some areas to consider before deciding to rescue an animal:

1. Many baby animals require frequent feedings during the day and occasionally during the night. Research how often an animal requires feeding at each developmental stage of life. If you cannot meet this feeding schedule, the animal must be referred to another wildlife rehabilitator.
2. Adult animals that are injured or ill may not be able to self-feed. These animals may require frequent feedings in the same manner as a much younger animal of their species. These animals may need to be gavage fed, which is a skill that requires training.
3. Animals with an injury or illness may require medications to be administered. Do you have access to this medication and know how to dose and administer it properly? Is there a veterinarian available to assist you with medication administration?
4. An animal with a serious injury will need the services of a veterinarian before going to a wildlife rehabilitator. Know which veterinarians in your area would be willing to help. Wildlife rehabilitators must work with a consultant veterinarian as part of the state permit requirements.
5. Every species has different requirements in the areas of formulas, natural foods, and caging. Is this something you can provide for this specific animal? Do you have a prerelease cage appropriate for this animal? You need to have a plan to care for an animal from when you receive it in care until it is released.
6. Some animals require habitats and specialized care that most in-home rehabilitators can't provide. The orphaned beaver is an animal that needs to be in care for two years with other young beavers for proper socialization. It needs a habitat which includes water for swimming. Could you do this?

If a wildlife rehabilitator cannot meet the needs of an animal, the animal must be referred to another wildlife rehabilitator or veterinarian.

One of the biggest mistakes made by new wildlife rehabilitators is taking too many animals into care. The sad fact is there are often too many animals needing care and not enough wildlife rehabilitators to receive animals. Experienced wildlife rehabilitators know that overloading their facility with too many animals will dramatically decrease their quality of care and the success rate of animals being returned to the wild. It is difficult to say "no" to a caller who is begging for

your help. However, the responsible thing to do is to refer the animal to another wildlife rehabilitator or veterinarian for care. It is important to set reasonable limits for yourself and stick to them. If you find yourself with too many animals to provide a good standard of care, you will need to close your intake and refer some animals to another wildlife rehabilitator.

Another common mistake made by new wildlife rehabilitators is rescuing species for which they've had no training. There are acceptable standards for the care of each species. If you do not know or cannot provide these standards, the animal needs to go to someone with the ability to provide proper care.

People who become wildlife rehabilitators generally are compassionate towards wildlife. It is important to remember that compassion alone won't save lives. The wildlife rehabilitator must be committed to providing an adequate standard of care for every animal rescued. Wildlife rehabilitation requires time, money, and extensive training to be successful. The main advice from experienced wildlife rehabilitators is to take it slow by learning how to rehabilitate one species at a time. This will ensure a better experience for you and the wildlife in your care.



Chapter 9: Physical Restraint, Capture, and Transport

This chapter will discuss the proper steps to follow if it has been determined that an animal needs to be rescued. In some cases, the animal is already in a container and ready for transport. In other cases, the animal is located alongside a road waiting for help. Taking the correct steps to get the animal to you quickly and safely is important for the animal's survival. Keep in mind that the safety of the public is the most important factor to remember.

Scenario One:

An animal is injured alongside a road. The caller is willing to capture the animal with instructions from you.

There are many factors to consider when attempting to capture an animal. The most important factor is the safety of the public and the wildlife rehabilitator. Before picking up an injured animal on the side of the road, be sure it is safe and legal to stop. Also be careful not to chase the animal into traffic, as this could cause an accident or the animal to be hit. Some species of animals carry diseases that could be harmful to people. Many species of animals will attack a rescuer and can cause harm with their teeth, claws, talons, or beaks. The public needs to be informed about risks before being encouraged to capture wildlife. There are some species that are simply too dangerous for the public to attempt a capture, such as an adult raccoon (rabies vector species). When this occurs, the public should be instructed to contact an Animal Control Officer if a wildlife rehabilitator is not available.

The technique for the capture of wildlife is dependent on the species and age of the animal. For example, an infant squirrel can easily be captured by a person wearing leather gloves and wrapping the baby in a soft cloth. Now let's compare this to the capture of an adult squirrel that was injured by a car. An adult squirrel has the jaw strength to crack open shelled hazelnuts without effort. Leather gloves will not provide adequate protection to your hands when the adult squirrel tries to bite you. The result could be a serious and painful injury. Wildlife rehabilitators can purchase specially designed gloves made from Kevlar to provide protection against various types of teeth, claws, and talons, or can use nets and other special equipment.

Understanding the natural history of different animal species will help you improve your capture and handling skills. The more knowledgeable and proficient you are, the safer it will be for both you and the animal. An injured red-tailed hawk will primarily use its razor-sharp talons as a defense mechanism, while a great blue heron will try to poke your eyes out with its bill. By knowing how an animal usually defends itself, you can plan a safe capture.

As part of your research, learn about the different tools and techniques for capturing wild animals. There will be simple techniques, such as throwing a cloth or net over a baby bird. There will be more advanced techniques, such as the use of pole restraints for more aggressive animals. Please be aware that Massachusetts has restrictions on the use of humane traps for the capture of animals. It is illegal for anyone (including wildlife rehabilitators, Animal Control Officers, or any members of the general public) to trap or attempt to trap any free-ranging wildlife for any purpose, including rehabilitation and the treatment of mange or other diseases or injuries without

the express permission of MassWildlife.

Scenario Two:

The animal is already in a box or cage and ready for transport. The caller is willing to bring the animal to you.

The wildlife rehabilitator has a responsibility to ensure that both the animal and the caller arrive safely at your home or facility. It is not enough to be told the animal is in a box. The wildlife rehabilitator needs to ensure that the box is appropriate for the wild animal by providing the following guidance:

1. The container needs to be big enough so the animal has room to turn around. It should not be excessively large or the animal will get injured trying to hop, fly, or jump out.
2. The container needs to have a secure cover and be sturdy enough to contain the animal. A cardboard box will contain a baby pigeon, but it will not contain an adult squirrel.
3. The container needs to have ventilation holes. This may seem obvious but be sure to check.
4. The container may need to have a soft cloth on the bottom so the animal can maintain balance during transport. This will depend on the species. The soft cloth should not have loopy holes, such as those found in terry cloth. Many animals could get their claws caught in these loops, which would increase their chance of injury during transport.
5. The container should not have a water dish that would spill on the animal during transport. It is not helpful for the animal to be cold and wet upon arrival.
6. Birds should not be transported in metal cages. A panicked bird will harm its flight feathers as it struggles in a cage.

Animals can become stressed and even die from stress during transport. The transport should be conducted in a manner to reduce this stress. The best way to reduce stress for wild animals is to maintain them in an environment that is warm, dark, and quiet. Here are some key points to investigate regarding the best ways to transport animals:

1. Learn which animals require supplemental heat during transport. This includes infant mammals that cannot thermoregulate. Supplemental heat is also important for ill or emaciated animals, including both baby animals and adults.
2. Look up simple methods that can be used to provide supplemental heat for animals. This may include hand warmers or the use of hot water bottles covered in soft cloth. Hot water bottles need to be prevented from rolling around and harming the animal. The heat source usually needs to be covered with a cloth to prevent an animal from getting burned when coming into direct contact with it. Many cars have seat warmers that work well to keep babies warm. You can also purchase heating pads that operate out of your car cigarette lighter.

Animals usually experience less stress when they feel hidden. It is important to remind the

rescuer to reduce noise by turning off music and to speak softly during the trip.

An efficient capture and transport of an animal is the first step to successful wildlife rehabilitation. Remember, the safety of the wildlife rehabilitator and the public are your first priority. Some mammals have the potential to transmit rabies by contact with saliva via a bite or scratch from the animal. Helping to keep the public safe is the primary responsibility of the wildlife rehabilitator. It is strongly recommended that you gain experience in the capture and transport of wild animals by working with an experienced wildlife rehabilitator.



What kind of tracks are these?



Chapter 10: Intake Procedures and Record-Keeping

Wildlife rehabilitation requires a certain amount of record-keeping to provide appropriate treatment for animals and to fulfill permit requirements. This chapter will cover some of the basic record keeping that all wildlife rehabilitators should maintain.

Intake Procedures:

Animals in distress can't tell us what has happened to them, but the people finding the animals can often fill in some of the blanks. Experienced wildlife rehabilitators conduct an intake interview in which they ask the finder a series of questions concerning the circumstances under which the animal was found and how it behaved. The intake procedure is a vital tool in determining whether an animal requires rehabilitation as well as diagnosing an injury or illness and determining an appropriate course of treatment. There are many wildlife rehabilitation books that offer sample intake forms for your use. Some of the common intake form questions include the following:

1. When was the animal found? It is important to know if the finder has held onto the animal for several days (or more) or if they brought it straight to the rehabilitator.
2. Where was the animal found? Is there suitable habitat nearby that a young animal could be returned to? Do some investigation yourself via Google Earth before taking the finder's word to see if there is suitable habitat nearby so the animal can be released back into its home territory, if appropriate.
3. What caused the animal to come into care? Was it hurt by a cat or hit by a car? This information will help create an appropriate treatment plan for the animal.
4. Did anyone feed the animal? It is important to know whether an animal has been fed an inappropriate food that could be causing more harm. Allowing an emaciated animal to eat a full meal can cause its death.
5. Did anyone give medication to the animal? It is important to get all the details if this occurred, such as the type of medication and amount administered.
6. Did anyone get bitten or scratched by the animal? Did anyone touch a rabies vector species with their bare hands? It is a public health and public safety issue when people encounter certain animals, especially raccoons, skunks, foxes, coyotes, and bats which are the most common rabies vector species.

The intake procedure is also a great opportunity to educate the public about the wild animal being placed into your care. The public is fascinated with how quickly a baby bird develops feathers or when a skunk's scent glands are fully developed. Remember that a wildlife rehabilitator is an ambassador for wildlife. Your interactions with the public can promote greater tolerance and understanding for wildlife in your community.

Maintaining Wildlife Records:

Although not required by state regulations, an experienced wildlife rehabilitator knows the importance of keeping treatment records for the animals in their care. The treatment records help the wildlife rehabilitator determine the progress of each individual animal. You can develop your own wildlife forms or adapt forms that can be found in many wildlife rehabilitation books. The

following key points are important for a new wildlife rehabilitator to learn:

1. Train with an experienced wildlife rehabilitator on how to mark an animal for identification using materials such as non-toxic paints, magic markers, or tape. A litter of baby raccoons will all look alike unless they are marked for identification. Each animal should have notes showing its progress in treatment. Assessing the progress of each individual animal is a key to quality wildlife rehabilitation.
2. Research how to determine the age of each species and include age at arrival on your intake form. When does a baby squirrel open its eyes or develop front teeth? It is critically important to know the age of the animal to determine the appropriate foods, caging, etc. There are wildlife manuals available that contain this vital information.
3. Train with an experienced wildlife rehabilitator to learn how to weigh animals safely. Infant animals need to be weighed daily to show they are growing properly. Learn the benefits of the metric system for weighing small animals. Tracking the weight of an animal is an important part of record keeping.
4. Learn how to record how much food or formula an animal has consumed per feeding.
5. Learn why it is important to record whether the animal has urinated and/or defecated each day. What does the quality and quantity of wildlife droppings tell us about the health of an animal?
6. Learn how to record the administration of medication. This will minimize an accidental overdose or a missed dose of medicine.

Maintaining Placement Records:

As part of a Massachusetts wildlife rehabilitation permit, you will be required to maintain records for the state's annual report. To complete the annual report, you will need to maintain the following information:

1. Record how many animals received care from you during the calendar year. Separate the count into specific species. It is important to use the precise names for each species. For example, how many Virginia opossums, eastern grey squirrels, or southern flying squirrels did you care for?
2. Record the source of each animal (i.e. the public or an Animal Control Officer).
3. Record the disposition of each animal.
 - a) Was the animal released back into the wild?
 - b) Did the animal die in care?
 - c) Was the animal euthanized?
 - d) Was the animal transferred to another licensed facility? If the animal was transferred, who was it transferred to?
 - e) Is the animal being held into the next calendar year? If so, what is the reasoning?

Being a licensed wildlife rehabilitator makes you part of a larger system involving the welfare of wildlife. The data collected by wildlife rehabilitators can be used by Fish and Wildlife officials to detect trends in causes of injury and mortality, or the appearance of emerging diseases. Maintaining good record keeping is an essential part of wildlife rehabilitation. Wildlife rehabilitators may develop their own systems to maintain records. These systems can be as simple as written notes or as complex as computer generated programs. As part of your training,

ask an experienced wildlife rehabilitator to show you what forms they use and how they maintain up-to-date records on all the animals in their care.

The following are the types of questions you might find on the state wildlife rehabilitation exam:

1. The doorbell rings and you are greeted by a person with a baby squirrel in a box.
Circle the answer that is least important to ask the finder during the intake procedure:
 - a) What gender (male or female) is the squirrel?
 - b) When did you find the squirrel?
 - c) Have you given the squirrel anything to eat?
 - d) Where did you find the squirrel?

Answer: a) It is not highly important to know whether the baby squirrel is a male or female. It is important to know when the squirrel was found to estimate how long it has been without proper nourishment or warmth. It is important to know if the finder gave the squirrel anything to eat and whether the food was appropriate. It is important to know where the squirrel was found. Squirrels often have litters of five babies, so the finder might need to go back and check for other baby squirrels.

2. When submitting your annual report to the Division of Fisheries and Wildlife, which of the following would not be an acceptable name for a species?

Fox Raccoon Opossum Rock dove Turtle

Answer: Fox, opossum, and turtle are vague identifications and, therefore, unacceptable. Rock dove is a precise identification of a species.



Chapter 11: First Response for Animal Care

Animals often arrive at wildlife rehabilitation centers in critical condition. They may have been without food or water for days. They may have been left out in the cold or heat of the season. They may have injuries or illnesses that threaten their survival. They also often arrive stressed from being captured, restrained, and transported. How we treat the animal upon arrival can significantly impact their survival.

Warm, Dark, and Quiet:

Typically, the first response upon receiving an animal is to allow the animal to calm down from the stress of the transport. Most animals prefer being in warm, dark, and quiet locations. This gives them a feeling of safety and allows them to think they have hidden from the predator (you) that has captured them. It is important to have an appropriate cage ready to receive the animal. Some species prefer having a hiding place in the cage, which can be as simple as some polar fleece bunched in the corner. Allow the animal to be in a calming environment and check to see whether the signs of stress (i.e. open mouth breathing, unnatural posture, etc.) have diminished. Generally, the animal should be allowed to destress for a period of about 15-30 minutes.

Please note that if an animal has a life-threatening condition, such as excessive bleeding or difficulty breathing, these conditions must be addressed immediately. Work with your veterinarian to learn how to properly recognize medical conditions that put animals at imminent risk of death and learn how to address these issues. Novice wildlife rehabilitators often transport wildlife to their veterinarian to handle serious medical problems. The wildlife rehabilitator may also request the animal be immediately transported to a veterinarian by the person who found the animal.

One of the most common mistakes made by new wildlife rehabilitators is immediately giving food to a starving animal. A cold animal cannot properly digest food. The undigested food in the animal's stomach promotes bacterial infection that can be lethal to the animal. There will be more information in subsequent chapters about how to deal with emaciated and dehydrated animals.

Hyperthermia and Hypothermia:

Wildlife rehabilitators often receive animals that have been left in excessive cold or heat. Hyperthermia means that an animal is suffering from the effects of excessive heat. Hypothermia means that an animal is suffering from the effects of excessive cold. Both conditions can be life-threatening. It is important to correctly diagnose these conditions and understand how these conditions impact an animal's body. As part of your exam preparation, study how to respond to hyperthermia and hypothermia.

1. Animals with hyperthermia need to be cooled down in a moderate manner. Trying to cool down the animal too fast can cause harm. Learn the best ways to help wild animals cool off.
2. Animals with hypothermia need to be warmed up slowly. Warming up an animal too quickly can cause the animal to go into shock. Placing the animal in a container with

a heating pad on low is generally acceptable. The best option would be to use an incubator, which allows for greater control of heat and humidity.

Preliminary Examination:

The next steps assume that the animal is a relatively healthy infant, juvenile, or adult animal and has been allowed to destress in an appropriate environment. The wildlife rehabilitator will begin a written record about the animal in care. The animal will be weighed and may be marked or tagged to identify it within a group. Obtaining the initial weight of an animal is very important because it allows the wildlife rehabilitator to track whether there is progress or regression during treatment. This measurement is also needed before giving any fluids, medication, and food to an animal.

The wildlife rehabilitator will do a preliminary examination of the animal before returning it to the cage. This will allow the wildlife rehabilitator to collect the supplies needed for the full physical examination. It will also allow the wildlife rehabilitator to determine the age of the animal.

For an infant mammal, this is a good time to stimulate the animal to urinate and/or defecate. For many animals, this is as simple as tickling the genital area with a tissue or cotton ball. Infant mammals that still have closed eyes require this stimulation to produce urine or feces. An experienced wildlife rehabilitator can show you different techniques for stimulating infant mammals.

Rehydration Fluid:

Wildlife rehabilitators assume that all wildlife is at least slightly dehydrated upon arrival. Giving an animal rehydration fluid will improve the function of the digestive track. Please note that rehydration fluid is not the same as water. This will also be discussed in the chapter on dehydration.

The following are questions to help you practice for the wildlife rehabilitation exam:

1. An infant mammal with closed eyes can usually urinate and defecate on its own. True or False?

Answer: False. An infant mammal with closed eyes usually needs to be stimulated to urinate and defecate. This is not the same for baby birds, who can produce droppings on their own.

2. You are brought an infant eastern chipmunk that is very cold and lethargic upon arrival. There are no apparent injuries. The first thing to do is:
 - a) Give the chipmunk some warm formula.
 - b) Give the chipmunk some food to provide energy.
 - c) Warm the chipmunk up slowly to a normal body temperature.
 - d) Warm the chipmunk up quickly to a normal body temperature.

Answer: c) The chipmunk has symptoms of hypothermia, which means its body temperature has dropped below normal. The chipmunk needs to be warmed up slowly back to its normal body temperature. This can usually be accomplished using a heating pad placed on low heat underneath a cage. Giving the chipmunk any food or water too quickly could cause a fatal reaction. Warming the chipmunk up too quickly could cause heart arrhythmias and shock.



Chapter 12: Physical Examinations of Wildlife

A comprehensive physical examination is one of the most important first steps in the rehabilitation of wildlife. Oftentimes, wildlife will appear to be normal while hiding a serious injury or illness. This is a normal defense mechanism for wildlife, especially for prey species. It is up to the wildlife rehabilitator to conduct a head to tail examination of the animal to ensure all abnormalities are treated.

Prior to conducting the full physical examination, it is often helpful to simply observe the animal. Note the posture of the animal, whether it appears to be favoring a limb, and the general condition of the fur, feathers, scales, etc. It is preferable to do this observation in a manner where the animal does not know it is being observed and does not feel threatened. This overview of the animal can be helpful for detecting hard to find injuries.

The following are some of the areas to learn about for the physical examination of an animal. This is not a full list and be aware that the list varies with different species.

