

Wildlife Care Basics for Veterinary Hospitals

Before the Rehabilitator Arrives

[Animal Care Centers]



THE HUMANE SOCIETY
OF THE UNITED STATES

hsVma

HUMANE SOCIETY
VETERINARY MEDICAL ASSOCIATION



A Word about the Author

Irene Ruth, Winchester Wildlife

Irene Ruth spent over a decade working as an artist. She discovered the world of wildlife rehabilitation when a forester friend asked her to take in a litter of orphaned baby raccoons. Once they entered her life, there was no going back. She soon founded a wildlife rehabilitation center, called Suburban Wildlife, at her home in Connecticut. She has rehabilitated hundreds of injured and orphaned wild animals every year since.

When Irene and her husband, Gus, moved to New Hampshire, Suburban Wildlife became Winchester Wildlife, since the facility there is housed on over 100 wooded acres in a setting no longer quite “suburban”!

Irene served as a board member of the Connecticut Wildlife Rehabilitators Association and was the New England state representative to the International Wildlife Rehabilitation Council. She is also the author of *First Aid for Wildlife*, a handbook for finders of wildlife in trouble, and co-author of *Wild Mammal Babies: The First 48 Hours and Beyond*.

Acknowledgments

This handbook was inspired by all the calls from veterinary offices requesting information about how to temporarily care for and treat injured and orphaned wildlife. Because the needs of wildlife are so different from those of domestic animals, it became clear that there was a wide information gap that needed to be filled.

The practical information in these pages will not only help the veterinarian’s office provide the needed short-term emergency care and housing, but it will also help facilitate the transfer of disabled wild animals to licensed wildlife rehabilitators. Tips for educating and screening the public are included, along with some relevant resource materials.

I am deeply grateful to all the people who made this possible. Many thanks to The Fund for Animals and the Katharine Matthies Foundation for funding the original printing of this book. I’m honored that the Humane Society Veterinary Medical Association has selected this handbook to offer to veterinary professionals and animal shelters.

Also, thank you to all the contributing authors, including Shannon Jacobs, a rehabilitator, for her wonderful flow charts and emergency rescue information; Michele Goodman, a waterfowl rehabilitator, for her critical information on emergency care of ducks and geese; wildlife rehabilitator Debra Gode for her wildlife disease information; Laura Simon, of the Humane Society of the United States, for her crucial rabies information and helpful hints on solving wildlife problems; and Harriet Forrester, a turtle rehabilitator, for the special supplemental section on turtle care.

Special thanks to Laurie Fortin and Mark Clavette of the Connecticut Department of Environmental Protection and to Pam Runquist of the Humane Society Veterinary Medical Association for their input and review and to rehabilitators Kim Johnsen and Debra Gode for their donation of photographs.

Finally, a special thanks to our veterinary review team for their insightful comments, additions and revisions:

Roberto Aguilar, DVM, Cape Wildlife Center, Barnstable, Mass.

Stefan Harsch, DVM, South Florida Wildlife Center, Fort Lauderdale, Fla.

Mark Lloyd, DVM, wildlife conservation, management, and medicine consultant; institutional disaster planning and preparation specialist, Winterville, Ga.

Erica A. Miller, DVM, Tri-State Bird Rescue & Research, Inc., Newark, Del.

Mark A. Pokras, DVM, Wildlife Clinic, Tufts University, Cummings School of Veterinary Medicine, North Grafton, Mass.

Note to Readers: *The medications, doses, and dosages mentioned in the text are based on clinician’s experience and recent publications, but are intended only as initial guidelines. Careful re-evaluation and re-dosing must be undertaken by the veterinarian with whom the licensed rehabilitator receiving the animal consults.*

Table of Contents

- A Word about the Author**.....i
- Acknowledgments**.....ii
- Table of Contents**.....iii
- Veterinary Hospitals and Rescued Wildlife**..... 1
- How to Handle Calls about Wildlife**.....3
- When Animals Are Brought to Your Veterinary Facility**

 - The Basics**.....5
 - Getting Information from the Finder.....5
 - Where and How to Confine Wild Animals.....6
 - Performing a Physical Exam.....6
 - Body Temperature.....8
 - Beyond the Basics**.....9
 - Mammals—Infants and Juveniles**.....9
 - Dehydration and Rehydration.....9
 - Methods for Administering Formula/Feed..... 11
 - Frequency of Feeding..... 12
 - Proper Feeding Position 13
 - Bowel and Bladder Issues..... 13
 - Common Feeding Problems..... 13
 - Mammals—Adults** 15
 - Special Species Information**..... 16
 - Opossums..... 16
 - Raccoons..... 17
 - Skunks..... 18
 - Bats..... 19
 - Rabbits..... 20
 - Rodents: Squirrels, Chipmunks, Woodchucks, Beavers, and Porcupines..... 21
 - Large Rodents: Beavers and Muskrats..... 22
 - Mustelids: Weasels, Mink, Ferrets, Fishers, Badgers, Wolverines, and Otters..... 22