1. Examine the animal's eyes for vision impairment. Learn how to check for pupil dilation and what this means. Do both pupils appear the same?
2. Examine the animal's nares (nostrils) for signs of mucous or blood.
3. Listen for the rate of breathing (normal versus shallow/rapid breathing). Is the breathing through the nose or open-mouthed? Is there a "clicking sound" from the lungs? Learn what these differences mean.
4. Examine the animal's ears for blood or mites. Does the animal appear to respond to sounds?
5. Does the animal have proper posture? Learn how incorrect posture may be a sign of fear or something different, such as a neurologic or nutritional problem.
6. Do all the limbs appear sound and functional? Are the limbs on the right side the same as the left side?
7. Does the animal have ectoparasites? (i.e. fleas, lice, mites, hippoboscids)
8. Does the animal have endoparasites? (i.e. tapeworms or internal maggots). You might need to do a fecal test to determine this problem.
9. Does the fur (or feathers or scales) appear healthy looking or in poor condition?
10. Are there any wounds on the animal? Do the wounds appear new (fresh blood) or old (dried, black blood)? Does the animal have a sickly-sweet smell that indicates an infection?
11. Is the vent (anal area) clean or dirty? Does the animal have a foul odor?
12. Is the animal overly calm or behaving normally (fearful of you)? Learn how "friendly" behavior can be a sign of injury or illness.

One of the most common mistakes made by a new wildlife rehabilitator is stopping the physical examination after the first injury is found. For example, animals often arrive with multiple bite wounds from cats and dogs. If you find a puncture wound on one side of an animal, it is likely that there is a second puncture wound on the opposite side of the animal. This is because the cat

or dog would use its upper and lower teeth while attacking an animal.

If the animal begins to show signs of stress during the physical examination, it may be important to let the animal rest for fifteen minutes or more before resuming the exam again. Animals can die from stress while being examined. It is important to learn how to reduce stress in animals during the physical examination.

Generally speaking, the animal is allowed to rest after the physical examination. During this rest period, the wildlife rehabilitator can gather materials needed for treatment, such as oral medications and wound management materials. The animal would be taken from the cage after the rest period so that treatment can begin.

There are several good ways to learn how to conduct a good physical examination. You can have your veterinarian or an experienced wildlife rehabilitator demonstrate their techniques to you. Some wildlife conferences include labs that use cadavers to show how a proper exam should be conducted. Following a standard procedure will ensure that every animal is carefully inspected from one end to the other so nothing is missed.

Don't be discouraged if this seems like a difficult skill to master. It is not always easy to conduct a physical examination with a struggling animal. Sometimes two people are required to properly conduct a physical examination. In this case, one person would be responsible for holding the animal, while the second person conducts the examination. There are even times when an animal, such as an adult porcupine, needs to be under anesthesia to conduct a thorough examination. New wildlife rehabilitators can learn these skills by observing and training with a mentor until they become proficient with their species.

Record any signs of abnormality on a wildlife medical form. This will help you remember which animal needs treatment during the following days. Use your veterinarian to help you with any serious injuries and unknown illnesses. Remember that you are not a veterinarian and you must use good judgment about what types of injuries and illnesses you can appropriately treat.

Here are some sample questions for your test practice:

1. A European starling was brought to you after getting its toe tangled in a feeder. The bird is open-mouth breathing upon arrival from a one-hour transport. Your first step is:
 - a) Give the bird something to eat.
 - b) Give the bird something to drink.
 - c) Immediately conduct a full physical examination of the bird.
 - d) Give the bird approximately fifteen minutes to destress in a warm, dark, and quiet environment. Recheck to see if the breathing has become normal.

Answer: d) It is likely the bird is open mouth breathing due to stress from the transport. Keeping the bird warm, dark, and quiet for a period will allow the bird to calm down before the physical examination.

2. Using the example of the European starling in the above question, you decide on what next steps:
- a) You immediately check the injured toe and decide it is fractured. You apply a splint and return the bird to the cage.
 - b) You observe the bird for several days in the cage to see whether the toe is a problem for perching.
 - c) You conduct a full examination of the bird and find only a fractured toe. You splint the toe and return the bird to the cage.
 - d) You decide to euthanize the bird because the open mouth breathing upon arrival indicates a serious respiratory problem.

Answer: c) You need to conduct a full examination of the bird once it has destressed. It is not enough to observe a fractured toe and not complete the rest of the examination. If the toe is the only injury or illness found, the toe can get splinted and the bird returned to the cage to rest. If the bird becomes stressed during the examination, you can allow the bird to rest and splint the toe once the bird is stabilized.



Chapter 13: Basic Equipment for Wildlife Rehabilitators

Becoming a wildlife rehabilitator requires that you have the space, caging, and equipment to provide proper wildlife care. The amount of space, the type of caging, and the various equipment needed will depend on the number of animals being kept and the species in your care. Clearly, the cage requirements for a turtle will be dramatically different than that for a squirrel. This chapter will provide an overview of some of the common pieces of equipment needed for wildlife rehabilitation.

Before any equipment can be purchased, the wildlife rehabilitator needs to identify both an indoor and an outdoor area where wildlife can be safely maintained. The indoor space should be separate from the family living areas (i.e. a room with a closed door). Wildlife are fearful of people and need a quiet location for stress reduction. Wild animals need to be kept separate from domestic pets, such as dogs and cats, which are their natural predators in the wild. The wildlife area should be easy to clean, free from vermin, and have a sink nearby for frequent hand washing. The outdoor space should be predator-proof and have a mixture of sun and shade available to the animal.

Before you start purchasing equipment, you must decide which species you wish to rehabilitate. Except for large wildlife centers, most wildlife rehabilitators limit themselves to one or two species in the beginning. By starting slowly, you can decide which species appeal to you and work with your schedule. It is strongly recommended that you work with a licensed wildlife rehabilitator who is familiar with the species of your choice. This will help you learn what materials and equipment are needed for that species.

The following is a list of some common equipment and materials required for wildlife rehabilitation:

1. Various indoor caging for animals, inclusive of plastic tubs, net caging, wire caging, and aquariums.
2. A gram or kilogram scale to weigh animals. For small animals, the scale should be accurate to one tenth of a gram.
3. Various sizes of syringes or bottles with accompanying nipples for feeding infants.
4. Disinfectants to clean cages, feeding dishes, etc.
5. Mechanisms to keep infants warm, such as heating pads, microwave “snuggle safe” disks, hand warmers, heating lamps, and incubators. It is important that infants can be kept warm throughout the day and night. The wildlife rehabilitator needs to learn how to safely use these heat sources in a manner that does not cause burns or overheat the animal. Note: Check out the “Babywarm.org” website for help obtaining an incubator.
6. A mechanism to keep formulas warm, such as a mug warmer, candle warmer, bottle warmer, etc.
7. Cage accessories, such as food dishes, water dishes, nest boxes, and polar fleece blankets.

8. Wildlife gloves to protect your hands from teeth and claws. Kevlar gloves are often used for this.
9. Disposable medical exam gloves to prevent infectious disease exposure. Learn the difference between vinyl and nitrile gloves for wildlife use.
10. Outdoor pre-release caging. These cages will generally be large units to encourage exercise.
11. Medications for injured and ill wildlife.
12. Medical and first aid supplies, such as vet wrap, gauze, cotton balls, and tape.
13. Wildlife formulas, weaning foods, and natural foods for each species.
14. Wildlife reference books for species identification and care.

Experienced wildlife rehabilitators will often help you get started with “welcome baskets” of wildlife supplies. Wildlife rehabilitators will also share some of their favorite places to buy quality wildlife supplies at the best price. The first year of being a wildlife rehabilitator is often the most expensive year because so many items need to be purchased. Be prepared for these expenses in advance and learn how to purchase essential items for the species in your care.



Chapter 14: Wildlife Caging

Experienced wildlife rehabilitators understand the importance of cage enrichment for wildlife. Wild animals do best when housed in cages that include some of the features of their natural environment. Simple details, such as including a tree branch with leaves in the cage, may reduce the stress of songbirds. Cage enrichment materials not only reduce stress in wildlife, but they also prepare young animals for life in the wild.

This chapter will describe different types of caging used for wildlife and why they are important. You are encouraged to visit other wildlife rehabilitation facilities and study the various caging used. Remember that every species has slightly different environmental needs. This is another instance in which knowing the natural history of different species is important.

The following key points should be studied in preparation for becoming a wildlife rehabilitator:

1. Birds should not be placed in caging with metal bars. They will often damage their flight feathers if they attempt to fly and hit their wings against metal bars. Birds do best in a cage with soft netting that let them “bounce back” when they hit the sides.
2. Nestling birds should be raised in a container that mimics their natural nest. A small container will support a baby bird around the middle to take pressure off its weak legs. Nestlings that do not get this support often get a condition called "splayed legs". Natural bird nests are not recommended because they are difficult to keep clean. Simple substitute nests can be made using berry boxes or margarine containers filled with soft tissue. You can also make knitted nests from a pattern designed for human infant hats.
3. Some species, such as raccoons, need to be placed in isolation cages when they first arrive at a rehabilitation facility. Learn about the diseases and parasites that require quarantine and which animals are susceptible to them. Often the quarantine cages need to be in separate rooms or even separate buildings to prevent the spread of disease.
4. An injured or emaciated animal may need a small cage initially. The small cage will limit movement and help to stabilize the animal’s health.
5. The size of the cage will change based on the size of the animal. An infant squirrel may start with a small net cage with supplemental heat. A young juvenile squirrel would need a larger cage with metal bars as it explores the environment. An older juvenile squirrel would need a large pre-release cage to practice climbing and jumping skills. A larger outdoor cage allows an animal to “wild up” as it experiences the outdoor environment.
6. Learn how to control various temperature ranges in cages so animals have a choice of moving from a warmer area to a cooler spot. This is especially important for infants as well as adult animals that have mobility problems caused by injury or illness. Animals that can’t move away from a hot area risk hyperthermia or skin burns.
7. Cages must have the capability to be easily cleaned without the animal escaping. Some species require caging with a double door setup so the animal can’t go far if it escapes through the first door. Learn the ways to clean cages while minimizing stress

- to the animal.
8. Cages must be designed for safety. Remember that animals may panic or try to escape their cage. Ensure there are no sharp edges, protruding nails, or entrapment areas that could cause injury. Consider whether the location of an indoor cage will allow you to safely capture an animal that has escaped.
 9. Caging used by raccoons should not be used by any other species due to the risk of contamination with raccoon roundworm eggs. These eggs are very resistant to disinfection and can be viable in the environment for ten years. Raccoon roundworm is lethal to most other mammal species. Wildlife rehabilitators minimize that risk by using a consistent deworming schedule with their raccoons.
 10. Outdoor cages need to be predator proofed. Learn how hardware cloth is commonly used to keep predators from gaining access to cages. Outdoor cages need to provide a mixture of sun, shade, and protection from the elements while the animal re-acclimates to life outdoors.
 11. Learn how cage enrichment can help a juvenile animal learn new skills and keep an adult animal from being bored. Hide nuts around the cage of a juvenile squirrel so they can practice their foraging skills. Place sprigs of berries or millet in the cage of a bird to mimic food in the wild. Try to replicate the natural world in your cage and see how well the animal responds.

The National Wildlife Rehabilitators Association (NWRA) (<https://www.nwrawildlife.org/>) has developed a listing of the minimum cage size requirements for a variety of wildlife. It is strongly recommended that you review these caging criteria to ensure the health and safety of wildlife in your care. Building cages for wildlife is often an expensive project, so you want to construct them correctly the first time.

The following are some questions for you to practice for the exam:

1. A person brings you a juvenile raccoon that looks stressed and weak. You already have a cage with three raccoons of a similar age. You should:
 - a) Follow a quarantine procedure by placing the new raccoon in an isolation cage.
 - b) Immediately place the new raccoon in with your other raccoons so it is less stressed.
 - c) Place the new raccoon in a cage with only one of your other raccoons. This will help to reduce stress in the new raccoon without jeopardizing all the raccoons.
 - d) Examine the new raccoon for fleas. If the raccoon appears clean, it should be placed with the other raccoons.

Answer: a) Raccoons are known to have contagious diseases, such as canine distemper and rabies. This raccoon needs to be quarantined until the health of the raccoon has been determined. There are other species, such as skunks, that require a similar quarantine protocol.

2. Which of the following statements is true about disinfecting cages?
 - a) A raccoon cage can be used by multiple species if it is disinfected with bleach.

- b) Soap and water are good disinfectants for most bacteria, virus, and fungi.
- c) Feces and organic materials need to be removed before disinfecting a cage.
- d) If an animal was healthy, the cage does not need to be disinfected before being reused.

Answer: c) Disinfectants don't work well unless feces and organic matter are first removed. This is the only true statement. All other statements were false. Soap and water can clean a cage, but do not kill disease-causing germs as well as a disinfectant. Even if an animal was healthy, the cage should be disinfected before another animal uses it. A raccoon cage should only be used by raccoons due to the concerns of a nematode parasite called Raccoon Roundworm (Baylisascaris procyonis). The eggs of this parasite are resistant to disinfectants and persist for years in the environment. The only effective way to destroy the eggs is through extreme heat, such as a blowtorch, which is not recommended as a routine procedure.



Chapter 15: Feeding Baby Animals

One of the most common responsibilities of a wildlife rehabilitator is to feed baby animals in their care. How well this task is accomplished will directly impact the health and survival of those babies. This chapter will deal with some important key points for you to study and practice under the supervision of an experienced wildlife rehabilitator.

1. Feed baby animals on a consistent schedule that will meet the animal's daily nutritional needs. This will vary from species to species as well as with the developmental stage of an animal. Learn about the feeding schedules of common species. Recognize that missed feedings will deny baby animals the sufficient nutrition they need to grow.
2. Use only formulas that have been researched and found to meet the nutritional needs of an animal. This will be discussed further in the next chapter (Wildlife Nutrition).
3. Many infant animals need to be stimulated to urinate or defecate. Sometimes it is helpful to stimulate prior to feeding so the infant is more comfortable. Sometimes it works well to stimulate the infant after feeding to encourage defecation. This may vary from species to species as well as individual animal needs.
4. Use a gradual process to transition an orphaned animal from rehydration fluid to formula. Many rehabilitators give baby animals a formula that has been fifty percent diluted for the first feeding and increased to full strength formula within the next two or three feedings. This gives the animal a chance to adjust to a formula that is different from the natural formula provided by the mother. Monitoring the quality of the animal's feces helps the wildlife rehabilitator to identify whether a baby's digestive system is ready to accept full-strength formula or requires a more gradual transition.
5. Keep the baby warm during feeding. Many infant animals cannot regulate their own body temperatures (thermoregulation) and require external sources to be kept warm. Wildlife rehabilitators commonly wrap baby mammals in a warm cloth during feeding. Baby birds are kept in an incubator or under a heat lamp.
6. Use the appropriate syringes, feeding tubes, bottles, and nipples as required for each species. The wrong size syringe or bottle could cause the formula to come out too fast or too slow. The wrong type of nipple could make the animal fussy at feeding time or could cause the nipple to be chewed and swallowed. There is a large assortment of nipples and syringes available for consideration. Experienced wildlife rehabilitators can tell you which feeding tools they prefer and why. For many animals, a syringe is preferred over a bottle because the flow of the formula can be controlled.
 - a) Some infant animals have difficulty swallowing and are commonly gavage (tube) fed by wildlife rehabilitators. The two most common species to be gavage fed are bunnies and Virginia opossums.
7. The wildlife rehabilitator needs to warm up the formula before feeding and keep the formula warm when feeding multiple babies. Formula that is cold can cause digestive

- problems in wild babies. Many wild babies will refuse formula that is not warm. Formula can be warmed up by placing the formula in a container of hot water and using a mug warmer or bottle warmer to keep the water at an optimal temperature. Note that some species like the formula hotter than other species.
8. Learn the best position for feeding your babies. Most babies do best with their feet on the ground and their heads tilted slightly upwards. Learn the best position to feed your baby to encourage proper formula consumption without aspiration.
 9. Learn how to calculate the correct amount of formula required for each baby animal. This is not guesswork. Feeding a baby animal too little formula per day results in the animal not getting enough nourishment to properly grow. Feeding a baby animal too much formula per day could result in life-threatening digestive problems, such as bloat or diarrhea. The wildlife rehabilitator needs to calculate how much formula to feed an animal per feeding, how many feedings, per day, and the recommended time between each feeding. These calculations will constantly change as the animal grows. Remember that every animal has individual nutritional needs and must be monitored to ensure the animal is gaining weight and growing strong. The following are some general calculations used by wildlife rehabilitators:
 - a) You must know the stomach capacity of each species to determine how much formula can be fed at once. Many mammals have a stomach capacity of 5-7% of their body weight. However, there are exceptions to the 5% rule. For example, infant eastern cottontails can hold 10% of their body weight per feeding. Learn the stomach capacity of common mammal species.
 - b) Many baby birds also have a stomach capacity of 5% of their body weight. However, some birds (i.e. rock doves) can hold up to 10% of their body weight due to having a large crop. Learn the crop capacity of common avian species.
 - c) Learn how to convert the weight of the baby animal to the amount of formula it can eat per feeding. Here is an example: You have a red squirrel weighing 50 grams. The red squirrel has a stomach capacity of 5% of its body weight. You calculate that 5% of 50 grams is 2.5 ($50 \times .05 = 2.5$). You can safely feed the red squirrel 2.5 ml (milliliters) of formula per feeding. You would have to know the developmental stage of the animal to know how many feedings per day is required.
 - d) Learn how to calculate the minimum number of calories an animal requires per day to survive. This term is symbolized by Kcal/day. It is also called the MEC (metabolic energy coefficient) or basal rate of the animal. Learn how to calculate the MEC for placental mammals, marsupials, passerines, non-passerines, and reptiles. There are wildlife rehabilitator books available that provide these formulas. The formulas can be adjusted for animals that require more nutrition, such as infant animals or debilitated animals.
 10. Learn what aspiration pneumonia is and how to avoid it. In brief, aspiration pneumonia can occur when an animal inhales formula into its lungs rather than swallowing the formula. This can occur if the animal is being fed too quickly, is being held in a poor feeding position, or an incorrect feeding tool is being used. The aspirated fluid in the lungs can cause a life-threatening infection.
 - a) One sign that an animal has aspirated would be the animal blowing “formula bubbles” out of its nose during feeding.

- b) If an animal has aspirated, immediately stop the feeding, and tip the baby so the head is aimed downward towards the floor. Gravity will help the fluid to flow out of the lungs. Give the baby a short time to rest before resuming the feeding.
 - c) Try to determine why the baby aspirated and correct the problem.
11. There is a process called “weaning” that involves an animal going from a liquid diet (formula) to a solid diet. This is generally the time when the animal begins self-feeding. Weaning is a gradual process since the animal needs time to learn how to recognize and eat natural foods. Learn the techniques for weaning an animal from formula to natural foods. Learn why it is important for an animal to recognize natural foods before being released into the wild.
 12. Learn how overfeeding can be a cause of diarrhea. Diarrhea can cause severe dehydration and could be fatal to young animals. Diarrhea has many causes, such as stress, parasites, cold formula, inappropriate formula, abrupt change in formula, or unclean feeding tools. However, one of the most common causes of diarrhea is overfeeding an infant animal, which overloads the animal’s digestive system.
 13. Learn what the terms “bloat” and “enteritis” mean. These are both life-threatening conditions of the digestive tract that can be caused by incorrect feeding techniques and infection in the animal’s intestinal tract. Learn how to respond to these conditions.
 14. Some baby animals are precocial, which means they can eat on their own at a young age. Examples of precocial animals are waterfowl, game birds, and turtles. It is important to recognize that precocial animals need to be in an environment that encourages self-feeding, is warm, and minimizes stress.