Avian	23
Young Birds	23
Adult Birds	24
Special Species Information	26
Songbirds	26
Pigeons and Doves.....	26
Raptors: Eagles, Hawks, Vultures, and Owls.....	28
<i>Raptor Young</i>	30
Waterfowl.....	31
<i>Adult Waterfowl and Other Aquatic Birds</i>	31
<i>Waterfowl and Other Downy Young</i>	32
Special Supplement Section on Turtle Care	35
Handling and Physical Examination	35
Stress.....	35
Warmth	36
Fluid Therapy.....	36
Analgesia.....	38
Drugs and Chelonians	38
Shell Damage.....	39
Euthanasia	42
Housing.....	42
Lighting and Heating.....	43
Nutrition	43
References	46
Additional Medical Considerations	49
Emergency Conditions and Treatments	49
Shock.....	49
Dehydration	49
Head Trauma.....	49
Unconsciousness	50
Poisoning.....	50
Malnutrition or Starvation	51
Internal or External Parasites.....	51

Heatstroke or Hypothermia.....	51
Cat Caught	52
Oiled Wildlife.....	53
Subcutaneous Air (Air Bubbles)	53
Feather Injury	54
Diagnostic Procedure Considerations	55
Radiology	55
Fluid Therapy Options with Wildlife	55
Medication Precautions/Warnings.....	56
Basic Zoonoses	57
Bacterial Diseases.....	57
Mycotic Diseases.....	58
Viral Diseases.....	59
Parasitic Diseases.....	59
Protozoal Diseases	60
Euthanasia	61
Appendix	63
Sample List of Supplies to Have on Hand	63
Where to Find Supplies	66
Sample Wildlife Contact and Advice List	67
Sample Transporter List	68
Sample Wildlife Admission Form	69
Common Misconceptions about Rabies	70
Solving Wildlife Problems—Helping the Public Live with Rabies Vector Species—Some Questions and Answers	74
Advice for Handling Fawn Calls	79
How to Rescue Infant Mammals	80
How to Rescue Baby Birds	83
Wildlife Rehabilitation Organizations	86
References	87
Index	89

Veterinary Hospitals and Rescued Wildlife

MANY OF THE WILD ANIMALS THAT come into a wildlife rehabilitator's care were first brought to veterinary hospitals. Because the care of wildlife is sometimes so different from the care routinely given to domestic animals, we can help by supplying some vital information and suggestions.

Regulations and Permits

While it's common for a veterinarian to take in wildlife and provide emergency care, it's illegal for a veterinarian, veterinary technician or assistant to do long-term care of the wild animal unless they have obtained a state rehabilitator's permit.

In most states veterinarians and veterinary technicians are allowed to have wildlife in their possession only up to 48 hours, and after that time they are required to turn over the animal to a permitted wildlife rehabilitator.

Each state has its own set of requirements for becoming a licensed wildlife rehabilitator. A state permit usually allows for the rehabilitation only of small mammals and non-migratory birds. A federal permit from the U.S. Fish and Wildlife Service (USFWS) is needed to rehabilitate migratory bird species and endangered species.

Additionally, the federal Migratory Bird Treaty Act prohibits anyone from keeping portions of any native migratory bird species, such as a feather, nest, or egg, without the proper permit from the USFWS. The state fish and wildlife agency may have additional permitting requirements as well.

Some exceptions are pigeons, European starlings, English sparrows and game species like wild turkey,

ring-necked pheasant and bobwhite quail. For these birds, you don't need a federal permit, but there may be individual state restrictions and laws.

Some other species, like mute swans and monk parakeets, are considered non-native invasive species and cannot be released in some states. Some raptors have additional protection, as well.

Separate permits may be needed to cover rehabilitating rabies vector species, deer, and some of the larger mammals and raptors, as well as threatened and endangered species.

It is illegal in most states to relocate rabies vector species for release. This is meant to mitigate the spread of the disease. However, in some areas of the country vector species may be released in the same or near the location of capture. This varies by state and anyone anticipating work with rabies vector species should consult the local animal control or fish and game office to ensure compliance.

Additional permits from the National Marine Fisheries Service are required to treat and rehabilitate marine mammals and sea turtles. Check with your state's policies to determine rules for wildlife care.

If you are a veterinarian, a veterinary technician, or assistant interested in working with a rehabilitator, contact your state wildlife agency or department of environmental protection for a list of rehabilitators in the area. When adding names of rehabilitators to your contact list, ask which permits they possess.

As soon as the emergency care is performed and stabilization achieved, a rehabilitator should be contacted and the animal transferred to that rehabilitator.

Eastern gray squirrel.

How to Handle Calls about Wildlife

Make Sure to Have a Contact List for Area Wildlife Rehabilitators

Your first contact with the finder of wildlife in distress is usually over the phone. Phone advice can solve problems, save lives, and prevent orphaning of baby animals.

A sample contact information list is provided in the Appendix of this handbook to help you keep track of the people who may be able to help you with the care and transport of wildlife. Keep this list current and it will help you to quickly get needed advice or help. Contact your state Fish and Game department for a list of wildlife rehabilitators or search for your state wildlife division online. Most will have a list of numbers of local wildlife rehabilitators.

If your office is busy and you can't spend time on the phone dealing with this sort of problem, please give out those names and phone numbers so that the caller can get the help or advice he or she needs from one of these sources.

More information can be found in books such as *Wild Neighbors* (2007, The Humane Society of the United States) or on websites such as humanesociety.org/animals/wild_neighbors/ and wildlifehotline.org.

There are also several handouts in the Appendix section of this handbook that can be given to clients to help handle wildlife situations.

Important Messages to Convey on the Phone

Don't Give Callers Advice on How to Raise Wildlife

Often a finder will call a veterinarian's office to find out how to raise a wild infant. Please don't ever give out any information that would make a person feel that he or she is qualified to raise infant wildlife. If callers have wildlife in their possession, have them bring the animal to you or to a rehabilitator immediately.

Wildlife Do Not Always Need to Be Rescued

You can remind them that juveniles of many species are normally separated from their parents for extended periods of time each day. Finding a neonate alone does not necessarily indicate abandonment or loss of parental care. The best course of action may be to leave the juvenile alone, or immediately replace the animal exactly where he or she was found. Species to which this applies include most fledgling birds, hoofed stock, and marine mammals. Parents will usually readily accept the returned offspring and continue to feed and care for the juvenile until self-sufficiency.

Young animals of some species may be best immediately released. Many precocious species need minimal or no parental care for feeding and care if adequate resources and cover from predators are available. These include many



Raccoon.



Infant Eastern cottontail.

species of ground-dwelling birds like galliforms (chicken-like birds) and waterfowl. These species can be orphaned with a higher chance of survival alone than altricial species that are born or hatched dependent upon intense parental care.

How to Deal with Rescuers Who Want to Raise Wildlife

If a finder seems determined to raise a wild infant, **first ask for the person's name and phone number.** Then you can use the following information to help convince them that raising a wild animal is not in the best interest of the animal and may be dangerous to the person:

- Explain that formulas are very specific to each species and must be changed continually as the animal grows to meet its changing nutritional requirements. The wrong foods can keep an animal

alive and even looking fine but the bones and teeth will be weak, and the internal organs will not develop correctly.

- The animal will have a difficult life, if he or she even survives.
- The wild animal infant that is sweet and cuddly now will grow up to be an adult wild animal with strong defense and survival instincts.
- A wild animal will be unhappy in captivity and will be a potential danger to humans and domestic animals.

As a last resort, explain that it is illegal for the public to keep wildlife except to rescue and transport to a veterinarian or licensed rehabilitator. Keeping the animal could involve a heavy fine, and the animal may be confiscated and destroyed.

Be sweet. Be calm. Be reasonable. Be firm. If all this fails, call one of the rehabilitators on your contact sheet and let trained professionals handle the situation.

When Animals Are Brought to Your Veterinary Facility

The Basics

Getting Information from the Finder

It just takes a few minutes to get this information. Some of it will help you to decide what treatment will be needed next. There is a sample wildlife admission form in the Appendix of this handbook that can be

used to record important information. Clinicians might want to design a similar one that more closely fits the needs of their facility. Staff members should always record the following details:

Information for Wildlife Admissions

- Name, address, and phone number of the finder.
- Where the animal was found (specifically what town and what street if possible, and in what context, such as under a tree, in the road, etc.).
- If the animal is an infant, does the finder have any idea what happened to the mother? (See How to Rescue Baby Mammals or How to Rescue Baby Birds in the Appendix to assist in determining if the animal really needs help.)
- When was the animal found?
- What has happened since then?
- Has the animal been fed? If so, what and how much?
- Who has handled the animal? How often?
- Were gloves worn? (This is an important question to ask about mammals and especially about rabies vector species and, in case the case of raccoons, because of *Baylisascaris*.)
- Is there any possibility that a cat injured the animal? If so, treatment should begin immediately. Since cats have extremely toxic bacteria in their saliva that will quickly bring on septicemia in a small animal, an antibiotic should be administered as soon as possible.
- Immediately try to determine whether the option of returning a healthy neonate or juvenile is still an option. Young birds, hiding hoofed stock like deer, and marine mammals are often best served by returning to the exact location if only very recently removed from the site. Maternal instincts are very strong even if human scent is present.

Where and How to Confine Wild Animals

Dark, Warm, and Quiet Spaces Are Usually Best

Any wild animal that comes into care will be stressed just from being captured and transported to your facility. The animal needs a dark, warm, quiet, and private space so that he or she can calm down. This may not be easy to provide in a busy veterinary clinic but do the best you can. Caging can be wire cages (not recommended for birds) or carriers for adult animals. A plastic storage bin with holes drilled in the lid or an aquarium with a wire cover work well for housing infants and juveniles. Include an extra heat source, such as a heat lamp, brooder, or SnuggleSafe. Provide something for them to hide in or under. A soft cloth will work for smaller animals, and for larger ones, a cardboard box with a door cut in it. Even just a cloth hung over the cage to cover any openings will help the animals feel safer and less threatened.

Noises and bright lights are very frightening and threatening to wild animals, unlike domestic animals who are used to them. It's important to take this into consideration when handling and housing wild animals. Different species are variably photophilic or photophobic. Nocturnal animals may prefer a nearly pitch-black enclosure. A photophilic species may prefer a basking spot of warm light, but still require an opaque enclosure to exclude external stimuli.

Performing a Physical Exam

Some veterinary clinics have the staff, time, and facilities to do a complete exam and initial emergency care for wild animals, including antibiotics,

wound care, fluid therapy, and parasite removal. Some don't. If your clinic doesn't, basic evaluations are still greatly appreciated by the rehabilitator receiving the animal.