The following are sample questions similar to those found on the state wildlife rehabilitation exam:

1. You are feeding an eastern grey squirrel formula from a syringe. The animal has become fussy and does not want to finish the syringe. Which of the following should you initially check?
 - a) Is the formula too cold?
 - b) Is the formula too thick and should be diluted with water?
 - c) Does the squirrel need to urinate or defecate before finishing the formula?
 - d) Only “a” or “c”

Answer: d) You should check to see if the temperature of the formula is appropriate. Sometimes baby mammals need to eliminate before eating. Diluting the formula would decrease the amount of nutrients being given to the animal so this would not be an initial response. However, there are some instances where formula is diluted as part of a treatment for diarrhea.

2. You have a house sparrow with half-grown wing feathers that should be fed:
 - a) Every four hours during the day.
 - b) Every four hours during the day and throughout the night.

- c) Every 45-60 minutes during the day.
- d) Every 45-60 minutes during the day and night.

Answer: c) Healthy baby birds do not need to be fed during the night, which eliminates answers "B" and "D". This bird is not yet weaned and would need feeding at least every hour. A bird being fed every four hours should have full feathers and only need minor support feeding.



Chapter 16: Wildlife Nutrition

One of the most important and complex areas of wildlife rehabilitation is the topic of nutrition. This is a constantly evolving topic and, therefore, difficult for a new wildlife rehabilitator to learn. The best nutrition for a wild baby animal comes from a healthy parent of the same species. Wildlife rehabilitators strive to replicate the specific nutrients required for each species by using various formulas.

Over the years, many homemade formulas have been used by wildlife rehabilitators. These formulas were created through a trial and error process to see which ones produced the healthiest animals. Many of these formulas were not analyzed to see whether they matched the nutrients found in the milk of the natural parent. This is not considered good practice by current wildlife rehabilitation standards. Homemade formulas may help a baby animal to survive, but they may not produce an animal healthy enough to withstand life in the wild.

Good practice in wildlife rehabilitation demands that wildlife rehabilitators use researched formulas with proven results. The protein, fat, and carbohydrate contents of the milk or food provided by the natural parents of different species have been determined. Companies now produce formulas designed for specific wildlife species that attempt to match the nutrients young animals would receive from their natural parents. It is best to use a formula or food that has been specifically developed to meet the nutritional needs of the species you are rehabilitating.

Since this is an evolving science, the recommended composition of certain formulas may change from year to year. Wildlife rehabilitators stay current on these issues by attending wildlife rehabilitation conferences and joining wildlife rehabilitation organizations.

The following key points are important to learn about wildlife nutrition:

1. Learn about the role of protein, fats, and carbohydrates for growth and development. For example, an eastern cottontail requires medium levels of protein and high levels of fat. Some animals require a higher level of these nutrients because they grow so quickly. An animal that fails to obtain vital nutrients during infancy might have stunted growth, unhealthy fur, or poorly functioning internal organs. Nestling birds that lack proper nutrition will develop a condition, known as stress bars or fault bars, that causes their feathers to easily break.
2. Learn about metabolic bone disease (MBD) and how it is caused by an imbalance of calcium, phosphorus, and vitamin D in the body. This is a disease that can cause brittle bones and crippled joints in an animal. It can be difficult to reverse and may cause an animal to be non-releasable. For many animals, the proper ratio of calcium to phosphorus is 2:1. An excess of phosphorus is one cause of metabolic bone disease. It is highly important to learn what types of foods contain calcium and phosphorus to ensure the correct balance is maintained in an animal's diet. Note that the term “rickets” is sometimes used to describe metabolic bone disease.
3. Learn about various vitamins and how they help an animal to grow. Vitamin

supplements are needed in wildlife facilities because animals often arrive depleted of vital nutrients. Some vitamin supplements can be added to water, while others can be added to food. Learn the differences between the B, C, D, and K vitamins in contributing to the health of an animal.

4. Vitamin D can be obtained from natural sunlight or a full spectrum artificial light source. Remember that natural sunlight does not produce vitamin D through a glass window.
5. Learn about the purpose of fiber in maintaining digestive health for some species. For example, juvenile and adult rabbits require fiber (easily provided by timothy hay) to maintain digestive health. Fiber can also be found in many fruits and vegetables.
6. Learn about the role of probiotics for wildlife health. Many species depend on the addition of probiotics to help them digest formulas. Probiotics are also helpful when animals are recovering from antibiotic therapy.
7. Understand how dietary needs vary from species to species. Diets will also change as an animal grows from an infant to a juvenile to an adult.

Be wary of some formulas and foods that are carried by your local pet store. They may be falsely advertised as being complete diets for birds or mammals. For example, a pet store may suggest that a young squirrel be fed sunflower seeds, cracked corn, and peanuts. An experienced wildlife rehabilitator knows that this is not a balanced squirrel diet and would produce a stunted squirrel that would likely require euthanasia. Since a squirrel is a rodent, the primary diet for a squirrel is a high-quality rodent chow or something with similar nutrients. There are wildlife rehabilitation websites and internet stores that can help you obtain items not found in local pet stores.

It becomes confusing when wildlife rehabilitators are advocating for different formulas for the same species. Since this is an emerging field of science, there will be differences of opinion about which formula or food works best. As long as a formula or food has been shown to contain the proper nutrients, it's a matter of personal preference when deciding what to use.

Wildlife nutrition is one of the most important topics to study when preparing to become a wildlife rehabilitator. Take the time to discuss this topic with an experienced mentor.

The following are sample questions to help you prepare for the state wildlife rehabilitation exam:

1. A vitamin that promotes nerve growth and eye development is:
 - a) Vitamin A
 - b) Vitamin B6
 - c) Vitamin C
 - d) Vitamin D

Answer: b) Vitamin B6 is one of the vitamins needed for healthy nerves and eyes.

2. Metabolic bone disease (MBD) is generally caused by:
 - a) A lack of fiber

- b) A lack of protein
- c) An improper balance of calcium and phosphorous
- d) An improper balance of fats and carbohydrates

Answer: c) Metabolic bone disease is often caused by an improper balance of calcium and phosphorous. It can also be caused by a lack of vitamin D, which is why most reptiles should have a UVB light source with a bulb that has been used for no more than six months. The UVB output will wear out before the illumination of the bulb does.



Chapter 17: Dehydration Protocols

Wildlife rehabilitators should assume that all wildlife entering their facility have some level of dehydration. Whether the animal is orphaned, injured, or ill, it is likely that something has kept the animal from getting adequate fluids. Helping to rehydrate an animal requires more than simply giving it a drink of water. Proper rehydration requires a planned process to supply the proper types of fluids the animal needs to return its body back to normal.

To appreciate the impact of dehydration on an animal, it is important to learn about the mechanism of dehydration. The loss of fluid from the body affects all organ systems of an animal. A severe loss of fluid can prevent the maintenance of normal blood pressure, resulting in insufficient oxygen supply to organs. Also, an imbalance of the electrolytes normally present within bodily fluid will have multiple negative effects at the cellular level. If you understand what is wrong inside an animal, you will understand why giving water to a dehydrated animal is not sufficient.

There are levels of dehydration that range from mild and moderate to severe and life-threatening. These levels are determined by the loss of fluid as a percentage of an animal's body weight. An animal that has lost 10% or more of its body fluid will be in extremely serious condition and may die.

Providing an appropriate rehydration fluid is one of the first things a wildlife rehabilitator should do after warming up an animal and assessing it for injuries. In most cases, the animal needs to be at least partially rehydrated before it can receive food or medications. It may take several hours to several days for the animal to become fully rehydrated.

All animals need a certain amount of fluids daily to survive. This is called "maintenance fluid". Existing dehydration and ongoing fluid loss, such as from diarrhea, are referred to as a "fluid deficit". Rehydration therapy involves calculating an animal's needs for both maintenance and deficit fluids.

The following key points are important to study in preparation for the state wildlife rehabilitation exam:

1. Learn about the mechanism of dehydration and what it means to an animal. Study how this is not just a loss of water, but rather an electrolyte imbalance inside an animal that affects it at the cellular level.
2. Learn the clinical signs of the different levels of dehydration. Learn what a "skin pinch" test shows about the level of dehydration in a squirrel. Find out what the mucous membranes of an animal can tell us about the animal's state of hydration. Learn how sunken eyes or "sticky saliva" might be an indicator of severe dehydration. Be prepared to determine whether an animal is mildly or moderately dehydrated versus in a severe or life-threatening state of dehydration.
3. Learn about how observation of urine and feces helps the wildlife rehabilitator assess

- the dehydration level of an animal. Has the animal urinated and, if so, what was the color of the urine? In many cases, a darker urine (dark yellow or brown) can be an indicator of dehydration. Learn how observation of feces can also provide similar information.
4. Learn about the terms “isotonic”, “hypotonic”, and “hypertonic” as they pertain to rehydration fluids. See the glossary in the back of this study guide for more information.
 5. There are a variety of rehydration fluids available to the wildlife rehabilitator. Some fluids, such as Pedialyte, can only be given orally (PO) to an animal. Other fluids, such as Lactated Ringers, can be given orally, subcutaneously (under the skin), or intravenously (in the veins). Learn about the different hydration fluids and the different routes for administering them to animals.
 6. Learn how to transition infant animals from rehydration fluids to formula. Many wildlife rehabilitators use a gradual process of diluted formula to make this transition easier for the animal’s digestive system.
 7. Learn how to calculate how much fluid must be replaced for an animal of a particular weight when a particular level of dehydration is determined. The fluid calculations will include the fluid deficit as well as the maintenance fluid the animal needs.
 - a) To calculate the fluid deficit: % dehydration of the animal X body weight (grams) = ml fluid to be replaced over 72 hours. For example, an animal is determined to be 10% dehydrated and weighs 1000 grams. To calculate the fluid deficit, you do the following equation: $.10 \times 1000 = 100$ milliliters of fluid to be replaced over a three-day period.
 - b) To calculate the maintenance fluid: estimate 55 ml/kg/day for mammals and 50 ml/kg/day for birds. For example, a one-kilogram mammal needs 55 milliliters of replacement fluid each day.

Using the above example, a mammal (one-kilogram weight) that has been determined to be 10% dehydrated would need 100 milliliters of deficit fluid replaced over a three-day period plus a daily maintenance of 55 milliliters of fluid. The 100 milliliters of deficit fluid would be replaced at the rate of 50% of the amount (50 milliliters) the first day and 25% of the amount (25 milliliters) during each of the next two days. This would mean that the animal would receive $50 + 55 = 105$ milliliters of fluid the first day, $25 + 55 = 80$ milliliters the second day, and $25 + 55 = 80$ milliliters the third day. The amount of fluid given daily would be divided into multiple, smaller amounts to accommodate the stomach capacity of the animal. Any animal that continues to have severe blood loss or diarrhea would continue to have a higher fluid deficit level and must be given additional fluids.

A new wildlife rehabilitator should consider attending a workshop on fluid therapy commonly offered at wildlife rehabilitation conferences. These workshops are very helpful in training wildlife rehabilitators how to recognize and treat the various levels of dehydration. Proficiency at fluid therapy will save the lives of many animals in your care.

The following sample questions will help you prepare for the wildlife rehabilitation exam:

1. You receive a bird that seems lethargic, has sunken eyes, and sticky saliva. You judge

that the bird is:

- a) Mildly dehydrated
- b) Moderately dehydrated
- c) Severely dehydrated
- d) Just needs a sip of water

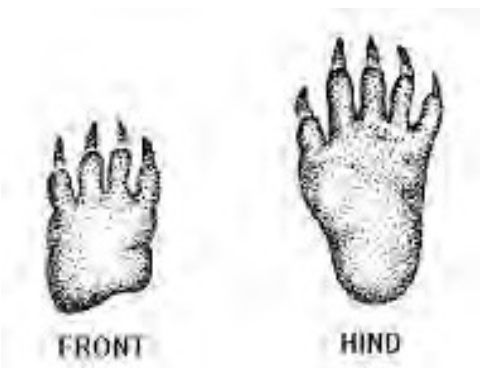
Answer: c) The bird is severely dehydrated and at imminent risk of death.

2. You receive a young Virginia opossum that has a leg injury with a deep puncture wound. The opossum has suffered a loss of blood due to this wound. You determine that:
- a) The opossum does not need rehydration fluid because the injury occurred on that day.
 - b) The opossum needs only maintenance rehydration fluid.
 - c) The opossum needs replacement rehydration fluid because of the blood loss.
 - d) The opossum needs both maintenance and replacement rehydration fluids.

Answer d) The opossum needs maintenance fluid to keep normal fluid levels, but it also needs replacement fluids due to the blood loss from the wound.

3. Water is an isotonic fluid and can be given subcutaneously. True or False?

Answer: False. Water is a hypotonic solution and can only be given orally to animals.



What kind of tracks are these?



Chapter 18: Dealing with Emaciated Animals

Wildlife rehabilitators regularly receive animals in varying states of malnutrition. This means that the animal has been deprived of the nutrients needed for survival. There are many causes of malnutrition and emaciation in an animal. A young animal may be deprived of food because its mother was killed or unable to come back to the nest. Additionally, an adult animal may have become injured and, therefore, unable to hunt or scavenge for food. There are also many diseases that can debilitate an animal to the extent that it is unable to forage in the wild. An emaciated animal is often on the verge of death when it is brought into care.

Any emaciated animal should be thoroughly evaluated for long-standing injuries that may have prevented it from being able to find food and could potentially prevent it from being released back to the wild. Such an injury would necessitate humane euthanasia.

A new wildlife rehabilitator may be dismayed when receiving an emaciated animal. Your first instinct is to give this animal something to eat. However, an experienced wildlife rehabilitator knows that giving an emaciated animal food right away would likely cause its death.

Emaciation is a complex process in which an animal is trying to cope with a lack of nutrients and protect the most vital organs. Once the body fat is gone, the animal begins to break down muscle to use as fuel as a last resort to keep alive. Many of the animal's body systems, such as the digestive system, start to shut down. Once an animal reaches this state, it is unable to digest food. It is harmful to give food to an animal that can't digest it. Undigested food will cause complications, including changes in the body's fluid balance, which may hasten death.

As a wildlife rehabilitator, it is important to learn about the different stages of malnutrition so you know how to proceed with an effective response. The following are some key points to learn:

1. Learn about the different levels of malnutrition, the mechanism of what is occurring, and the effect of malnutrition on an animal.
2. Never forget the basic first response for animal care. An emaciated animal needs to be warmed up and given rehydration fluid before anything else can occur.
3. If an animal has a disease, this will need to be addressed to reverse the emaciation. Please see the section on "Wildlife Diseases" for additional information.
4. There are many different products that can help an animal that is emaciated. Some products are "pre-digested" or easily digested foods and formulas. These are products that don't require much energy from an animal to digest. Learn about these products from experienced wildlife rehabilitators, wildlife manuals, or wildlife conferences.
5. Learn why not all "pre-digested" foods or formulas are alike. Some products provide the animal with more sugar than protein. For many animals with severe emaciation, the need for highly digestible protein is the best choice.
6. Learn about the term "re-feeding syndrome" and what it means for the treatment of emaciated animals. Re-feeding syndrome explains why a starving animal can have a

- sudden collapse if given whole food too early in the treatment process.
7. Learn how to give smaller portions of food or formula to an emaciated animal. It is important not to overload the gut since it may only be minimally functioning. For example, an animal that would normally get four servings of formula a day may now need eight smaller servings to accommodate an impaired digestive system.
 8. Learn how to evaluate the progress of the animal from its urine and feces. An infant animal that expels “white poop” after being fed formula is not digesting that formula. An animal whose abdomen becomes hard after feeding is indicating signs of bloat (gastric stasis).
 9. Keeping an animal warm and in a smaller cage will help it save calories for recovery.

Not all animals recover from severe emaciation, but it is possible to save some with the proper training and supplies. Severe emaciation is more problematic for growing babies than adults since their organs may still be developing. It is recommended that you work with a veterinarian or experienced wildlife rehabilitator to develop sound protocols for dealing with emaciated animals.

The following questions will help you prepare for the state wildlife rehabilitation exam:

1. You receive a juvenile woodchuck suffering from moderate emaciation and dehydration. Your first response is to:
 - a) Feed it Ensure.
 - b) Warm up the animal and feed it Ensure.
 - c) Provide Lactated Ringers solution, warm up the animal, and feed it watermelon for sugar energy.
 - d) Warm up the animal, provide Lactated Ringers solution, and feed it an easily digested diet.

Answer: d) You need to warm up the animal and provide rehydration fluid before moving onto an easily digested diet.

2. A person brings you a seven-day old eastern cottontail rabbit that they kept in a box for three days. They tell you that the bunny wasn't given anything, but the bunny's belly is distended and hard. The most likely reason for this is:
 - a) The finder gave something inappropriate to the bunny resulting in gastric stasis (bloat).
 - b) The bunny was appropriately fed.
 - c) The bunny has been self-feeding.
 - d) The bunny is not emaciated.

Answer: a) An infant eastern cottontail rabbit in a box for three days is going to be emaciated. The most likely reason for the swollen belly is bloat (GI stasis) due to being fed an inappropriate formula or having bacterial gas build-up after being starved. Seven-day old bunnies do not self-feed.



Chapter 19

Injured Wildlife and Wound Management

One of the more advanced and challenging areas of wildlife rehabilitation is working with injured wildlife. Unless you are a veterinarian or veterinary technician, you have probably had limited exposure to injured animals. This chapter was written to help new wildlife rehabilitators who have had little to no exposure to injured wildlife.

A new wildlife rehabilitator may only have adequate training to deal with relatively healthy orphans. It is important to recognize your limitations when dealing with injured animals rather than trying to treat an injury for which you are not trained. It is common for new wildlife rehabilitators to be brought injured animals by the public. A new wildlife rehabilitator needs to learn basic wound management skills so they can minimally “do no harm” until the animal can be brought to a veterinarian or more experienced mentor.