Emergency medical care for wildlife is essentially the same as for any animal. The physical exam may be trickier. Prey species, like non-raptor birds and most small mammals, may appear tame and quiet. This is instinctual behavior when compromised to avoid attracting predators. The animal may actually be experiencing tremendous psychological stress. Just being held captive can cause enough stress to be life-threatening. Small birds and rabbits can literally die of fright.

Visual Exam First

You should start a visual exam as soon as you are in a room with the animal. Continue observing after the animal is placed in the dark, warm, quiet place as treatment for stress. Are there any visible wounds or breaks? Can the animal



Fledgling American goldfinch.

stand or walk? Do all the limbs seem to be in the right positions? Does the animal seem dazed, dehydrated, malnourished, or weak?

It is best if you can observe the animal without the animal knowing. Otherwise, wildlife often feign good health to avoid predatory attention and their condition may be more severe than immediately apparent. Once a wild adult animal begins to act weak or vulnerable, he or she is most likely far more compromised than it appears.

Preparations

Set up your equipment for a hands-on exam. Have everything you might need readily accessible, including clean towels, saline solution, soft cloths, medications, flea treatments, paper towels, and scissors. You don't want to have to stop the exam to get supplies. The goal is to do a complete and thorough exam with as little handling, noise, and movement as is practical.

Checklist for Exam Supplies

- clean towels
- saline solution
- soft cloths
- medications
- flea treatments
- paper towels
- scissors

Physical Exam—Go Slowly

It is sometimes necessary to do an exam in several parts, placing a stressed animal back into a cage and allowing the animal to calm down before proceeding. Open mouth breathing in birds can be a sign of stress. Intense struggling, screaming, biting, and scratching are signs that a mammal needs a break. Sometimes a hands-on exam isn't practical, as in the case of an adult mammal or raptor. It may be that the best that

can be done is a visual exam, until appropriate physical or chemical restraint can be used.

Move slowly and speak softly. Keep movements, noise, and especially talking to a minimum. Make no direct eye contact with the animal as this may be seen as threatening. Avoid strong smelling soaps or perfumes and, when handling birds, avoid hand lotions in order to protect waterproofing. The exam and the confinement of the animal should be done in the quietest possible area of your facility.

Cold metal exam tables add to the animal's stress during the exam. Place a soft cloth or blanket on the table first. If a towel is used, be sure that there aren't any loops or loose threads that can snag claws and wings. T-shirts, sweatshirts, huck towels, fleece, or baby blankets are ideal. Have more cloths handy to help manage the animal. Cloths can be used to wrap around the animal to hold the animal more securely while he or she is examined or to cover the eyes. This will help to calm the animal. Never leave a wild animal unattended during an exam or treatment.

Take Precautions with Restraint

Common-sense advice is to protect yourself, and the animal at the same time, by using gloves. Wear rubber gloves when handling any wild animal. Use thick leather gloves for all adult mammals, older juvenile mammals, and big birds. Keep your fingers out of the tips of the gloves. Protect your eyes and neck from birds with long, sharp beaks.

Adult birds can be seriously dangerous, but appropriate physical restraint can mitigate the risk. Complete control of the head is possible if the bird's neck is restrained near the angle of the mandible. However, release of the head for even a moment can result in a rapid strike by the bird. Rather than facing the bird forward with one hand around the body and one on the neck, a safer option may be to point the bird facing backward.

Adaptive restraint devices can also be employed. A cloth bag over the entire head and neck can be held in place to make targeting impossible. It also calms the bird and provides minimal cushion should the bird strike. An appropriate object may be placed over the tip of the beak to render it temporarily blunt. Common items that can be used are tennis balls or handballs, corks, or even a quick gauze and Vetrap over the tip.

CAUTION: Many birds will regurgitate their last meal as a defensive measure. If the bird has eaten recently, regurgitation could result in aspiration pneumonia resulting from a forcibly closed beak and the impossibility of expelling the regurgitated material.

Raptors and birds with talons can be a particular challenge; adaptive devices can also be useful. A tennis or handball, or even just a roll of gauze, can be placed in the sole of the foot allowing the bird to grasp the object tightly. The foot with the object can quickly be covered with a non-adhesive wrap like Vetrap to simply hold the object in place for the exam. It is easily removed upon completion.

Adhesive tape is seldom appropriate for use on birds. It can be difficult to remove and may pull feathers when removed. A non-adhesive tape like Vetrap or a simple roll of gauze is usually better.

Appropriate restraint of the wings may prevent injury to both the personnel and the bird. Large birds can do significant damage with their wings. The body may be wrapped with either a towel or large cloth for restraint,

often referred to as a “bird burrito.” However, extra care must be taken to prevent suffocation with birds. Birds lack a diaphragm, so chest excursion is essential to avian respiration, unlike mammals. Always wrap the cloth just snug enough to control the wings, never tightly.

Remember to Weigh the Animal

Weigh the animal to help determine the condition of the animal, food amounts or dosages for medications. If held for several days, most animals should be weighed daily or frequently as this is the best measure of healthy improvement.

Special Precautions for Rabies Vector Species

If any staff have not received rabies pre-exposure vaccines, they should not be allowed to handle wild mammals that are potential rabies vector species. No one should work with rabies vector species without pre-exposure vaccine prophylaxis.

Body Temperature

Most animals in distress need warmth, but wild animal infants cannot survive without it.



Animals should be weighed to determine the proper food and medication dosages.