There are numerous types of injuries that a wildlife rehabilitator may encounter; this study guide will highlight some of the common wildlife injuries. The following key points are areas to study in preparation for being a wildlife rehabilitator:

1. Learn how to clean wounds properly. It is important to remove dead tissue (dead skin or broken feathers) that could cause infection. This process is called debriding a wound. In moderate to severe cases, this must be done with the animal anesthetized since this process will cause pain. There are solutions that can be used to clean debris without harming tissues. Povidone Iodine diluted to the strength of “weak tea” can be used as a cleanser. In contrast, undiluted hydrogen peroxide is a substance that can harm normal tissue and is not recommended for the cleansing of wounds.
2. Learn about the different topical medications for wounds. Some of them may be antimicrobial whereas other topical applications help to keep a healing wound moist. A moist wound helps to promote granulation tissue which is the start of healing for skin abrasions. Unpasteurized honey has long been recognized as an antimicrobial substance that helps fight infected wounds.
3. One common animal injury is puncture wounds caused by another animal, such as a cat or dog.
 1. Learn how to clean and treat these wounds with topical and oral antibiotics. Even the most minor scratch caused by a cat can cause a life-threatening infection in an animal. Cats have harmful bacteria in their saliva that can cause severe infections and possibly death. Learn how to look for the puncture wounds caused by the top and bottom teeth of a predator.
4. Another common injury is a skin abrasion on an animal. Learn how to clean debris from these areas and treat abrasions with topical and/or oral antibiotics. These injuries are commonly found on an
 2. animal that has “road burn” from being hit by a car.
 5. Learn about the use of antibiotics for infection control. A wildlife rehabilitator must learn how to
 3. correctly use antibiotics to “do no harm”. Some antibiotics used by humans can harm

4. certain species of animals. For example, rabbits cannot tolerate penicillin given orally. A wildlife rehabilitator must learn how to give the correct dose of an antibiotic to avoid an overdose or ineffectual dosage. See the chapter on “Medication Administration” for further information. Note: Improper use of antibiotics can result in the development of bacteria that are resistant to antibiotics, which can result in severe infections in animals and humans. Antibiotics should not be given unless there is a legitimate indication for their use. Consult with a veterinarian about the proper use of antibiotics.
5. Learn the proper techniques to safely restrain an injured animal. Remember that an animal in pain is likely to fight back. Have a backup plan in anticipation of the injured animal defending itself or fighting back. Know when it is safe to conduct a physical restraint by yourself and when a second (or third) person will be required.
6. Learn how to stabilize a fractured limb or wing so an animal can be safely transported to a veterinarian. Learn the difference between a simple fracture and an open fracture. Learn the basic bone structure of bird, mammal, and reptile species so you can have a knowledgeable conversation with your veterinarian. Do not attempt to splint a fracture unless you have received specific training in this area. Remember that manipulating a broken bone can be very painful for the animal. Learn to recognize when a wound or injury should not be addressed without anesthesia due to the amount of pain the animal would experience. In these cases, it is best to give pain medication and antibiotics, if indicated, and transport the animal to a veterinarian as soon as possible.
7. Turtles are often hit by cars while crossing roads and brought to a wildlife rehabilitator with a cracked shell. There are several techniques for turtle shell repair that can be performed by a new wildlife rehabilitator. However, a veterinarian should be consulted prior to attempting any major repair. Remember that a turtle shell is composed of living bone. Shell fractures are painful and can become severely infected if not treated properly. A turtle’s spine is embedded into its shell. Any shell fracture that crosses the spinal column will likely cause paralysis to the turtle.
8. Animals frequently experience neurologic symptoms due to head or spinal trauma. This can result from any severe impact, such as an animal colliding with a motor vehicle or a bird hitting a window. Learn how supportive care can often help these animals survive. Understand that neurological symptoms may be due to trauma, but they can also be caused by toxins, bacteria, virus, or parasites. This is another area where the advice of a veterinarian is recommended to make a differential diagnosis.
9. A more severe injury is paralysis of limbs due to spinal trauma. This requires assessment by a veterinarian to determine whether the animal can be saved. The animal will be assessed for a
10. “deep pain reflex” (bone pain) to help determine whether recovery is possible. An animal that cannot demonstrate a deep pain reflex has a poor prognosis for recovery.
11. Learn about the benefits of pain management for animals. Many animals don’t show signs of pain even when in major discomfort. Animals often benefit from a pain medication, such as Meloxicam. The general rule of thumb is to give pain medication if a similar injury would cause
12. pain in humans. Animals that are given pain medication will eat and sleep better and may also recover from their injuries more quickly. Be aware that some pain

- medications require the animal to be well hydrated to avoid side effects.
13. Learn different techniques for bandaging wounds. Be aware that some animals have difficulty tolerating a bandage. There are bandages that help keep wounds moist without sticking to developing granulation tissue. There are bandages that will help to drain an infected wound. Work with your veterinarian to learn about these wound management techniques.
 14. Learn how to detect vision or hearing deficits in wildlife. Are the pupils of both eyes the same? Does the animal respond to light and/or sound? Some animals rely upon vision or hearing to survive in the wild. Other animals can be released with some deficits in these areas. Learning about functional eyesight and vision requirements for each species is important in wildlife rehabilitation.
 15. Learn about the benefits of physical therapy for recovering animals. It takes time for an injured animal to regain strength and flexibility of its limbs after a lengthy recovery from an injury. Some animals require their wings and limbs to be periodically stretched, but often the best physical therapy is simply providing the animal with a proper enclosure in which it can exercise.

Realistically, wound management is a skill that requires both training and practical application to become proficient. It is important for a wildlife rehabilitator to work with their veterinarian or mentor to gain these practical skills. Many wildlife rehabilitators acquire basic skills by working on cadaver animals at conference labs. Working on cadavers allows the wildlife rehabilitator to learn and practice techniques on an animal that is not struggling and won't be harmed if mistakes are made.

The following sample test questions will help you prepare for the state wildlife rehabilitation exam:

1. You are brought a baby squirrel with two small puncture wounds in its side. The finder reported that the squirrel was taken out of the mouth of a cat. Due to the small size of the wounds, this animal does not need antibiotics. True or False?

Answer: False. Any animal that has been in the mouth of a cat will need antibiotic therapy. Cat saliva has gram-negative bacteria that can cause a lethal infection in small animals.

2. Which of the statements about wound management is true?
 - a) Animals can take care of minor wounds on their own and don't need our help.
 - b) To "debride a wound" means to cover it with a dry bandage.
 - c) A drop of antibiotic would generally be the correct dose.
 - d) An open fracture is generally more serious than a simple fracture.

Answer: d) An open fracture means the bone is sticking out of the skin. This type of fracture is more serious than a simple fracture since the animal is prone to infection. It is false to assume an animal can take care of minor wounds by itself. Although this may happen in nature, it is safer to conduct wound management on all wounds. To "debride

a wound” means to clear out any dead skin, fur, or feathers. A drop of antibiotic is not a precise dose and would often be incorrect. See the chapter on “Using Medication with Wildlife” to learn about how to determine the correct dose of medication for an animal.



Chapter 20: Using Medication with Wildlife

Wildlife may come into your care with both injuries and illness. Each of these conditions generally requires the use of medications to provide appropriate treatment. This chapter will provide a general overview of how medications are administered to wildlife. It is essential for a veterinarian to help new rehabilitators select the appropriate medications and calculate the proper dosages. This chapter provides an introduction to administering medications to wildlife.

Many medications are commonly used for a variety of purposes. Some may kill parasites or are intended to treat infections, while others stop diarrhea or relieve pain. The use of medications for wildlife is an “off-label” use. This means that the medication was not developed with the intention of being used to treat wild animals, and the drug’s effectiveness for treating wildlife, or its safety when administered to wildlife, has not been tested. However, if a drug is known to be safe and effective in treating similar conditions in domestic animals, it can reasonably be assumed that it may be useful for treating at least some wildlife species as well. The use of any medical drug carries a certain level of risk. Some medications can be beneficial for some species, but lethal to others. Some medications should only be given after the animal has been rehydrated.

The wildlife rehabilitator should begin with a diagnosis of the animal's condition. Based on this diagnosis, the wildlife rehabilitator should consult with their veterinarian or a medical reference book to select the appropriate medication and dosage. Prescription strength drugs can only be obtained through a veterinarian.

A wildlife rehabilitator needs to know the precise amount of medication to give a specific animal. For example, one drop of a particular medication for a six-week old squirrel may be an overdose of medicine. On the other hand, one drop of the same medication for a full-grown raccoon may be too little medicine. The squirrel risks side effects from the high dosage while the raccoon may not receive enough medication to treat the problem.

There are mathematical calculations that must be made to determine the correct dose of medication. These calculations consider the weight of the animal, type of species (i.e. bird, mammal, or reptile), and the concentration of the medication.

Before beginning the mathematical calculations, it is helpful to learn a few medical terms. These medical terms are listed at the back of this study guide. Here are a few you must learn for this particular exercise:

PO: oral, by mouth

SQ: subcutaneous (under the skin)

IM: intramuscular (into the muscle)

SID: once a day, every twenty-four hours

Q24: once a day, every twenty-four hours

Mg/kg: milligrams per kilogram

Mg/ml: milligrams per milliliter

1 Kilogram = 1,000 grams= 2.2 pounds

The mathematical equation you must memorize is:

Weight of the animal (kilograms) multiplied by the dose rate (milligrams per kilograms) divided by the medication concentration (milligrams per milliliters)

1. To calculate the amount of drug to administer you take the animal's weight in kilograms multiplied by the recommended dose rate of drug (milligrams per kilograms) to get the specific amount of drug needed.
2. To calculate the volume of drug to administer, you take the amount of drug needed (milligrams) divided by the drug concentration (milligrams per milliliters) to get the volume of drug to administer in milliliters.

Let's take these calculations step by step using the following example. You have an infant eastern grey squirrel that weighs 100 grams. The squirrel has an infection and requires an antibiotic named Baytril, as recommended by your veterinarian. How much Baytril should you administer to this infant squirrel?

Step One: The mathematical equation requires the animal's weight to be in kilograms. Your squirrel is very small and has been weighed on a gram scale. You need to change the squirrel's weight from grams to kilograms for your equation. In the metric system, one kilogram is equivalent to one thousand (1,000) grams. Therefore, the easiest way to do this conversion is to divide the squirrel's weight by 1,000. $100 \text{ grams} \div 1,000 = .100 \text{ kilograms}$.

Step Two: You need to find out the recommended "dose rate" of Baytril for squirrels. This is the amount of medication believed to be within the therapeutic range for this antibiotic. You can either find out this information from your veterinarian or you can look into a medication formulary. Be aware that some medication formularies were developed for domestic "exotic species" while other formularies were created specifically for wildlife dosing.

Enrofloxacin is the official name for Baytril and the name you look for in the medication formulary. Baytril is the trade name that most wildlife rehabilitators use. A review of the NWRA Wildlife Formulary showed that Baytril can be administered to rodents at a range of 5-20 mg/kg. The term "mg/kg" stands for milligrams per kilogram. You recall that squirrels are classified as "rodents". Therefore, an average dose rate for squirrels would be around 10 milligrams/kilograms.

Step Three: You need to determine the strength or "concentration" of the Baytril you will use. Baytril comes in different strengths for different species of animals. The one commonly used by wildlife rehabilitators is 22.7 milligrams per milliliters (mg/ml). You can find the concentration of the medication listed on the label of the bottle.

Now that you have the three variables you need for the mathematical equation, you can determine how much medication to give your infant squirrel doing two simple math steps.

Weight of the animal (kilograms) multiplied by the dose rate (milligrams per kilograms) divided by the medication concentration (milligrams per milliliters)

Putting the numbers into this equation looks like this:

$.100 \text{ multiplied by } 10 \text{ divided by } 22.7 = \text{amount of medication to give your squirrel}$

$.100 \text{ multiplied by } 10 = 1.0$

$1.0 \text{ divided by } 22.7 = .044 \text{ (round it to } .04)$

You will administer .04 milliliters of Baytril to your squirrel.

Different medications have different dosing regimens. Some medications should only be given once a day, while other medications are required twice a day or more. Let's go back to the example of the infant squirrel. We calculated that the squirrel needed .04 milliliters of Baytril for the infection. The NWRA Wildlife Formulary showed that the Baytril can be given PO, SQ, IM, or Q24. This indicates that the Baytril can be given orally, subcutaneously, or intramuscular once a day (every 24 hours).

Wildlife rehabilitators most often use oral (PO), subcutaneous (SQ), or intramuscular (IM) methods for administering medications. These are the easiest techniques to use on wild animals. Another excellent mode of medication administration is intravenous (IV), which means putting the medication directly into a vein. This is a more challenging technique to learn and generally only done by a veterinarian or someone with similar medical training.

It is important to learn these terms to converse clearly with your veterinarian. Your veterinarian may give you a bottle of medication that shows the name of the drug, the concentration of the drug, the technique for administering the drug, and the correct dose for the specific species. It is also important to use these terms for record keeping purposes.

Wildlife rehabilitators must ensure that drugs are stored safely and correctly in their homes. Keep these drugs out of the reach of children. Some drugs require refrigeration, and many drugs must be kept out of bright daylight. All drugs have an expiration date that will let you know how long the drug will retain its full potency.

In addition to traditional medications, some wildlife rehabilitators also use homeopathic medications. Homeopathic medications help an animal's immune system recognize an illness or injury and focus the body on its own healing process. Homeopathic medications can generally be used in combination with traditional medications dispensed by veterinarians without causing any harm. Many wildlife rehabilitators use homeopathic medications to help reduce fear, grief, and stress in animals.

Please review the glossary of medical terms located at the back of this study guide. You should anticipate that some of these terms may be included in questions on the state wildlife rehabilitation exam.

The following questions will help you prepare for the state wildlife rehabilitation examination:

1. You have an animal that weighs 2 kilograms. The animal needs a drug dose of 10 milligrams per kilogram of Medicine X. The drug comes in a tablet with a concentration of 20 milligrams per tablet. How much medication will the animal

need?

- a) 2 tablets
- b) 1 tablet
- c) 1/2 tablet
- d) none of the above

Answer: b) The animal needs only one tablet. First, determine how many milligrams are needed per kilogram of the animal's weight. If the medication dose rate is 10 milligrams per one kilogram, then your two-kilogram animal needs double that amount (2×10) = 20 milligrams of medication. Lucky for you, the drug comes in a tablet of 20 milligrams.

2. Your veterinarian tells you to give the medication PO, BID. This means you should:

- a) Give the medication once a day orally.
- b) Give the medication twice a day subcutaneously.
- c) Give the medication twice a day orally.
- d) Give the medication twice a day subcutaneously.

Answer: c) The terms mean to give the medication orally (PO) twice a day (BID).



Chapter 21: Wildlife Diseases

Wildlife rehabilitators will encounter animals that have become sick and need our help. Dealing with a wildlife disease may seem scary to a novice wildlife rehabilitator. The best way to help a sick animal and keep yourself safe is by acquiring knowledge about wildlife diseases. This chapter will help you begin to learn the basics about this very complex subject.

Working with wildlife presents the risk that you may be exposed to animals with diseases. Some of these diseases can be transmitted from wild animals to people (i.e., from raccoons to humans). These diseases are called zoonotic diseases. Some zoonotic diseases have the potential to be life-threatening to humans. Other diseases can only be transmitted between wildlife species and cannot be transmitted to humans. However, domestic animals, such as pets, are still at risk of potential exposure. As a wildlife rehabilitator, you need to become familiar with all the common diseases that affect wild animals.

It is critically important for you to learn about zoonotic diseases for your own health as well as the safety of the public. There will be further discussion about keeping the public safe from dangerous situations in the chapter on “Dealing with the Public”.

This chapter will cover some common wildlife diseases, their causative factors, host animals and symptoms, and the means of disease transmission. The term “causative factors” is the agent that causes the disease. Common causative factors are bacteria, viruses, fungi, parasites, and toxins. A host animal is the primary animal that is targeted by a disease. Transmission is the means for the pathogen to find a new host. Examples of transmission include air borne, bite, fecal/oral, and vermin.

By learning how zoonotic diseases are transmitted, you can take the necessary steps to avoid transmission. Some of these steps are as easy as washing your hands and wearing disposable gloves. Other steps may not be as obvious to a novice wildlife rehabilitator. The next chapter on “Sanitation and Infection Control” will cover basic methods to prevent disease transmission.

It is important to realize that an animal that does not appear sick can be a carrier of a disease or parasites, which can cause illness in anyone who has contact with the animal. Wildlife rehabilitators assume that all animals may be carriers of disease and take the necessary precautions.

The following are some of the common wildlife diseases in Massachusetts:

Wildlife Diseases

Disease	Zoonotic?	Cause	Transmission	Host Species	Symptoms
Squirrel Pox	No	Virus	Contact with lesions, insect bite transfer	Squirrels	Lesions on skin
Rabies	Yes	Virus	Animal bite via infected saliva	All mammals, particularly rabies vector species	Dumb or furious, neurologic symptoms
Canine Distemper	No	Virus	Close-contact sneezing, coughing	Raccoon, fox, coyote, fisher, skunk	Neurologic symptoms, coughing, diarrhea, tremors, etc.
Feline Distemper	No	Virus	Contact with body fluids, insects possible	Bobcat, raccoon, fisher, weasel	Diarrhea, vomiting, seizures, ataxia
Raccoon Roundworm	Yes	Parasite Roundworm	Fecal-oral ingestion or inhalation of eggs	Raccoons	Brain damage, blindness, death
Tularemia	Yes	Bacteria	Contact and eating infected meat	Mainly rabbits, rodents	Minimal to anorexia, death
Lyme Disease	Yes	Bacteria in a tick	Infected tick	Mammals	Flu-like symptoms, joint pain, neurologic symptoms
Salmonella	Yes	Bacteria	Ingestion of bacteria; Fecal/oral	Mammals, birds, reptiles	GI distress, diarrhea
Aspergillosis	Yes	Fungal	Inhalation of spores	Birds, mammals, reptiles	Pneumonia-like for compromised individuals
Coccidia	No	Protozoan species specific	Ingestion of protozoan or stress factors	Mammals, birds, reptiles	Severe diarrhea, GI distress
Hantavirus	Yes	Virus	Inhalation of rodent feces	Mammals	Pneumonia-like symptoms

Disease	Zoonotic?	Cause	Transmission	Host Species	Symptoms
Trichomoniasis (frounce)	No	Protozoan	Contact with infected bird	Avian species	Cheesy mass in mouth/throat
Parvovirus	No	Virus	Fecal/oral	Canines and felines	Severe neurologic symptoms
Sarcoptic Mange	Yes, Mites can get on you, but not reproduce	Mites	Contact with mites	Mammals	Severe hair loss, itching, secondary infections
Leptospirosis	Yes	Bacterial	Contact with infected food, urine, soil	Raccoons, skunks, rodents	Minimal except marine animals- depression, anorexia, fever, etc.
Giardiasis	Yes	Protozoal	Contaminated water	Beavers, waterfowl, muskrats	Diarrhea, lethargy, weight loss

The two most dangerous zoonotic wildlife diseases are rabies and raccoon roundworm (*Baylisacaris procyonis*). Here is some additional information on these two diseases.

Rabies:

This is a dangerous and fatal viral disease. All wild mammals must be considered potential carriers of rabies.

Host Animals: The most common animals in Massachusetts that contract rabies includes all species of bats, raccoon, skunk, fox, coyote, and woodchuck. The Virginia opossum appears somewhat resistant to this disease due to its lower body temperature. However, there have been documented cases of rabies in opossums. Other smaller animals (rodents and lagomorphs) do not tend to spread rabies because they are unlikely to survive an attack from another rabid animal. Although rabbits and rodents rarely contract rabies, they can contract the disease from other rabid animals.

Transmission: The virus is transmitted from the saliva of the host animal. This may occur via a bite wound or contact with infected saliva to open cuts or mucous membranes.

Animal Symptoms: The symptoms may include the animal exhibiting lethargy, aggression, friendliness, motor dysfunction, paralysis, excessive salivation, seizures, and eventual death.

Human Symptoms: Human symptoms are the same as animal symptoms and may also include an ascending paralysis. This disease is fatal once symptoms are observed. Human exposures require immediate washing of the wound area, allowing the wound to bleed, and immediate post-exposure rabies treatments. If exposure occurs, a doctor should be consulted immediately. The diseased animal should be euthanized according to the requirements of the Department of Public Health, and the brain tissue should be examined for the disease.