Eastern gray squirrel.

Neonatal wild infants with their eyes still sealed can't thermoregulate and generally need an ambient temperature around 85 to 95 degrees Fahrenheit. Older babies or severely compromised adults may need an extra heat source, too.

You can use a heating pad set on the lowest setting. Place the pad under a quarter to a third of the container and up one side (but never in direct contact with the animal.) Other heating options include a regular 60-watt light bulb for photophilic species or a ceramic heat bulb for photophobic species, suspended over one end of the box and about 18 inches above the area to be heated, or an incubator, brooder lamps, hot water bottles, and SnuggleSafe discs. Numerous types of heat sources sold for reptiles are available and may be safer. **Use a thermometer to ensure that neither the ambient air temperature nor the substrate directly above or below the heat source exceeds 95 degrees Fahrenheit and make sure that the animal never comes into contact with direct heat source.**

Check the container and the animal often to make sure the temperatures are not too hot or cold. The container should be 85 to 95 degrees Fahrenheit, depending on the age and condition of the animal. Use two separate ther-

момeters to double-check the temperature. If a heating pad on the lowest setting is still too hot, use layers of newspaper, a wire cake rack or cloths between the heating pad and the container to regulate the temperature.

Beyond the Basics

Mammals—Infants and Juveniles

Identify the Species

Try to determine the animal's species. A good wild mammal guide and a list of the wild animals in your area can be very useful. You should be able to obtain a list from your state wildlife department. Sometimes a wild infant is brought to you pink and hairless: information given to you by the finder may prove helpful in making your best guess as to which species you are about to treat.

Dehydration and Rehydration

You can assume that any wild infant brought to you is suffering from some degree of dehydration. Treat with warmed rehydrating fluid such as lactated Ringer's Solution, Pedialyte, or other commercial rehydrating fluids.

Administering fluids to birds can be challenging for inexperienced people. Birds in particular may be very difficult to treat using I.V. administration techniques, especially slow drip I.V. administration. Intracoelomic (intraperitoneal) fluids can easily drown a bird as the air sacs connect directly with the lungs. Birds lack a diaphragm to exclude intracoelomic fluids from the lung parenchyma. Methods of fluid administration are described in the **Avian** section of this handbook; but they are to be used with caution.

Methods of Administering Fluids

Even though your clinic may be willing to deliver fluids using these methods, it is sometimes better to offer fluids orally. Self-consumption via a bowl is ideal, but many stressed new captives will resist drinking. Neonates may never have consumed standing water. Mammal neonates obtain it from the milk they consume, and hatchlings via parental regurgitation. Some marine species such as pelagic birds and marine mammals may never drink fresh water their entire lives. Most of the required fluids for those specialized species may be acquired from metabolic sources. Those species will require alternate means of hydration until normal feeding can resume.

If the animal is willing and able to accept oral rehydration, it is the best choice, since it will help to keep restraint stress levels down. Neonatal mammals may consume nipple fed water, but birds and some mammals may be best rehydrated via tube feeding if forced consumption is required. Tube feeding can mitigate the risk of aspiration because it bypasses the glottis and delivers the fluids directly to the stomach. It also allows the exact volume to be delivered.

If the animal resists taking fluids by mouth, and struggles, use a bolus of subcutaneous fluids (in most mammals and some birds), or intraosseous administration in larger birds if the bird is under local or general anesthetic since piercing the periosteum is not without

The Shortcut Method for Figuring Replacement Fluids

Day 1:

Give 3.3% of the animal's initial body weight, three times during the first 24 hours.

Days 2 and 3:

Give 2.5% three times a day for the next two or three days.

Day 3 or 4:

At this point the animal should be rehydrated. If the animal has ongoing fluid losses (vomiting, diarrhea, etc.) additional fluids may need to be given.

As presented by Erica Miller, DVM, at the 2004 New York State Wildlife Rehabilitation Council Conference

pain. It requires less handling of the animal and reduces the danger of aspiration. The more invasive routes should be the last choices for mild to moderate dehydration but may be essential in more severe dehydration. Ringer's, lactated Ringer's Solution or Normosol-R would be appropriate parenteral fluid choices for wildlife. However, mild to moderate capture myopathy can result in severe lactic acidosis, especially in mammals, and lactated Ringer's may be less appropriate.

Rehydration protocols are the same as those used for domestic mammals. The above shortcut method is used by some rehabilitation facilities that welcome efficient short-cuts as they struggle to handle large numbers of animals.

Warm the animal and the rehydration fluids before administering. If the animal can't be passed on to a rehabilitator right away, he or she can be maintained on rehydration fluids for at least 24 hours.

If the animal isn't dehydrated, use rehydration fluids in normal feeding amounts. The rehydration solution helps to reduce shock, is easy on the digestive system and, for neonates and hatchlings, it makes for a good transition fluid from mother's milk to the substitute formula needed for older animals. It can also ease the transition from whatever foods were eaten in the wild to what the animal will be fed while in the rehabilitator's care. If it looks as though the animal will have to remain in treatment a few days, infant animals should be placed on formula and older ones onto foods they will receive once they are in the rehabilitator's care.

Transitioning from Rehydrating Solution to Neonatal Mammal Milk Replacer Formula

Once the animal is rehydrated, begin to introduce the formula gradually.

- Start with $\frac{1}{4}$ formula to $\frac{3}{4}$ rehydration fluid for a feeding or two
- Then move to $\frac{1}{2}$ formula and $\frac{1}{2}$ rehydrating fluid
- Then move to $\frac{3}{4}$ formula and $\frac{1}{4}$ rehydrating fluid
- Finally use full-strength formula

Move to the next step when you see that the infant is tolerating the new strength formula. The animal should be able to digest the formula with no gastrointestinal problems. This is a gentle way to introduce the new formula to the infant's system.

Determining the Correct Formula

Wildlife nutrition experts recommend the use of puppy or kitten milk replacers, commonly found in veterinary clinics, modified to fit each mammalian species needs, or formulas



Syringe-feeding an Eastern gray squirrel.

designed specifically for the species. Because you will have the animal for a short period of time, the use of appropriate commercial canine and feline milk replacers (without the modifiers) will simplify things for your facility, and will be fine for a starter formula. Be sure to let the rehabilitator who takes over care of the animal know the details of what you have been feeding so that a gradual transition to the modified formula can be made.

Most mammal infants will do fine on a puppy milk replacer for a short time. Raccoon and cottontail young need a kitten milk replacer. Formulas for some of the other species are much more complicated and can change according to the age of the animal being fed. If the animal needs to be at your facility for extended care, consult a rehabilitator in your area.

Methods for Administering Formula/Feed

A syringe with a long tip works well for oral feeding; luer tips for very small animals, and curved tips for larger species. Catheter tips

may be too large for milk in most species, but may be useful for a transition from gruel or fish paste over to solid food. Using a small syringe makes it easier to control the flow of formula, even if it requires several refills. Teat infusion cannulas, Catac nipples, and small pet nurser nipples (which can be found in veterinary supply catalogs) will fit nicely on the end of a syringe and will make feeding easier for you and for the infant. (See photo on page 13 for syringe-feeding an infant skunk.)

The animal may initially fight the feeding. Gently and slowly get some fluid into the mouth. After a few tastes, the animal will usually get the idea and cooperate if able.

Loss of appetite and lethargy are some of the first signs of hypothermia in neonates. They are also more likely to have difficulty swallowing and aspirate more easily. Moreover, a hypothermic neonate's gastrointestinal tract experiences ileus, fecal stasis, painful gas production, and potentially lethal colic. Ensure the animals remain warm before, during, and after feeding.

Opossum infants don't suckle like other mammals, and need to be tube-fed or fed drop by drop onto their tongues. All marsupials are so altricial when they are born that they lack sufficient manual or oral musculature to hold the teat. The marsupial teat nipple is long and thin and may extend all the way to the stomach. There is more opossum information in the **Special Species Information** on page 16.

Frequency of Feeding

Weigh the animal using a gram scale.

We recommend using the 5 percent rule: the maximum comfortable stomach capacity is 5 percent of the body weight.

If, for example, a squirrel infant weighs 100 grams, you would calculate 5 percent of 100, which equals 5 grams, or approximately 5 milliliters. This tells you that 5 milliliters would be an appropriate amount to feed an animal of this weight. The animal may not eat that amount the first few feedings, but you know that the animal needs approximately this amount to supply adequate nutrition. It is a good starting point. Rabbits are an exception to this rule, with a stomach capacity of 8 to 10 percent of their body weight.

If the animal seems hungry after a feeding of 5 percent, feed slightly more and see how well the animal tolerates the increase. The 5 percent rule gives you a rough idea of the quantity to feed at each meal and you can adjust for individual differences. Some mammals will continue to nurse as long as you let them so you have to make the decision about how much to offer. The stomach should be full, but still soft. It shouldn't be palpably hard and stretched like a balloon.

The real indicator for proper amounts is the stool. One of the major causes of diarrhea in mammal infants is overfeeding. If the animal begins to have diarrhea or the stool begins to look loose or lighter in color, cut back on the amount given at the next feeding. If overfeeding has caused the change, the stools should return to normal.

Newborns will have to be fed as often as six to eight times a day to get the nutrition they need. Infants who are just beginning to be furred need to be fed five to six times a day (every three to four hours). Infants who are furred and have their eyes opened or beginning to open need to be fed four to five times a day.



A skunk infant.

Proper Feeding Position

Infants should be fed in the prone position, stomach down, with the chin raised so that the face is forward. Most infants should not be fed while lying on their backs like a human child.

Bowel and Bladder Issues

Wild mammal infants with their eyes closed have to be stimulated to urinate and defecate. If this is done after each feeding the results can become an important diagnostic tool.

Use soft tissue or a cotton ball dampened with warm water and lightly rub the anal area. This stimulates the perineal-colic reflex that normally allows the parent to initiate elimination and remove the infant from the nest before it soils the bedding; this is an added advantage to sanitation as well. This has to be done even if there are signs in the bedding that the animal has been eliminating somewhat on its own. Use rapid but gentle strokes to simulate maternal licking.

Adults of many species maintain a gastro-colic reflex. Stretching of the stomach stimulates the

parasympathetic nervous system and results in increased colonic peristalsis. Therefore, one of the best times to encourage defecation is immediately postprandial.

If the stool is well formed, proceed with a regular feeding, but if it's loose or if diarrhea is present, adjust the feeding accordingly.