Pet Exposure: If a domestic animal is exposed (bites, scratches, saliva exchange, close contact), the pet's owner should contact their veterinarian immediately for advice on care and to see if a rabies booster is needed. Animal control should be notified as well to assist with submitting the wild animal for rabies testing. For advice on rabies exposures with domestic animals, contact the Massachusetts Animal Health Inspector at 617-626-1810.

Note: Any member of the public that has touched a rabies vector species with bare hands is considered to have potential exposure to rabies. Questions about exposure should be directed to the Massachusetts Epidemiologist at 617-983-6800 to determine the need for testing of the animal and post-exposure vaccinations for humans.

For more information on rabies, see the Massachusetts Department of Public Health webpage devoted to rabies at the following link: <https://www.mass.gov/rabies>

All wildlife rehabilitators are strongly encouraged to get a pre-exposure rabies vaccination even if they don't intend on working with the rabies vector species. All mammals can get rabies. Talk to your physician about the benefits of this important vaccination. Learn about the protocols of booster shots if exposure to rabies occurs and how often to get a rabies titer.

Raccoon Roundworm (*Baylisacaris procyonis*):

This is a dangerous parasitic disease.

Host Animals: Raccoons

Transmission: The infectious eggs are excreted in the feces. Transmission is through fecal-oral contamination (ingestion of the roundworm eggs or inhalation of the eggs). The eggs are resistant to disinfectants and can remain infectious in the environment for ten years. The eggs become infective within twenty-four hours of being expelled from the animal via feces.

Animal Symptoms: Adult raccoons show no signs of infection and are not harmed by this parasite.

Human Symptoms: In humans and other animals, the symptoms include irreversible central nervous system damage, inclusive of blindness and death, as the larvae migrate to the eyes, brain, and spinal cord. Children appear particularly susceptible to this disease from playing in infected dirt. The disease can be managed in adult raccoons through monthly administration of a de-worming medication.

Note that a similar parasite called *Baylisacaris columnaris* is commonly found in skunks. This parasite is equally as dangerous to other animals and humans.

Please note that the above information is only a partial list of diseases that affect wildlife. The disease chart does not list all the disease symptoms and further study is needed by the wildlife rehabilitator. It takes time to learn about these various diseases, including the symptoms, means of transmission, and possible treatment options. However, the conscientious wildlife rehabilitator maintains current information regarding the zoonotic and non-zoonotic diseases associated with the species in their care.

As part of your preparation for becoming a wildlife rehabilitator, you should learn about some of the other well-known wildlife diseases not mentioned above. Examples include Brucellosis,

Psittacosis, Histoplasmosis, West Nile Virus, White-Nose Syndrome, and Ehrlichiosis. You should also learn about diseases impacting amphibian species, such as Chytridiomycosis.

Wildlife rehabilitators are encouraged to talk to their health care professionals about their work with wildlife. Health care professionals need to know what species you work with to be aware of possible zoonotic diseases in the event you become ill. Many zoonotic diseases look “flu-like” but may require specific treatment. Working closely with your health care professional is an important step to protecting your own health.

There are multiple challenges that wildlife face in addition to natural predators and disease. Wildlife can become threatened by environmental hazards, such as lead poisoning, rodenticides, lawn chemicals (organic-phosphate poisoning), and toxic oil spills. Learn about the symptoms from exposure to these substances. Being a wildlife rehabilitator provides an opportunity to help animals overcome some of these obstacles to survival.

1. There are classes you can take to learn how to clean an animal contaminated by an oil spill.
2. Lead poisoning can be tested and treated by a method called “chelation therapy”. A veterinarian can help you with an animal poisoned by lead.
3. Rodenticides are commonly used by members of the public to eliminate vermin in their homes. There are different types of rodenticides that affect the body in varying ways. Some are neurotoxins, meaning they affect the brain and nervous system, while others called anticoagulants can affect the animal’s ability to clot their blood normally. These anticoagulant toxins cause severe internal bleeding and death in an animal. An animal eating this type of rodenticide poisoned mouse or rat will also get poisoned. There are Vitamin K treatments that can be used to save these animals if caught in time.
4. Lawn chemicals (organic-phosphate poisoning) are difficult to reverse and cause severe neurological symptoms. A veterinarian can give advice on the best treatment approach to cleanse the animal’s body from the toxic chemicals.

At the time of writing this study guide, there is an active pandemic of COVID-19 in Massachusetts as well as the rest of the world. There are many unanswered questions about whether humans can transmit this virus to wildlife (and vice versa). There is evidence that mustelids are contracting this disease, which is concerning for both human and wildlife populations. There are also concerns about a rabbit disease (Rabbit Hemorrhagic Disease [RHDV2]) in the southern part of the United States that will likely impact Massachusetts in the near future. Wildlife rehabilitators need to stay abreast of emerging infectious disease threats. Being part of a wildlife network is the best way to keep informed about emerging diseases that could impact wildlife and/or human populations. This will be further discussed in our chapter on “Professional Development”.

The following sample questions will help you prepare for the state wildlife rehabilitation exam:

- 1) There is a juvenile red fox that has scabby skin and missing fur. The fox is most likely suffering from the following:

- a) Canine distemper
- b) Rabies
- c) Ricketts
- d) Sarcoptic mange

Answer: d) The symptoms being described are consistent with sarcoptic mange. This disease is treatable; however, your veterinarian should be consulted as there are often secondary issues involved that will require further diagnostics and treatment. Treatment can ONLY be given in a rehabilitation setting. Never treat animals that are still loose in the wild by putting out medicine in bait. It is not only ILLEGAL, but the bait could be eaten by the wrong animal with deadly consequences. Wildlife rehabilitators are not allowed to use humane traps to capture wildlife.

2) Which of these animals is not as susceptible to rabies?

- a) Little brown bat
- b) Striped skunk
- c) Virginia opossum
- d) Gray fox

Answer: c) The Virginia opossum seems to be resistant to rabies due to the animal's lower body temperature. However, wildlife rehabilitators should assume the possibility of rabies when handling all mammals.



Chapter 22: Sanitation and Infection Control

The previous chapter covered animal diseases and may have left you wondering about the risks to your own health and the health of your family by working with wild animals. Being a wildlife rehabilitator will expose you to more diseases than the average person, but these risks can be managed by following standard precautions. Standard precautions are used by doctors, nurses, veterinarians, emergency workers, and many other professionals whose work exposes them to potentially harmful substances. Standard precautions mean that the wildlife rehabilitator will take preventative measures to avoid contact with blood, saliva, feces, and urine. The wildlife rehabilitator also must take precautions against any hazardous airborne particles. This chapter will cover some of the key points you should learn about standard disease control precautions appropriate for wildlife rehabilitation.

How can a wildlife rehabilitator avoid contracting a disease or exposing family members or volunteers to zoonotic diseases? The following are some ways to maintain a healthy wildlife facility:

1. Maintain control of insect and rodent infestations in your facility. Remember that insects and rodents can facilitate the transmission of some diseases.
2. Wash your hands frequently with antibacterial soap and warm water. Wash hands before entering a facility, after contact with an animal, and before exiting a facility. If you are bitten, immediately wash out a wound as thoroughly as possible. Contact your health professional if the wound is from a rabies vector species or a mammal displaying symptoms of rabies.
3. Where is your sink located? Is it in the same room as the wildlife or do you need to exit doors for handwashing? How will you keep doorknobs clean if the sink is in an adjacent room?
4. Wear disposable exam gloves for your protection and the protection of wildlife. Put on a new pair of gloves, as needed, to avoid transmission of germs from one animal to another. Wear nitrile gloves to prevent exposure to chemical substances. You may also need masks, gowns, disposable footwear, and eye protection for some high-risk cases.
5. Wear specially designed protective gloves to shield hands and arms from animals that bite. Often these gloves are made with Kevlar, which helps deflect sharp teeth and claws.
6. Learn the correct way to use needles to inject an animal with fluids or medication. Have an appropriate container for the disposal of “sharps”.
7. Know which animals require an isolation cage upon admittance due to their potential to spread certain diseases. Work with a mentor to learn how long a specific species needs to be quarantined to prevent the spread of disease. Understand that some diseases require an animal to be in a separate room (or separate building) to avoid airborne transmission of viral particles.
8. Use raccoon cages only for raccoons to avoid transmission of *Baylisascaris procyonis* (raccoon roundworm). The eggs can remain infectious in the environment for years. Generally, the use of a blowtorch flame is needed to sanitize the cage of a raccoon.

- Use a regular deworming schedule with raccoons to minimize risk. Learn how to clean a cage using appropriate footwear or disinfection foot bath to prevent disease transmission.
9. Learn the proper techniques for cleaning and disinfecting a cage. Most disinfectants won't work unless the cage has been cleared of debris (animal feces, bedding, left-over food, etc.) Some disinfectants need to remain on a surface for a period before the germs are killed. This is called "contact time". Read the labels on all bottles of disinfectants to learn their proper use.
 10. Learn about the role of disinfectants. Soap and water are not adequate for killing many bacteria, fungi, and viruses. Some disinfectants will work on bacteria but may not be effective on viruses. Read the label about whether the disinfectant needs to be rinsed off dishes used by animals for food and drink.
 11. A bleach and water solution can be an effective disinfectant and is inexpensive. However, bleach has a strong odor that is offensive to many species. Bleach and water solutions need to be made fresh daily to preserve effectiveness.
 12. All cages require disinfecting before use by any new animal. Animal food dishes, bottles, syringes, etc. require cleaning and disinfecting after each use.
 13. Whenever possible, feed healthy animals before feeding diseased animals. This will help prevent the transfer of disease to healthy animals.
 14. Allow only approved and trained staff to enter the rehabilitation area and/or work with the animals. Children and pets should not be allowed to have contact with any wild animals.
 15. Train all volunteers how to safely work with wild animals. Are your volunteers working with rabies vector species? It is important that all persons working with rabies vector species have the rabies pre-exposure vaccinations.
 16. Never consume food or drink in animal areas. There is a risk that airborne particles could land in your food or drink. Do not store food for human consumption in refrigerators or cabinets used for animal storage.
 17. Consider how you will launder wildlife items, such as blankets and towels. Do you need a separate washing machine and dryer different from your family's laundry?

Learning how to run a clean and sanitary facility will help you provide better animal care as well as a safer work environment.

The following questions will help you prepare for the state wildlife rehabilitation exam:

1. It is not necessary to wear disposable gloves if you wash your hands after touching an ill animal. True or False?

Answer: False. The best procedure would be to wear gloves while working with an ill animal and wash your hands afterwards.

2. You've had a new coyote pup in an isolation cage for twenty-four hours. Your normal isolation period is three days, but the coyote pup appears depressed. You have a group of two other coyote pups the same age in another cage. You should do the following:

- a) Take the coyote pup out of the isolation cage and put it with the other group of coyotes.
- b) Keep the coyote pup in the quarantine cage for the full isolation period.
- c) Have the coyote pup visit the other cage, but only for a period of one hour.
- d) Have the isolation cage and the other coyote pup cage next to each other so the coyotes can interact, but not come in direct contact with each other.

Answer: b) You should keep the coyote in the isolation cage for the full quarantine period. The other answers risk spreading germs from one coyote to another. You can consider cage enrichment to help make the pup happier.

3. A volunteer wants to work with bats but does not want to get the rabies pre-exposure vaccination because she is fearful of needles. You should:
- a) Allow her to work with bats but encourage her to get the vaccination.
 - b) Allow her to only work with bats you have deemed to be healthy.
 - c) Require her to get the pre-exposure vaccination before working with any of the common rabies vector species, including bats.
 - d) Respect that she has a phobia and make an exception to your rule.

Answer: c) The volunteer needs to have a pre-exposure rabies vaccination prior to working with any of the common rabies vector species, such as bats. There should be no exceptions to this rule. It is not possible to determine which animals are free from rabies and no chances should be taken with this potentially lethal disease.



Chapter 23: Release Criteria

The release of a rescued animal is the biggest reward for being a wildlife rehabilitator. It is a joyful occasion to watch a rehabilitated squirrel or an orphaned raccoon return to its rightful place in the wild. How well the release is done will significantly impact the animal's chance for survival after release.

There are many factors to be considered prior to releasing an animal back into the wild. Please note that the release site must meet the specifications under the regulation "Point of Capture" as well as be appropriate for the animal. The following factors need to be considered when preparing for a successful release:

1. Determine the developmental stages at which each species can live independently in the wild. Some species may need to be kept longer in captivity before they are able to survive in the wild than if they had been raised in the wild by their parents.
2. Know what a healthy and fit animal should look like. Is the animal the correct weight? Can the animal run, jump, fly, etc. to hunt for food and escape predators?
3. Know the appropriate habitat in which to release each animal. Some animals require deciduous forests while other animals require coniferous forests. Some animals require a nearby water source while other animals (i.e. lagomorphs) can survive on morning dew. The appropriate habitat will provide the requirements for food and shelter needed by the species being released.
4. Has the animal demonstrated the ability to recognize and eat natural foods? Orphaned animals may need to be exposed to the types of foods they will need to rely on in the wild. A healthy juvenile fox that is only used to eating canned dog food may not survive if it has not learned how to hunt and kill prey. A squirrel that cannot crack open hard-shelled nuts is not ready for release.
5. Is the habitat already densely occupied by the species being released, or is the site devoid of this species? Either of these situations may be of concern. Releasing an orphaned squirrel into a setting where there is already a high density of adult squirrels may place the orphan in competition for space and food resources with the well-established resident squirrels. If there are no squirrels at the site, there may be some necessary resource that is missing or a high predator load. Releasing an animal where it can't find a mate would be a lonely existence.
6. Does the animal have predator awareness? This is a crucial skill for an animal to survive in the wild. The wild animal that has become used to dogs and cats will not know to avoid them and their wild cousins (i.e. coyotes and bobcats) after it has been released. An animal is not suitable for release until it has the ability and instinct to run, hop, fly, or hide when approached by a predator.
7. Learn the differences between the terms "habituated to humans" versus "imprinted on humans". These are both problems that may result in an animal being non-releasable. Being habituated means that the animal is no longer afraid of people. For example, a squirrel that is habituated to humans might approach a stranger looking for food. This is generally caused by a person treating the baby animal as a pet by over-

- handling it or exposing it to multiple persons. Being imprinted is a more serious problem. An imprinted animal believes that it is a human being (or another animal) rather than its own species. Certain species (i.e. passerines, raptors, deer, and waterfowl) can easily imprint on people. These animals are not releasable and generally have to be euthanized or placed in an educational setting. Learn how to avoid both habituation and imprinting in your wildlife rehabilitation facility. Wildlife rehabilitators respect the wild nature of an animal and take steps to ensure their animals demonstrate appropriate natural behavior.
8. Check to be sure the weather will be favorable for at least three days after release. This is especially important for the release of orphaned animals that need time to find or build a new shelter. Releasing an animal in good weather can greatly increase its chances of success.
 9. Understand the terms diurnal, crepuscular, and nocturnal. For example, a little brown bat is a nocturnal animal and is most active at night. Therefore, it makes sense to release bat species at dusk or shortly after dark when the animal is alert and safe from diurnal predators. The glossary in the back of this study guide includes the definitions of diurnal and crepuscular.
 10. Learn the terms soft-release and hard-release. Soft-release means that an animal requires nutritional support for days or weeks after being released. For example, many mammals do best with a soft-release where food is provided for them until they become self-sufficient. Other animals only require a hard-release. For example, a juvenile eastern cottontail rabbit needs no additional assistance after being released into an appropriate habitat.
 11. Learn how to determine if an animal needs to be kept overwinter before it can be released. This may be the case for an orphan born very late in the season that was not developed enough to be released in the early fall. This may also occur if an adult animal has an injury or illness that prevents it from migrating or storing food for the winter. Some juvenile species (i.e. southern flying squirrels) are generally overwintered because they usually remain with their parents through the first winter. Turtles may need to be overwintered if they cannot be released before freezing nighttime temperatures have set in.
 12. Be aware of hunting seasons before releasing an animal that gets hunted by man. Coyotes and turkeys are examples of animals that may benefit from either a delayed release or an earlier release before hunters enter the area.
 13. Should some animals be vaccinated prior to release for diseases, such as rabies and distemper? While this may not be required by regulation, it is a common practice to help keep the populations healthy. Vaccines have not been developed and tested on wildlife. There are reports of some wildlife having adverse effects from vaccinations. Some vaccinations utilize live viral material and are not appropriate for some species (i.e. fox species).

In preparing for the state exam, consider the key points above for a variety of animal species. It might be helpful to have a discussion with an experienced wildlife rehabilitator about the release criteria they use. By making good judgments as a wildlife rehabilitator, the success of a released animal can be substantially increased.

Here are some sample questions to help you prepare for the state wildlife rehabilitation examination:

1. A member of the public brings you a juvenile European starling to practice flying in your flight cage. You notice that the starling repeatedly flies over and lands on you when you enter the cage. One of your volunteers commented that the same thing happened to other staff. Based on this information, you decided:
 - a) The starling needs to be euthanized since it is annoying the staff.
 - b) The starling is friendly but is ready for release since it is healthy.
 - c) The starling may be imprinted or habituated on humans. More observation is needed to determine whether the starling is a releasable animal.
 - d) The starling should be released in an area where there are few humans.

Answer: c) This starling is either imprinted or habituated to humans. If it is only habituated, it might be possible to “wild up” the bird before release. More information is needed to make a sound decision.

2. You have rehabilitated an orphaned red squirrel. The squirrel is now ready for release. The preferred location to release this squirrel is:
 - a) At your site in the city so you can provide supplemental food for a soft-release.
 - b) At the site of another wildlife rehabilitator who has a mixture of coniferous and deciduous trees and will support feed the squirrel.
 - c) In a location where you recently observed several eastern grey squirrels but is not where this squirrel was found.
 - d) At the home of the person who found the squirrel because they would enjoy watching it.

Answer: b) The red squirrel has a preferred habitat of a mixture of coniferous and deciduous trees. It would do better in this preferred habitat with the wildlife rehabilitator providing support feeding. It is not likely that your location in the city will provide appropriate habitat for the squirrel. Finders often want an animal to be released at their home, but that may not be an appropriate location.



What kind of tracks are these?



Chapter 24: The Lessons of Natural History

Throughout this study guide, there have been references made about the value of knowing the natural history of wildlife. This knowledge helps set a wildlife rehabilitator apart from the general public and many veterinarians. Wildlife rehabilitators often try to match their care of an animal as closely as possible to what the animal would receive in the wild. This includes things such as infant formula, weaning foods, natural foods, caging features, and socialization with their own species.