Common Feeding Problems

- **Inhalation of Formula**

Too much formula at once or too fast will cause the infant to aspirate or "snarf" the fluid up the nose. This creates a danger of having the fluid go into the lungs and cause aspiration pneumonia. If the infant begins to sneeze or if fluid comes out the nose, immediately tip the infant forward and upside down so that gravity can bring the fluid into the nose and away from the lungs. Gently wipe away any fluids from the nose. Give the animal a chance to recover before continuing the feeding. Press more gently on the feeding syringe plunger to slow down the flow of formula or change to a smaller feeding tool.

• Diarrhea

This is most often caused by overfeeding. At the first sign of diarrhea, reduce the amount of formula given. If diarrhea persists, dilute the formula with lactated Ringer's solution, other rehydrating solutions, or plain water (or alternate feedings of formula with feedings of rehydrating solution until you see results). Pedialyte-type fluids may be diluted in half with LRS, Ringer's or 0.9% sodium chloride if given orally.

With severe cases of diarrhea, stop the formula altogether. Feed just rehydrating solution for 12 to 24 hours. Slowly reintroduce the formula. Imodium AD, or kaolin and pectin, (an animal version of Pepto-Bismol, but without the acetylsalicylic acid) can be used to soothe the GI tract. Doses are measured according to the weight of the animal.

Doses for K-P

Add to food or give directly every four hours.

Animals 1 to 15 pounds:
give 1 teaspoon (5 milliliters);

16 to 50 pounds:
give 2 teaspoons (10 milliliters);

51 pounds and over:
1 tablespoon (15 milliliters).

Imodium AD should be given at 0.1 or 0.2 milligrams for each kilogram the animal weighs.

• Bloat

Bloat, colic, or gaseous distension is usually only seen in neonate or very young wild infants and may be caused by hypothermia with food in the GI tract, overfeeding, inappropriate milk replacer, internal parasites, diet changes, constipation, or internal abnormalities. It is seldom pre-existing in a recent wild caught neonate upon

presentation examination, but often seen when the people who find them have fed the infants. Once bloat is identified, stop feeding until it's resolved.

Attempt to identify the location of the gas entrapment (proventriculus/crop, stomach, lower intestines). Radiography is the best diagnostic tool to determine enteral impaction or gaseous distension.

If gastrointestinal stasis is considered, place the infant in warm water to cover the abdomen, and extremely carefully massage the abdomen for about five minutes. Keep the infant warm. Gently dry it with a soft cloth. Don't use a blow dryer. (The noise and the heat are stressful to wild animals.) Repeat the process every half-hour until the problem has been resolved. A carefully measured dose of infant (formulation for humans) simethicone—65 to 130 mg total dose PO TID—may relieve some of the pain and distress caused by gas. If you think the animal is in extreme pain and discomfort, the addition of a pain reliever like Metacam may help.

Metacam Dosage

The Loading dose:
0.2mg/kg po once.

After 24 hours, start
Maintenance doses of:
0.1mg /kg po q 24h.

• Resistance or Reluctance to Feed

This may be due to one or more of the following conditions:

- The animal is too weak or too sick and has no interest in eating
- The animal does not understand that you are offering food. Be sure to get at least a tiny taste in the mouth. This may require patience.
- The animal is too hot or cold.
- The food may be too hot or too cold.



A woodchuck.

- Your hands may be too cold. Keep a warm cloth between you and the animal.
- You may be holding the animal too tightly or in an uncomfortable position.

It may be too soon after the animal's last meal. If the stomach is still nicely full when you begin to feed, and the animal is not hungry enough to nurse well, lengthen the amount of time between feedings slightly.

Try to determine the animal's age and feed an age-appropriate diet. The **Sample List of Supplies to Have on Hand** (in the Appendix) includes age-appropriate emergency diets for birds and mammals. These diets are not by any means complete or meant to be used for the long term. They are strictly suggestions for emergency short-term feeding.

Transfer of Animal

During the transfer of the animal, consider showing the rehabilitator how you are performing all technical procedures so that they are consistent after the animal is taken to his or her facility for care. The clinician may also have the rehabilitator come to the office to show the

staff correct handling and feeding techniques for that species.

Mammals—Adults

Use extreme caution when offering food to an adult wild mammal. Anyone opening its cage door and reaching inside may be perceived as a threat and the animal may try to defend itself by biting or scratching. If the animal is alert and can move easily, "trespassing" into the cage for feeding or cleaning could be dangerous. Large gloves may be practical as a protective measure but could seem even more threatening to the animal. Be prepared for possible sudden lunges, or attempts to escape the cage.

Regular appropriate foods can be placed in dishes into the cages of adults able to feed themselves.

Those too weak or otherwise unable to feed themselves may have to be syringe- or gavage-fed. Even weak and sick wild animals may suddenly gather their energies and make a surprising defensive move or struggle to escape.



Virginia opossum young.

Special Species Information

Opossums

Opossum infants don't have the same suckling reflex that most mammals have, nor do they possess the oral or extremity musculature to hold a teat. They are normally attached to their mother's teat constantly during the nursing period of several months. The teat is long and thin and may reach the neonate's stomach, not just the oral cavity of marsupials. In the mother's pouch they ingest formula slowly, drop by drop, much like an IV drip, and never have to suck to get milk. These infants must be either gavage-fed or fed drop by drop with a syringe or eyedropper. If you are feeding or rehydrating with an eyedropper, allow a lot of time to be sure that each drop is swallowed and that the infant takes in enough fluid.