Let's use the example of a red fox and gray fox to show how their natural history would guide a wildlife rehabilitator:

1. A red fox can be distinguished from a gray fox (or juvenile coyote) by looking at its tail: a red fox has a white-tipped tail, while a gray fox has black on the end of the tail. A gray fox is generally about 20% smaller than a red fox. It is important for the wildlife rehabilitator to correctly identify the species since some aspects of their care will differ.
2. Red fox kits are born in dens that are dug out by the parents, while gray fox often den in tree cavities.
3. Around five weeks of age, the kits of both fox species start to venture out of their dens. This is when the public may notice them and mistakenly believe they are orphans. If the mother is killed and the kits are already weaned, the father can finish raising the kits on his own. This knowledge enables a wildlife rehabilitator to leave the baby kits with their natural parents in many circumstances.
4. Red and gray fox kits are given killed prey by their parents around four weeks of age. This is when wildlife rehabilitators can start offering orphans some weaning and natural foods.
5. Both the red and gray fox are social animals. Therefore, a single fox kit should not be raised alone. It may be necessary to locate another rehabilitator who has one or more fox kits of the same species and transfer the single kit to be raised with the others. This will help prevent habituation or imprinting on humans.
6. The red fox prefers a mosaic of fields and forest borders. The gray fox prefers forested areas and has semi-retractable claws that allow it to climb trees. Both species can easily adapt to suburban neighborhoods. As part of the rehabilitation process, pre-release caging that allows for climbing by the gray fox and digging by the red fox should be provided.
7. The red fox hunts mice and rabbits as a large part of its natural diet, while the gray fox consumes more insects, corn, and fruit. The wildlife rehabilitator must provide the appropriate natural diet required by each species.
8. Both the red and gray fox are rabies vector species, so a wildlife rehabilitator needs to know what precautions to take when handling these animals. If the kits are to be vaccinated for rabies, it should be done when they are approximately twelve weeks old. Any wildlife rehabilitator who expects to handle rabies vector species should get pre-exposure rabies vaccinations before working with these animals.
9. Both the red and gray fox are legal to hunt and trap, so they need to be fearful of

- humans and dogs to survive in the wild. As soon as foxes can feed themselves, they should be allowed to socialize with each other and have very limited human contact.
10. Since both the red and gray fox are most active at dusk and after dark, late afternoon is the best time for release.
 11. The red fox is less susceptible to canine distemper, while the gray fox is highly susceptible to this disease. For this reason, gray foxes are not vaccinated with canine distemper virus. However, new research has shown it is safe to vaccinate gray foxes with ferret distemper. Canine distemper has been documented in red foxes in Europe, so it has the potential to spread to North America. In contrast, the red fox is highly susceptible to sarcoptic mange, while it is not as well documented in gray foxes. However, sarcoptic mange is not species specific, so it has the potential to affect gray foxes. It is important to learn which diseases can be prevented by vaccination and which cannot.

Now let's take the natural history of the Virginia opossum as another example:

1. The Virginia opossum is the only marsupial in the United States. A marsupial (like a kangaroo) has babies that develop in the mother's pouch. An opossum gives birth to an average of eight or nine babies that migrate to the mother's pouch and attach themselves to her nipples.
2. Baby opossums don't have a good sucking reflex. The milk from the mother's nipples slowly drips down their throats. As a result, wildlife rehabilitators have to gavage feed (tube feed) formula to baby opossums.
3. When the opossum babies are about two months old, they climb out of the pouch and travel around by holding onto their mother's back. If a baby falls off, the mother will continue walking and will not retrieve the baby. Therefore, baby Virginia opossums cannot be reunited with their mother and need to come into rehabilitation.
4. The Virginia opossum is an omnivore. It requires a varied diet that includes animal protein as well as plant protein.
5. The natural habitat of the Virginia opossum is open woods with a nearby water source. The pre-release cage should include lots of tree branches so the animal can practice its climbing skills.
6. Since the Virginia opossum is a nocturnal animal (most active at night), the best release time is dusk or early evening.
7. The Virginia opossum has an involuntary response to fear as a defense mechanism. When threatened, the animal goes into a near coma state. It will also display its teeth and omit a foul discharge from its anal glands to ward off predators.
8. The Virginia opossum has a low body temperature making it less likely to contract rabies. However, the USDA has documented several opossum rabies cases throughout the US.

These are just two examples of how an animal's natural history may guide a wildlife rehabilitator in the care of wild animals. Here are some natural history facts you should study in preparation for the wildlife rehabilitation exam:

1. Learn how to distinguish one baby animal from another. For example, a newborn

- eastern grey squirrel may look very much like a Norway rat, except the squirrel has black toenails. A coyote pup looks very much like a fox pup except the fox pup has more elliptical eyes.
2. Learn how animals are characterized by species. For example, the term “mustelid” includes the weasel family while the term “corvid” includes the crow family.
 3. Learn the schedule for which infants of different species meet milestones in their development, such as when they first open their eyes, tooth development, fur or feather development, and motor skills. This will help you determine the age of a baby animal brought to you and what type of care it will require.
 4. Learn what the nests or dens of various animals look like. This will also help with species identification.
 5. Learn the average litter size of common species. If you hear that a lactating American porcupine was hit by a car, you know to look for only one orphaned baby. If you hear about an orphaned eastern grey squirrel baby, you know that other babies are probably nearby.
 6. Learn how adult animals defend themselves from predators. How does a porcupine use its quills? At what age does a baby skunk have the ability to spray with a foul scent? Learning these defense mechanisms will help you safely work with wild animals.
 7. What type of hunting, climbing, and/or flying skills does an animal need to be ready for release? A wildlife rehabilitator must take over the role of the parent for an orphaned animal and teach it the skills needed to survive in the wild. The prey species need to learn how to recognize and avoid predators. The predator species need to learn how to catch prey.
 8. What are the weaning foods and natural adult foods of each species? Which animals are herbivores, omnivores, insectivores, or carnivores? Note that the types of foods eaten by an animal is different than the classification by a biologist. For example, a skunk is listed as a carnivore even though it has the varied diet of an omnivore.
 9. When is each species most alert and active in the wild? Which animals are diurnal, crepuscular, or nocturnal? Know the meaning of those terms as they relate to wildlife. This information allows rehabilitators to release animals at an optimal time.
 10. Learn about the value of the senses (vision, hearing, smell, etc.) of each species and how important each sense is for their survival. For example, many raptors rely heavily upon vision to hunt for prey. Rabbits rely heavily on hearing and smell to detect predators. On the contrary, it is a myth that birds cannot be put back in their nest after being touched by humans since most birds do not have a good sense of smell.
 11. Know the appropriate release sites for animals. Wildlife rehabilitators must make decisions about whether to return animals to their original location or find a new site. Some animals, such as southern flying squirrels, should be released into a colony.
 12. Learn which species can be reunited with their parents and which species require immediate intervention. For example, natural history tells us that a baby eastern chipmunk would not be found outside its burrow unless something happened to the parent. This baby chipmunk would immediately be taken into care. However, the eastern grey squirrel may be able to be reunited with the adult squirrel in some cases. Learn when reuniting with a parent may be a viable option.

13. Know which species are true hibernators (turtles) versus animals that den in the winter (bears). You would not want to release a snapping turtle back into the wild in December in Massachusetts since the animal should already be deep into hibernation.
14. Learn some of the common diseases of each species so you can be prepared to recognize symptoms. Do you know the symptoms of squirrel pox? Which animals are susceptible to canine distemper and what are the symptoms? Which animals always need to be quarantined upon admission to prevent transmission of infectious diseases?

The natural history of wildlife is a vast topic and may seem overwhelming to learn. This is one reason why having a comprehensive collection of wildlife rehabilitation reference materials is important. Wildlife rehabilitators often refer to reference books to help them make informed decisions about the treatment of different wildlife species. Take the time to look at the reference book section at the back of this study guide for resource materials that have proven to be invaluable to other wildlife rehabilitators.

The following sample questions will help you prepare for the state wildlife rehabilitation exam:

1. You have raised a healthy fisher, but it has only been fed dog food while in your care. You don't want to give the fisher live prey because it is against your beliefs to harm other animals.
 - a) It is okay to release the fisher because the wild instincts to kill prey will kick in once released.
 - b) You can have the fisher practice chasing a toy mouse on a string as preparation for killing a real mouse.
 - c) You release the fisher, but give it support feeding of dog food for several days as part of a soft-release.
 - d) You don't release the fisher until it learns to identify and kill natural prey.

Answer: d) Most wildlife rehabilitators believe that you should not release a fisher until it learns how to identify and kill natural prey. The fisher will have some natural instincts to kill prey, but without experience it could struggle in the wild. It is helpful to provide support feeding to many animals, but the primary goal is to have the fisher learn basic skills prior to release. There are some wildlife rehabilitators who have used dead mice on a fishing pole to simulate prey. It is questionable whether this method is adequate. In general, it is preferable to teach predator species the hunting skills they need prior to release.

2. Which of the following animals are rarely found near residential neighborhoods?
 - a) Bobcat
 - b) Raccoon
 - c) Eastern coyote
 - d) Big brown bat

Answer: a) A bobcat usually avoids populated areas but can occasionally be seen in

residential backyards or crossing residential streets. Raccoons and coyotes are highly adaptable and can coexist well in residential settings. Maternity colonies of big brown bats often spend their summers in attics or barns. In the past, little brown bats were also common in buildings during the summer, but their population dropped by about 99% in Massachusetts because of White-nose Syndrome. The only bats that hibernate in houses in Massachusetts are big brown bats.



Chapter 25: Avian Rehabilitation

There are a limited number of avian species allowed to be rehabilitated with a standard Massachusetts state wildlife rehabilitation permit. These species are: house sparrow, European starling, rock dove, wild turkey, ruffed grouse, northern bobwhite quail, mute swan, and ring-necked pheasant. These species are not native to Massachusetts and are not under the jurisdiction of the U.S. Fish and Wildlife Service.

All other avian species require a wildlife rehabilitator to have both a state permit and a federal migratory bird rehabilitation permit from U.S. Fish and Wildlife Service. This species list includes songbirds, waterfowl, and raptors/birds of prey (owls, hawks, eagles, etc.), gamebirds, and shorebirds. Many avian species are migratory and cross state lines. Therefore, these species are protected by both the federal and state governments. It is important for the wildlife rehabilitator to correctly identify any avian species in their care to ensure they are rehabilitating only species for which they are permitted.

This study guide will give basic information on the rehabilitation of the non-native species you will be allowed to rehabilitate with a standard permit. You should also be knowledgeable about the natural history of the native avian species found in Massachusetts. Wildlife rehabilitators will receive telephone calls about native avian species and need to know whether the animal is behaving normally or needs to be referred to a person with a federal permit.

The following key points need to be studied in preparation for the state exam:

1. The developmental stages of songbird species can be divided into the categories of hatchlings, nestlings, fledglings, juveniles, and adults. Learn the characteristics of these stages for the species you can rehabilitate with a standard Massachusetts permit.
 - a) Hatchling and nestling songbirds can be difficult to identify since they are born with no feathers. Review pictures of nestling house sparrows, European starlings, and rock doves to learn their facial characteristics for identification purposes.
 - b) Learn the basic body parts of birds to assist in identification. Be prepared to identify the nares, vent, flanges, mandibles, uropygial gland, blood feathers, primary feathers, etc. There are diagrams at the end of this study guide to assist you.
2. The house sparrow, European starling, and rock dove are altricial birds that cannot thermoregulate or self-feed when hatched. In contrast, most waterfowl and gamebirds are precocial birds. They are born with feathers and can self-feed almost immediately after hatching. Waterfowl and gamebirds still need warmth from their mothers or from wildlife rehabilitators after hatching. Note that the body temperature of birds is generally higher than mammals so supplemental heat is crucial. Most avian rehabilitators rely on incubators, brooders, heating pads, and heat lamps to keep birds at correct temperature.
3. Birds need special caging to protect damage to their flight feathers. Wildlife rehabilitators generally use net or cloth cages for songbirds. Wire cages, like the

- typical bird cages in pet stores, are not appropriate for wild songbirds. Young waterfowl or gamebirds can be initially housed in plastic tubs with net covers.
4. Bird nests from the wild do not usually make good songbird nests for wildlife rehabilitation. These nests often contain mites, and they are difficult to clean. A small container filled with Kleenex for softness is preferable.
 5. Learn the term splayed legs, which occurs when baby songbirds are placed in a container that does not properly support the bird's body.
 6. Learn when avian species can be reunited with their parents. This is a complex subject to cover since it is very species specific. Here are a few general rules to follow:
 - a) An uninjured nestling bird can be put back into the original nest if the parent is still attentive. It cannot be placed into a substitute nest if the parent bird is still brooding on an original nest. The baby bird would freeze to death without the parent.
 - b) Find out how to make an appropriate substitute nest if an original nest becomes damaged. The location of the nest is crucial for success. Drainage holes in the substitute nest will keep the baby bird from drowning during a rainstorm.
 - c) A fledgling bird that is kidnapped by the public can often be returned to the parent within 24 hours.
 7. House sparrows and European starlings require an insect-based diet for proper development. Learn about the various insect-based diets available for these birds from reference books listed at the back of this study guide. Learn the frequency of feeding needed for each developmental stage of a bird. Nestling songbirds may need feeding every 20 minutes from dawn to dusk, but do not require night feeding. Fledgling songbirds may need feeding every hour until they start weaning.
 - a) Insects (mealworms, crickets, etc.) used for bird diets need to be fed correctly to be nourishing for the birds. Learn how to care for insects to ensure they have the protein needed for optimal bird care.
 8. Rock doves are Columbiformes and require a grain-based diet. Kaytee Exact and Rowdybush are two brands often used to create an appropriate diet for these granivores. Mourning doves are also in the Columbiforme family and require a similar diet.
 9. Waterfowl diet is dependent on the species. It may be heavily dependent on fish, insects, crustaceans, and plants. Gamebird diet is also dependent on the species. Gamebirds can be raised on grain diets free from added medications.
 10. Learn about the feeding techniques for various species. Common feeding tools include syringes with cannula tips for liquid diets or tweezers/hemostats for solid diets. Be able to identify the location of the glottis in a bird. Food needs to be placed in the back of the throat past the glottis to avoid aspiration in birds. Learn the role of the epiglottitis in closing the glottis for swallowing. Gavage feeding is also a method used for rock doves and other avian species.
 11. Learn the crop capacity for Passerines versus Columbiformes. House sparrows and European starlings have a crop capacity of five percent of their body weight. The rock dove has a crop capacity of ten percent of its body weight. Rock dove babies don't need to be fed as often as European starlings or house sparrows. Most birds will stop gaping (begging) for food when full, but some species don't.

12. Sometimes a nest of baby birds has one baby that is significantly larger and different than its nestmates. That baby is usually a brown-headed cowbird. The brown-headed cowbird is a brood parasite that lays eggs in the nests of other birds. Learn to identify the brown-headed cowbird and understand its impact on other species.
13. Avian species require perfect feather condition to be successful in the wild. Feather growth is dependent on proper nutrition and preening to zip the feathers together. What are pin feathers or blood feathers in nestling birds? These growing feathers look like quills. Learn about the role of the uropygial gland (oil gland) located at the base of the tail. Learn about the term stress bars or fault bars to describe feathers weakened by poor nutrition. Waterproofing is necessary for all avian species, but especially important for waterfowl. Study how you determine whether an avian species has sufficient waterproofing for release.
14. Avian species have a different bone structure than mammals. Their bones are lighter so they can achieve flight. These lighter bones also tend to heal much faster than mammal bones. Wildlife rehabilitators can take courses on how to splint bird wings using vet wrap or paper tape. Most splints can be removed within 7-10 days with additional healing (mineralization) occurring within the bone afterwards.
15. Understand the term sticky saliva to be a symptom of dehydration. (See section on “Dehydration”)
16. Avoiding imprinting or habituation to people is crucial for the success of avian species. Some avian species, such as wild turkeys, are hunted animals and need to be fearful of humans. Avian species should be raised with conspecifics (same species) whenever possible. The use of mirrors or puppets can also help to keep avian species from identifying with their human rescuers. It is also important to expose Passerines to the songs of adults of their species. These are all methods to minimize imprinting on humans.
17. Learn about the release criteria for each avian species. This will include predator awareness, ability to recognize natural foods, waterproofing, flight muscles, appropriate behaviors, and acclimation to the weather. Some birds, such as rock doves, need to be released into a flock. Most birds need support feeding for at least two weeks.

Working with nestling altricial birds is labor-intensive. It should only be done by wildlife rehabilitators who can maintain the required feeding schedule for 12-14 hours per day. These birds grow quickly and can change from a naked nestling to a fledgling within three weeks. This rapid growth requires sound nutrition and feeding techniques from the wildlife rehabilitator. Working with the non-native birds allowed under a Massachusetts state permit will give you valuable skills for future work with native species if you decide to obtain a federal permit.

In preparation for your wildlife rehabilitation exam, be sure to memorize the avian bones and identification of avian body parts.

The following questions will help prepare you for the state exam:

1. Nestling songbirds need to be stimulated to produce urine and feces? True or False?

Answer: False. Nestling songbirds will produce a fecal sac that is a combination of urine and feces. This occurs after almost every feeding. There is no need to stimulate the baby bird to do this.

2. The nares on the bird are:

- a) The nostrils on a bird's beak.
- b) The oil gland above the bird's tail.
- c) The blood feathers on a nestling.
- d) None of the above

Answer: a) The nares on a bird are the nostrils on the upper beak. The oil gland is called the uropygial gland on the bird's back near the tail. The blood feathers are also called the hard-penned or pin feathers that are the hard quills protecting new, growing feathers on a bird.



Chapter 26: Rehabilitation of Reptiles and Amphibians

Wildlife rehabilitators receive fewer calls regarding reptiles and amphibians than they do for mammals and avian species. It may be because reptiles and amphibians are more reclusive and harder to detect when in distress. It also may be because the public has a bias to rescue animals with fur and feathers over animals with scaly skin. The reality is that many of our reptiles and amphibians are in severe decline and need our help. Wildlife rehabilitators can help educate the public about the value of these species.

Working with reptiles and amphibians is a specialty field in wildlife rehabilitation. Many of the reptile calls involve turtles needing care. Most of the turtle calls involve cracked shells from predators or from being hit by cars. Turtles take a long time to reach sexual maturity and saving every turtle is important. The wildlife rehabilitator can take a lab training to learn how to repair a turtle shell. Turtle shells are bone and can take a long time to repair. The turtle spinal column is embedded into the shell. A shell injury that involves the spinal column will result in paralysis for the turtle.

Wildlife rehabilitators are not allowed to work with the two venomous snake species found in Massachusetts. They are the timber rattlesnake and the copperhead. A special permit is required to rehabilitate these two dangerous species. However, there are many snakes that a wildlife rehabilitator can treat, such as the eastern hognose snake, the eastern milk snake, and the eastern garter snake. Legally, the public can keep the eastern garter snake as a pet. The Division of Fisheries and Wildlife has a webpage (<https://www.mass.gov/guides/wildlife-as-pets>) that lists the wildlife species the public can legally keep as pets. This information should be studied in preparation for the state exam.

The following key points need to be studied in preparation for the state exam:

1. Reptiles and amphibians are ectotherms. This means that their body temperature changes with the temperature of the environment. Mammals are endotherms and can regulate their own body temperature as healthy adults. Ectotherms require supplemental heat as a critical part of their rehabilitation. Ectotherms that do not have adequate heat will not eat properly. Inadequate heat will also delay recovery in an injured or ill ectotherm. The wildlife rehabilitator needs to provide a range of temperatures so an ectotherm can move from warmer to cooler zones as needed.
2. Learn the value of ultraviolet (UV) lamps that mimic the full spectrum of sunlight. Access to proper lighting is vital for metabolism or certain vitamins and minerals. Did you know that these special light bulbs need to be changed every six months to produce their valuable rays? The quality of their rays will decrease long before the light bulb burns out.
3. Reptiles and amphibians can suffer from dehydration like mammals and avian species. Reptiles and amphibians should be given rehydration fluid upon admittance. These animals generally require subcutaneous fluids to be administered since oral administration is not as successful.
4. Learn the specialized diets for reptiles and amphibians. Did you know that pellet

- food is not recommended for turtles despite what the pet store will tell you? Baby snakes in the wild begin to eat small live prey immediately. Frogs go through several developmental stages with different nutritional needs. Learn about what reptiles and amphibians eat in the wild and how you can replicate it in a rehabilitation setting.
5. What is the proper habitat for reptiles and amphibians? Should the substrate be soft sand or gravel? Research suggests that gravel in turtle habitats may get eaten and cause impaction. There is also concern about the abrasiveness of gravel on a turtle's plastron (underside of the shell). Study the use of plants and water dishes to promote a natural environment.
 6. Female turtles frequently get hit by cars as they try to cross a road to lay their eggs. The eggs of a gravid (pregnant) turtle can be seen on a radiograph. Learn how wildlife rehabilitators can hatch the eggs of a deceased gravid turtle and complete the cycle of birth for the mother.
 7. Amphibians tend to have a mucous coating covering their bodies. It is important for the wildlife rehabilitator to wear nitrile gloves while handling these animals. Some secretions of toads can be toxic to our skin.
 8. Learn about common diseases for reptiles and amphibians. Currently, there is a fungus called Chytridiomycosis which has caused a severe decline and extinction of frog species throughout the world.
 9. Learn about the role of hibernation for reptiles and amphibians. Turtles are true hibernators and will slow down their heart rate and metabolism during hibernation. The wildlife rehabilitator needs to factor in hibernation when determining whether a turtle can be released in the fall. A turtle that cannot be ready for hibernation needs to be held overwinter to recover from an injury or illness.
 10. Euthanasia for turtles is more difficult than for mammals due to their extremely slow metabolism. Only a veterinarian with training in turtle euthanasia should perform this task (see chapter on "Euthanasia" for more information). Turtles are very resilient animals and can often be released with an amputated leg. In comparison, most mammals and avian species cannot be released back into the wild with an amputated leg.
 11. A hard-release method is used when returning reptiles and amphibians back into wild. This means they do not require any support feeding for success. The success of their release depends on finding an appropriate habitat for the release site and releasing a healthy animal prior to hibernation.

The following questions will help prepare you for the state exam:

1. You receive a turtle that you identify as a painted turtle. The turtle has a small crack in its shell. The first thing you do is:
 - a) Place the turtle in water to see if it can still swim.
 - b) Determine that the crack does not transverse the spine.
 - c) Contact your veterinarian or an experienced turtle mentor to see if the shell can be repaired.
 - d) Put the turtle back in the wild since the shell will heal itself.
 - e) "b" and "c"

Answer: e) You don't want to put a turtle with a cracked shell into the water since it could cause debris to enter the turtle's body. You also don't want to put the turtle back into the wild since the shell needs time to repair. After determining that the crack did not injure the spine, you should seek help on how to repair this shell.

2. You receive a telephone call about a baby turtle found sunning on a rock. The finder brought the turtle home because it seemed too young to be on its own. You tell the finder:
 - a) Bring the turtle to you for rehabilitation
 - b) Put the turtle back since it is not an orphan
 - c) They can keep the turtle as a pet
 - d) The turtle will need a friend, so they need to find a second turtle to keep it company

Answer: b) Turtles are self-sufficient as soon as they are born. This turtle was not an orphan. It was kidnapped by the public and needs to be put back where it was found. Unless it was a non-native turtle (like a red-eared slider), it would be illegal to keep it as a pet. Turtles don't need other turtles for friends.

3. You hear about a spotted salamander found by the public. What is the most important question(s) to ask?
 - a) Does the salamander have blue spots or yellow spots?
 - b) Is the salamander injured?
 - c) When and where was the salamander found?
 - d) All the above

Answer: d) However, the first question to ask is whether the salamander has blue or yellow spots. The Blue-spotted Salamander is on the Massachusetts Endangered Species List and needs immediate attention (and a call to the Division of Fisheries and Wildlife). However, all the other questions are important to help plan what to do next.



Chapter 27: Euthanasia and Wildlife

Euthanasia is called the “good death”. It is the act of providing a humane death for an animal that cannot be released back into the wild or placed in a licensed educational setting. A crucial part of wildlife rehabilitation is knowing when euthanasia is the most appropriate and humane option for an animal. All wildlife rehabilitators need to learn the basic concepts of euthanasia so they can quickly and humanely end the life of an animal that does not have any reasonable likelihood of recovery.

The field of veterinary medicine has developed standards that guide the use of euthanasia for domestic pets. These standards can and should be applied to wildlife. The goal of euthanasia is to provide a quick and painless death. The intent is for the animal to swiftly lose consciousness, followed by the cessation of breathing and heart function. Ideally, the animal is only aware that it has gone to sleep. The animal should be in a safe environment and handled in a manner that minimizes its fear.

The American Veterinary Medical Association’s standards of humane euthanasia can be found online at: <https://www.avma.org/kb/policies/documents/euthanasia.pdf>.

The preferred, most effective, and least stressful method of euthanasia is the injection of a controlled drug by a veterinarian. Many veterinarians use a sedation drug prior to using the euthanasia drug. The wildlife rehabilitator should have a discussion with their consultant veterinarian to learn more about this process and when it is most appropriate.

Be aware that animals that have been euthanized via a controlled substance by the veterinarian should also be cremated by the veterinarian. Animals that are buried after this type of euthanasia would cause the death of a predator if they were dug up and eaten.

Some wild animals, such as turtles, are very difficult to euthanize due to their slow metabolism. One method of euthanasia for a turtle involves placing it under sedation (unconsciousness) and using a mechanical method to destroy the brain. The euthanasia of a turtle should be done by a veterinarian who has training and experience working with turtles.

There are a few methods of euthanasia that can be used by the experienced wildlife rehabilitator. The use of a carbon dioxide chamber may be an effective form of euthanasia for small animals. Recent research has indicated that the animal needs to be under sedation prior to exposure to the carbon dioxide for the most humane process. Decapitation and cervical luxation, when performed correctly, meets the humane standards of euthanasia for small wildlife. It is crucial that the wildlife rehabilitator obtains proper training to perform this form of euthanasia correctly without causing the animal additional suffering. A wildlife rehabilitator that is not comfortable with these methods would likely not perform it well.

There are some methods of euthanasia that should never be used. These include freezing, drowning, or using carbon monoxide from an automobile. These methods fail to meet the criteria

for humane euthanasia. Other methods that are inhumane include blunt force trauma or gunshot wound to the body.

The wildlife rehabilitator should be aware that a gunshot to the head for a larger animal is considered humane. This form of euthanasia tends to occur when the animal receives a life-threatening injury, such as a deer hit by a car, and cannot be transported to a veterinarian. Be aware that a gunshot to the head should never be done to an animal that needs to be tested for rabies since an intact brain is required.

Every wildlife rehabilitator should develop a relationship with a veterinarian who can perform euthanasia when necessary. It is helpful to have a working relationship with a veterinary hospital that is open on evenings and weekends in addition to your local veterinarian.

The hardest decision for new wildlife rehabilitators is recognizing when an animal should be euthanized. Our intellect may be telling us that the animal requires euthanasia, but our emotions may make it difficult to come to that conclusion.

Let's explore some examples to highlight when euthanasia is necessary:

The first example is the easiest to understand. Any animal that has been injured so severely that there is no reasonable expectation of recovery and release should be euthanized. Euthanasia can be viewed as a final gift to the animal to free it of pain and suffering.

The second example is harder to recognize. You have an animal in your care that can't survive in the wild but could survive in captive care. For example, you have a squirrel that recovered from head trauma sufficient to live in a cage, but has occasional seizures that would make it incapable of climbing a tree without the risk of a life-threatening fall. There may be seizure medications that could help this squirrel in captivity. Clearly, the seizure medications would not be available to the squirrel in the wild. Should this squirrel be euthanized or placed in an educational facility?

The Division of Fisheries and Wildlife requires that any non-releasable animal that cannot be placed in a legally permitted educational setting must be euthanized. Since the squirrel is a common animal, it is unlikely that an educational placement could be found. It may be tempting to keep the squirrel as a pet since the squirrel currently appears content in captivity. However, keeping wildlife as a pet would be a violation of your state permit. An additional consideration is the likelihood that the squirrel would not be content in a lifetime of captivity, especially after it becomes sexually mature. Therefore, the difficult decision must be made to humanely euthanize the squirrel.

Experienced wildlife rehabilitators know that in many instances euthanasia of a wild animal is the most humane option for an animal that can recover from its injuries but cannot be released. For many wild animals, life in captivity can be compared to a human facing life imprisonment. There is no cage or habitat that provides the freedom of the wild. Most wild animals instinctively fear humans and being in captivity creates a state of constant fear for them. Infant animals that appear cute grow up into sexually mature adults that feel frustrated in captivity.

These animals may demonstrate their frustrations with aggression, which places people at risk of injury. Keeping the squirrel from the above example in captivity is not only illegal but would likely result in a miserable animal after a period. It is important for wildlife rehabilitators to put aside their own feelings about euthanasia and make the most humane decision for the animal.

On occasion, a wildlife rehabilitator is faced with decisions about whether to release an animal into the wild that has some limitations but appears to function properly. There are no easy answers for these types of cases. The wildlife rehabilitator must give careful thought about the ability of the animal to seek shelter, obtain food, and escape predators daily. The NWRA (National Wildlife Rehabilitators Association) has criteria that help wildlife rehabilitators make the most appropriate decision for animals that fail to make a full recovery from an illness or injury. It is not humane to release an impaired animal into the wild that cannot fully fend for itself. The wildlife rehabilitator must have a reasonable expectation that the animal can be successful in the wild despite any minor impairment.

It is never easy to decide about euthanasia and it is common to feel sadness for the passing of an animal. The only thing that gets easier is recognizing that you made the correct decision on behalf of the animal in your care. New wildlife rehabilitators often find it helpful to have animals assessed for euthanasia by another wildlife rehabilitator or their consultant veterinarian prior to making a final decision. It is hard to be objective about an animal that you may have spent long hours trying to save. Delaying inevitable euthanasia only makes it more difficult for you and the animal. It also takes away precious time and money that could be spent on other animals in need of rehabilitation.

Take the time to fully understand all aspects of euthanasia before you are faced with putting it to use. Deciding when it is appropriate to euthanize an animal is part of being a wildlife rehabilitator. Humane euthanasia is the final gift you can give an animal that has no reasonable chance of survival in the wild.

The following sample questions will help you prepare for the state wildlife rehabilitation exam:

1. You receive a turtle that has a severe shell fracture that transverses its spinal column. The turtle appears to have minimal function of its limbs. What is the most appropriate course of action?
 - a) You place the turtle in a warm, dark, and quiet location to die in peace.
 - b) You bring the turtle to your veterinarian, who is trained and experienced in turtle euthanasia.
 - c) You try to repair the shell and see if the turtle can regain function of its limbs.
 - d) You use blunt force trauma to kill the turtle as quickly as possible.

Answer: b) The spine of a turtle is embedded into the shell. Any shell fracture that transverses the spinal column would cause irreparable paralysis. The turtle needs to be euthanized by a veterinarian with the training and experience to do it humanely. It is not humane to let the turtle suffer until death. It is not humane to repair a shell that will still result in paralysis of the turtle. It is also not humane to use blunt force trauma to kill the

turtle.

2. You receive a telephone call from a person that captured a bat inside their house. During the capture process, the person was bitten by the bat. The bat was not described as injured. What is the most appropriate course of action?
- a) You tell the person to wash out their wound and bring bathe bat to you for intake.
 - b) You tell the person to wash out their wound and release the bat back outside since it was healthy.
 - c) You tell the person to wash out their wound, release the bat, and speak to a medical professional about a rabies exposure vaccination.
 - d) You tell the person to wash out their wound, bring you the bat for euthanasia and rabies testing, and speak to their medical professional about rabies exposure vaccinations.

Answer: d) The person was bitten by a rabies vector species. It does not matter whether the bat appears healthy or not. The bat should never be released outside even if the person agrees to do a rabies exposure vaccination. The bat needs to get euthanized and tested for the rabies virus. The person should immediately wash out their wound as a preventative measure against rabies. A consultation would be made with the state rabies epidemiologist to make the decision whether the person should be immediately vaccinated for rabies exposure or wait for the test results. The euthanasia is done because of the public health risk.



Chapter 28: Dealing with the Public

An important part of being a wildlife rehabilitator involves dealing with the public. Wildlife rehabilitators are ambassadors for wildlife. We are the voice for countless creatures who can't speak for themselves. We are representatives of an organized group of people with professional standards, working on behalf of wildlife. Much of our public education occurs via telephone conversations and contact with the general public. Beginning in 2021, all licensed wildlife rehabilitators are required to be listed on the Division of Fisheries and Wildlife's public website. This is an opportunity for wildlife rehabilitators to form a cooperative network that enables the public to access accurate information in an expedient manner.

Wildlife rehabilitators receive many types of telephone calls from the public. Some calls involve an animal in distress while others are inquiring about whether an animal's behavior is normal or if the animal is in trouble. The wildlife rehabilitator will receive telephone calls for species they accept for rehabilitation as well as for species they don't accept and need to be referred to another rehabilitator.

Providing timely and accurate information to the public is a powerful tool for saving wildlife. Research has shown that wildlife rehabilitators save more wildlife from telephone interventions than actual wildlife care. A ten-minute telephone conversation can keep six baby bunnies in their nest with their mother because the public learns that the babies are not really orphans. A quick lesson on the natural history of birds teaches the public to recognize a fledgling bird that does not need our help. Wildlife rehabilitators always want to keep wild babies with their parents whenever possible and getting information to the public expediently is the way to make this happen. Wildlife rehabilitators must recognize communication with the public is an important part of their profession as advocates for wildlife.

Most of the time, dealing with the public is satisfying. There are many wonderful people who will drive miles just to bring you a tiny sparrow and will express their gratitude for the work you do. Some of these wonderful people turn into amazing volunteers for your program or new wildlife rehabilitators. But like everything in life, there are exceptions to this behavior.

On occasion, there will be a member of the public who is ignorant about wildlife and doesn't know (or care) about the value of a wild animal. This person may be very demanding and rude. It would be very easy to be rude back or simply refuse to take the animal they found. Consider this an opportunity to educate this person about wildlife. Even if the person does not appear to listen, a calm conversation about an animal could be productive. If you are rude back or refuse to take the animal, consider what will happen to the animal. It is not the animal's fault that it was found by a difficult person. The animal needs care and you might be its only chance at survival.

There are many ways that you can make it easier to deal with the public. One recommendation is to set clear limits about what you are willing and able to do. What species do you accept into care? What hours do you accept telephone calls from the public? Are you open on holidays? Are you willing to pick up the animal yourself or does the finder need to transport the animal to you? By setting simple rules, you can give a clear message to the public about what they can expect.

This will help keep the process more orderly and manageable.

Wildlife rehabilitators need to use caution when receiving calls about animals trapped in homes. We are not licensed to trap and remove wild animals from buildings. The public generally needs to refer such calls to their local Animal Control Officer (ACO) or a Problem Animal Control (PAC) agent. Wildlife rehabilitators also work with the public to teach methods of co-existing with wildlife that are raising families near humans.

Wildlife rehabilitators need to maintain public safety as their first priority. This is especially important for rabies vector species. A person that has touched a rabies vector species with bare hands is considered to have potential exposure to rabies even if the animal is not showing symptoms. All wildlife rehabilitators need to know the proper steps to ensure the animal is secured and the rabies exposure protocol is followed.

Technology has given us more ways to deal with the public. The majority of people now have a smart phone and can text an image of an animal to you for identification. Many wildlife rehabilitators now prefer receiving text messages instead of voicemail messages about wildlife. There are also different telephone applications that allow you to manage wildlife calls without getting an additional line.

Another method of communicating with the public is via Facebook. Many wildlife rehabilitators have a Facebook page and post updates about the animals in their care. Be sure these postings are educational and do not give the public the impression that wild animals are pets. Never post pictures of an animal being hugged or kissed! Remember that if you post a picture of yourself holding a raccoon without gloves, you are telling the public that this behavior is acceptable. Experienced wildlife rehabilitators post pictures of themselves engaging in wildlife rehabilitation activities, such as feeding a baby animal or a release video. Facebook and other social media platforms are a great avenue to educate the public about wildlife related topics if it is done professionally.

Being a wildlife rehabilitator requires many different skill sets. The direct care of wild animals is one skill set that you need. Learning how to deal with the public in a professional manner is another valuable skill set. There are trainings you can attend to help you gain the skills to communicate with all types of people in a calm and professional manner. Be proud to learn this important skill!



What kind of tracks are these?



Chapter 29: Professional Development and Mentoring

This study guide is designed to help you pass the Massachusetts state wildlife rehabilitation exam and become eligible to receive a wildlife rehabilitation permit. It is important for you to understand that becoming a wildlife rehabilitator puts you on a continual path of learning.

The field of wildlife rehabilitation is constantly evolving as new research provides better information on how to care for wildlife. The techniques used today might well be obsolete within the next five years. It is critical for the wildlife rehabilitator to stay well-trained in current methodology and best practices for treating and raising animals.

Fortunately, there are many ways for you to continue your professional development. Here are some of the resources available to you:

1. The Wildlife Rehabilitators Association of Massachusetts (WRAM) is a nonprofit membership organization established to support wildlife rehabilitators in Massachusetts and the surrounding states. The purpose of WRAM is to keep active rehabilitators informed about conferences and trainings, and to promote the practice of quality wildlife rehabilitation in Massachusetts. WRAM traditionally provides a newsletter, website, labs, and an annual conference to achieve its goals. Please consider joining this important group. (<http://www.wraminc.org/>)
2. Some of the neighboring states also have organizations designed to support wildlife rehabilitators. The Connecticut Wildlife Rehabilitators Association (CWRA) (<http://www.cwrawildlife.org/>) and New York State Wildlife Rehabilitation Council (NYSWRC) (<http://www.nyswrc.org/>) are two such groups. Both organizations hold conferences that are available to Massachusetts wildlife rehabilitators.
3. The Cummings School of Veterinary Medicine at Tufts University is home to the Tufts Wildlife Clinic that provides comprehensive medical care to wildlife in the Northeast. The Tufts veterinarians are nationally known for their expertise and often speak at the state, regional, and national wildlife rehabilitation conferences. <http://vet.tufts.edu/wildlife/>
4. The National Wildlife Rehabilitators Association (NWRA) is the national organization for wildlife rehabilitators. This agency has an annual conference, email updates, and articles to promote the professional development of wildlife rehabilitators. This agency helps to connect wildlife rehabilitators across the country. (<http://www.nwrawildlife.org/>)

Attending wildlife conferences gives wildlife rehabilitators current information on techniques for wildlife rehabilitation. Many conferences include lectures and labs on basic techniques, such as physical examinations, wound management, gavage feeding animals, and much more. Attending wildlife conferences is a wonderful way to work with experienced wildlife rehabilitators and network with rehabilitators in your community.

It is equally important for every wildlife rehabilitator to have an experienced mentor. A

mentor will help you when you receive a new animal and have questions about appropriate care. A mentor will share your joy when you describe a success story about a challenging case. A mentor can also provide comfort when a wildlife case goes wrong and can help you figure out what should be done differently in the future. Wildlife rehabilitators can choose their own mentors in their local community.

The Division of Fisheries and Wildlife website provides the location and contact information for all licensed wildlife rehabilitators. Don't be afraid to contact a local wildlife rehabilitator and ask whether they can be a mentor to you. Here is the link for this website: <https://www.mass.gov/service-details/find-a-wildlife-rehabilitator>

Wildlife rehabilitators can also find a highly qualified mentor via the WRAM Mentor Initiative. The WRAM Mentor Initiative ensures that the mentor has experience with the species you are rehabilitating and the desire to help new wildlife rehabilitators learn new skills. You must be a member of WRAM to participate in this helpful training tool.

Being a wildlife rehabilitator involves being part of a professional group of people committed to helping wildlife in our communities. It is your responsibility to continue your training even beyond the minimum state requirements so you can offer the very best care for wildlife. With experience and training, you will have a higher rate of success and be able to take on more advanced and challenging cases. We owe it to wildlife to be the best wildlife rehabilitator possible!



Chapter 30: Closing Thoughts

This study guide was written to give you guidance on preparing for the state exam, but it is also intended to give insight into being a wildlife rehabilitator.

Being a wildlife rehabilitator is challenging, exhausting, sad, exhilarating, frustrating, and almost every other emotion you can imagine. It takes time, patience, and perseverance to learn the basic skills. We need more wildlife rehabilitators and hope that you have the characteristics to become one!

Here are some final thoughts for your consideration:

1. Before you decide to take the exam, have a discussion with the important people in your life about the impact of wildlife rehabilitation on your relationships. How do you juggle your time if you have a job, family, and friends wanting your attention? Wildlife rehabilitation can take up a good portion of your free time. Are your family members willing to help you? Keeping balance in your life is important.
2. How much money can you budget for wildlife rehabilitation? The first year is the most expensive since there are cages and equipment to buy.
3. Pass the state exam! There is no fee to take the exam, but there is a \$10 fee to submit your permit application after you successfully pass the exam. You will need to STUDY! There are also seminars available in Massachusetts to help you learn the key points in this study guide.
4. Take it slowly for the first year. Pick one species and become proficient at rehabilitating that species. Don't try to rehabilitate a variety of species the first year.
5. Don't be afraid to say no and set limits on what you can do. If you need to take a break, do it! You are in control of how many animals you rehabilitate.
6. Find a rehabilitation buddy. This is the person who can step in and take your animals if you have an emergency. Stuff happens in life and you need to be prepared in advance.
7. Don't feel foolish about asking for help. It is important to ask for help quickly rather than waiting for an animal to be near death. Don't be ashamed if you make a mistake. Every wildlife rehabilitator makes mistakes, but the best wildlife rehabilitators learn from their mistakes and don't repeat them.

At the end of this study guide is a copy of the NWRA Code of Ethics for Wildlife Rehabilitators. Review this document and strive to achieve these ideals. Being a wildlife rehabilitator is more than taking care of animals; it is a commitment to being an advocate for wildlife in many ways. We hope you have the passion to do this important work. Thank you for caring about wildlife!

Animal Track Answers

Chapter 2: What is Wildlife Rehabilitation?

Wild turkey

Chapter 4: Endangered Species

White-tailed deer

Chapter 12: Physical Examinations of Wildlife

Raccoon

Chapter 17: Dehydration Protocols

Porcupine

Chapter 23: Release Criteria

Black bear

Chapter 26: Dealing with the Public

Eastern cottontail

Recommended Reference Materials

The following are some resource books found to be useful by wildlife rehabilitators.

Wild Mammal Babies: The First 48 Hours and Beyond, 3rd Edition

Debra Gode and Irene Ruth

This is an extremely useful book for baby mammal rehabilitation. It includes wildlife forms, information on diseases and injuries, medications, and species-specific care.

NWRA Principles of Wildlife Rehabilitation

Adele Moore and Sally Joosten

This is a very comprehensive book covering all basic principles of wildlife rehabilitation.

NWRA Quick Reference, 3rd Edition

Compiled and edited by Erica A Miller, DVM

This is a handy pocket-sized guide for quick reference of conversions, nestling identification, fluid therapy, and many more useful topics.

Passerine Fundamentals

Veronica Bowers

This is a concise and easy-to-read book about native songbird care from a national expert. It includes an insect-based songbird diet and nestling identification charts.

New England Wildlife

Richard DeGraaf and Mariko Yamasaki

This is a useful book for natural history information on New England wildlife.

Hand-Rearing Birds 2nd Edition

Laurie Gage DVM and Rebecca Duerr DVM

This is a comprehensive book for all avian species (raptors, waterfowl, gamebirds, songbirds, etc.) with specific information on care of birds from hatchling stage until release.

NWRA Wildlife Formulary, 4th edition

Erica Miller DVM, Michele Goodman VMD, Sherri Cox, DVM

This is a medication formulary developed by three wildlife veterinarians to cover medication doses specifically for wildlife. It also gives information on contraindications for medications and effected species.

Minimum Standards for Wildlife Rehabilitation, 4th edition

Erica Miller DVM

This is a small booklet that holds an enormous amount of useful information to help wildlife rehabilitators meet minimum standards.

Behavior of North American Mammals

Mark Elbroch and Kurt Rinehart

This is a fascinating book covering natural history of mammals.

Field guides for mammals, birds, reptiles, and amphibians

There are many wonderful field guides available to help you identify birds, mammals, reptiles, and amphibians. These are useful for studying for the state exam. These guides also help you identify an animal that could be an endangered species.

Division of Fisheries and Wildlife District Office Locations

Division of Fisheries and Wildlife, Field Headquarters

1 Rabbit Hill Road
Westborough, MA 01581
(508) 389-6300

Division of Fisheries and Wildlife, Western District Office

88 Old Windsor Road
Dalton, MA 01226
(413) 684-1646

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Division of Fisheries and Wildlife, Southeast District Office

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Glossary of Terms

- Altricial: animals that are born helpless and depend on their parents for food and thermoregulation.
- Avian: relating to birds
- Brancher: a raptor that spends time out of the nest, but has not fledged
- Callus: the collection of collagen that mends a fractured bone
- Carnivore: an animal that eats primarily animal protein
- Crepuscular: most active at dawn and dusk
- Debride: remove debris, dirt, and dead or damaged skin from a wound
- Dehydration: the condition where there is insufficient fluid in the tissue or blood
- Diurnal: most active during the day
- Electrolyte: a solution that conducts electricity by means of ions
- Gavage: feeding an animal through a tube passed into the stomach
- Glottis: the opening of the airway (trachea) to the lungs
- Herbivore: an animal that eats vegetation
- Humerus: the bone that goes from the shoulder to the elbow
- Hyperthermia: having an elevated body temperature
- Hypothermia: having a lower than normal body temperature
- Hypertonic: a substance that will draw fluid out of the cells
- Hypoglycemic: having low blood sugar
- Isotonic: a substance that will not draw fluid out of cells by osmosis
- Kcal: the energy value of food (kilocalories)
- Metabolic Bone Disease (MBD): a condition that develops from a prolonged deficiency of calcium, phosphorus, vitamin D, or an improper ratio of those elements that results in defective development of bones.
- Necrosis: cell death of localized tissue death
- Nocturnal: most active at night
- Nystagmus: a rapid involuntary movement of the eyes
- Open Fracture: a fractured bone that is protruding out of the skin
- Omnivore: an animal that eats both vegetation and animal protein
- Packed Cell Volume (PCV): the percentage of red blood cells in a blood sample
- Passerine: a perching bird, altricial
- Precocial: able to function independently at birth (i.e. thermoregulate, stand, eat food)
- Raptor: a bird of prey
- Rickets: another term for MBD
- Shock: acute peripheral circulatory failure
- Thermoregulation: the ability to control your own internal body temperature
- Vent: the anal opening in birds
- Zoonoses: diseases that can be transmitted from animals to humans

Medical Terms

- SID: once a day; every twenty-four hours
- BID: twice a day; every twelve hours
- TID: three times a day; every eight hours
- QUID: four times a day; every six hours
- PRN: as needed
- q: every (add a time period)
- q.24: every twenty-four hours (same as SID)
- IM: intramuscular
- IO: intraosseous (in the bone)
- IP: intraperitoneal (in the abdominal cavity)
- IV: intravenous (in the vein)
- PO: oral, by the mouth
- SQ: subcutaneous (also known as SC or SubQ)
- BAR: bright, alert, responsive
- FX: fracture
- GM: gram
- HBC: hit by car
- Kg: kilogram
- LRS: lactated ringer's solution
- L: liter
- IB: pound
- Mg: milligram
- Ml: milliliter
- Oz: ounce
- Tab: tablet
- Tb: tablespoon
- WNL: within normal limits

Conversions

1 gram = 1000 milligrams (mg)

1 kilogram = 1000 grams = 2.2 pounds

1 grain = 65 mg

1 ounce = 28.35 grams

1 pound = 16 ounces = 454 grams = 0.454 kilograms (kg)

1 milliliter (ml) = 1 cubic centimeter (cc)

1 liter (L) = 1000 milliliter (ml)

1 teaspoon (tsp) = 5 ml

1 tablespoon (TB) = 3 tsp = 15 ml

1 fluid oz = 30 ml = 2 TB

1 cup (c) = 8 oz = 16 Tb

1 pint (p) = 2 cups = 16 oz

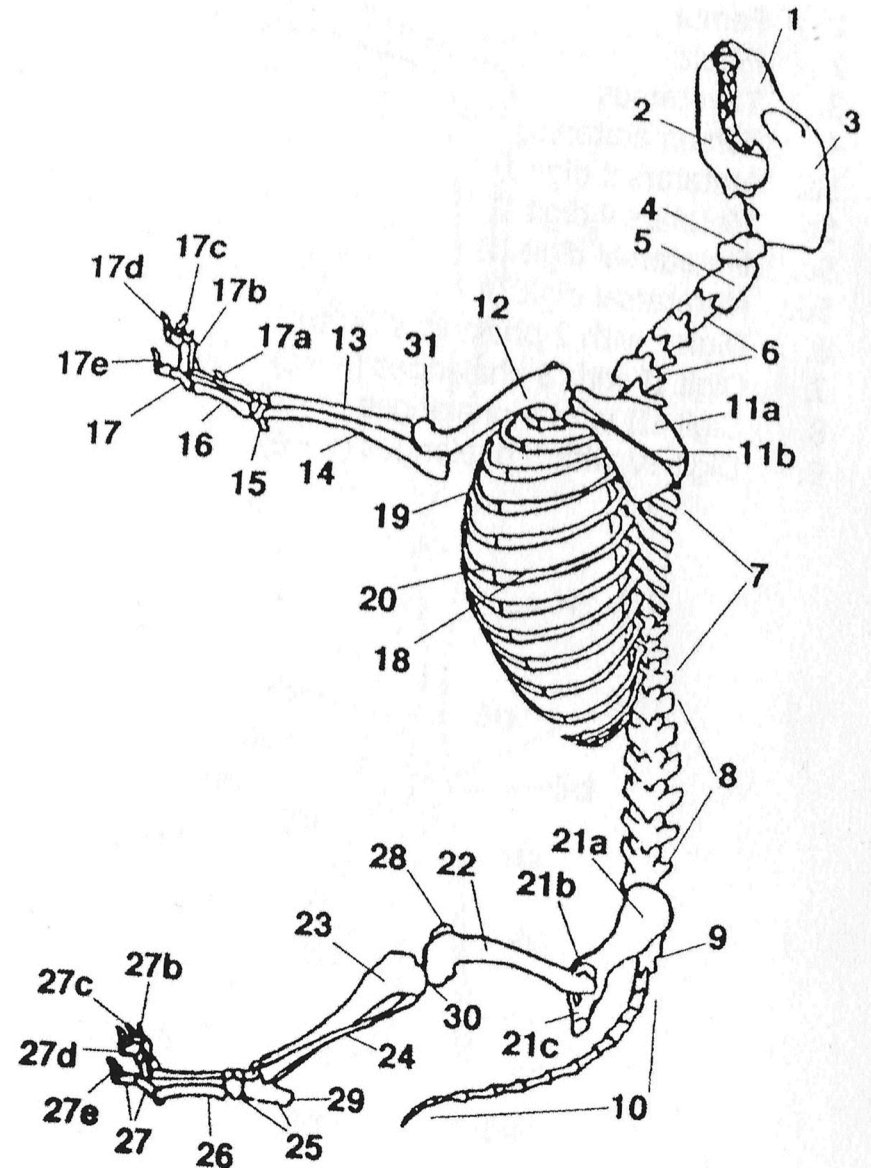
1 quart (qt) = 2 pints = 4 cups = 32 oz

1 gallon (gal) = 4 quarts = 8 pints = 16 cups = 128 oz

Mammal Skeleton

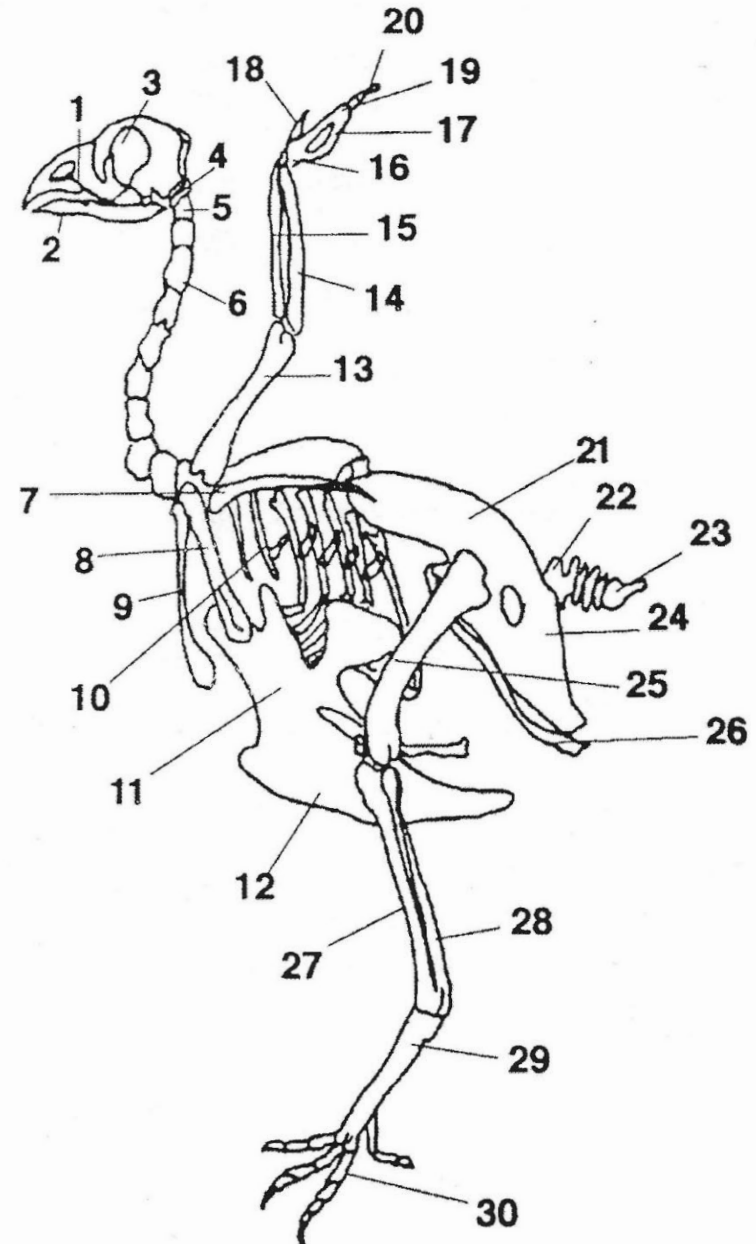
Mammalian Skeletal System - Lateral View

- | | |
|--|-------------------------------------|
| 1. Maxilla | 22. Femur |
| 2. Mandible | 23. Tibia |
| 3. Parietal bone | 24. Fibula |
| 4. Atlas | 25. Tarsal bones |
| 5. Axis | 26. Metatarsal bones |
| 6. Cervical vertebrae | 27. Digits of pelvic ap-
pendage |
| 7. Thoracic vertebrae | 27b. Digit II |
| 8. Lumbar vertebrae | 27c. Digit III |
| 9. Sacrum | 27d. Digit IV |
| 10. Caudal Vertebrae | 27e. Digit V |
| 11a. Scapula | 28. Patella |
| 11b. Spine of scapula | 29. 'Hock' |
| 12. Humerus | 30. 'Knee joint' |
| 13. Radius | 31. 'Elbow joint' |
| 14. Ulna | |
| 15. Carpal bones | |
| 16. Metacarpal bones | |
| 17. Digits of thoracic
appendage
(phalanges) | |
| 17a. Digit I | |
| 17b. Digit II | |
| 17c. Digit III | |
| 17d. Digit IV | |
| 17e. Digit V | |
| 18. Ribs | |
| 19. Sternum | |
| 20. Costal cartilages | |
| 21. Ox coxae | |
| 21a. Ilium | |
| 21b. Pubis | |
| 21c. Ischium | |



Bird Skeleton

1. Maxilla
2. Mandible
3. Orbit
4. Atlas
5. Axis
6. Cervical vertebra
7. Scapula
8. Coracoid
9. Clavicle (furcula)
10. Rib
11. Sternum
12. Keel
13. Humerus
14. Ulna
15. Radius
16. Carpus
17. Carpometacarpus
18. Alula (Digit I)
19. Phalanx of Digit III
20. Phalanges of Digit II
21. Ilium
22. Caudal vertebra
23. Pygostyle
24. Ischium
25. Femur
26. Pubis
27. Tibiotarsus
28. Fibula
29. Tarsometatarsus
30. Digits



Wildlife Rehabilitator's Code of Ethics

1. A wildlife rehabilitator should strive to achieve high standards of animal care through knowledge and an understanding of the field. Individuals must make an effort to be informed of current rehabilitation information, methods, and regulations through participation in continuing education.
2. A wildlife rehabilitator should be responsible, conscientious, and dedicated, and should work continuously toward improving the quality of care given to wild animals undergoing rehabilitation.
3. A wildlife rehabilitator must abide by local, state, provincial and federal laws concerning wildlife, wildlife rehabilitation, and associated activities.
4. A wildlife rehabilitator should establish safe work habits and conditions, abiding by current health and safety practices at all times.
5. A wildlife rehabilitator should acknowledge limitations and enlist the assistance of a veterinarian and other trained professionals when appropriate.
6. A wildlife rehabilitator should respect other rehabilitators and persons in related fields, sharing skills and knowledge in the spirit of cooperation for the welfare of animals.
7. A wildlife rehabilitator should place optimum animal care above personal gain.
8. A wildlife rehabilitator should strive to provide professional and humane care in all phases of wildlife rehabilitation, protecting the welfare, respecting the wildness, and maintaining the dignity of each animal in life and in death. Releasable animals should be maintained in a wild condition and released as soon as appropriate. Non-releasable animals have a right to euthanasia.
9. A wildlife rehabilitator should encourage community support and involvement through volunteer training and public education. The common goal should be to promote a responsible concern for living beings and the welfare of the environment.
10. A wildlife rehabilitator should work from a foundation of sound ecological principles, incorporating appropriate conservation ethics and an attitude of stewardship.
11. A wildlife rehabilitator should conduct all business, activities, and communications in a professional manner, with honesty, integrity, compassion, and commitment, realizing that an individual's conduct reflects on the entire field of wildlife rehabilitation.