When admitting an adult female, check her pouch for infants or joeys. If there are infants and the mother is in reasonably good shape, leave them with her to let them nurse. If she needs medicine that might harm the infants, or if she is sick or emaciated, then the litter will have to be removed from the teats and hand-fed with a puppy milk replacer. If the infants are less than 30 grams and the mother cannot take care of them, then they should be euthanized.

It's extremely difficult and time-consuming to keep them alive. If infants this young do survive, their immune systems are compromised and they usually die before they are release size.

Opossums are not usually aggressive but would like you to think they are. They have an elaborate defense routine that is meant to frighten a predator away. The routine includes open-mouth growling or hissing, showing their teeth (the most of any terrestrial mammal), and swaying side to side. If this does not succeed, they may start drooling, expelling gas, urinating, defecating, and then releasing a foul-smelling greenish slime from a special gland under the tail. As a last resort the animal may "play possum," but this isn't play for the opossum. He or she has initiated an actual physiological response, which is an involuntary coma-like state. However, they seldom resort to this behavior unless actually grabbed. The opossum is aware enough to know when danger is passed and can come out of this state. Sometimes, in extreme danger they will simply invoke the "playing possum" state and not exhibit the other warning behaviors. Be sure to check carefully for a faint heartbeat before declaring an opossum dead!

It's rare for an opossum to be a rabies carrier. Opossums are highly resistant to the disease,

perhaps because of a low body temperature that can't support the rabies virus well. However, rabies has been known to occur in the species, so take precautions when handling them.

If you have opossum infants from different litters in your care, house them separately until you can place them with a rehabilitator. House any wounded opossum alone. **Stressed opossum youngsters can and do attack one another.**

Raccoons

Raccoon infants should be fed a kitten milk replacer, using a syringe with a nipple to get them used to the idea, and then switching to a human baby bottle with a preemie nipple. Small raccoon infants easily become habituated to humans. Once their eyes open, it is essential to minimize human contact as much as possible.

The raccoon roundworm (*Baylisascaris procyonis*) is commonly found in the small intestinal tract of raccoons. It is a serious zoonotic agent and special care should be taken to avoid or decrease exposure. Cages and containers housing raccoons should not be used to house other animal species.

The recommended way to disinfect a cage to remove all roundworm eggs is by propane torch or cleaning with boiling lye water. Since this is not always practical, it is recommended to designate some cages as "raccoon only."

Nonporous plastics or stainless steel should be cleaned and sanitized with a strong antiseptic like a quaternary ammonium or concentrated sodium hypochlorite. Washing surfaces with bleach can remove the sticky outer coating of any eggs there so it is less likely that they will stick to anything, but it will not kill them. Porous containers or materials cannot be sterilized even with strong disinfectants. They should be discarded after use by a raccoon of any age—these include cardboard boxes, bedding and all substrate. Bedding will not be sanitized by washing, but rather will contaminate other items in the wash.

The only way to disinfect soil contaminated by *Baylisascaris* is high heat sterilization,



Baby raccoons.

sometimes performed with flame. The most practical means is to remove all the soil down to the depth of at least a foot and replace with fresh substrate. Raccoons should not be kept on dirt unless the enclosure will be exclusively for raccoons or the soil removed.

The roundworm eggs cannot be killed with common disinfectants or antiviral solutions and can survive for years in the environment. In other species, an infection with roundworm causes permanent blindness, brain damage, permanent neurological abnormalities, and even death. **This includes humans.** No one should handle raccoons without personal protective gear, including gloves at a minimum. All raccoon feces should be considered infective waste.

Older raccoons can be fed cat or dog chow, fruits, nuts, and whole-grain cereals. They will eat and drink water from a bowl. Since raccoons are considered rabies vector species in most states, all due precautions should be taken. If rabies is present, it could be transmitted in the animal's saliva. Even tiny raccoon

infants can be infected with the virus *in utero*. Most are not, but it's safest in a clinical setting to treat any warm-blooded mammal as though it might be. All rabies vector species should be handled with gloves, no matter how cute or innocent they appear.

Skunks

Infant or young skunk kits can be fed puppy milk replacer after having been rehydrated. Older kits and adults can be fed canned cat or dog food or chow. They adapt quickly to drinking and eating from a shallow dish.

When skunks are left alone in a quiet place they don't spray. The smell is just as obnoxious to them as to us. Skunks are nonaggressive animals with a nonconfrontational disposition. Make some subtle noise from a distance as you approach so they are not startled. Move slowly and quietly around them and watch their body language. A skunk will usually give several warnings before spraying. It is wise to pay attention to these signals. The skunk may puff his or her tail and hold it up straight,

stamp his or her front feet and move his or her rear around to face you. If the skunk in your care does these things, you have been warned! Stop what you're doing and slowly back away. If the skunk is startled the animal may not bother to give the warnings.

You can move a skunk from one place to another fairly easily without touching (for example to move a skunk into an aquarium before using isoflurane gas to knock the animal out). Just point the skunk toward a **covered** container you want the animal to go into, and the skunk will usually go in. If the animal is reluctant, you may have to tilt the container, or gently nudge in the direction you want the animal to go. Skunks like dark places and are thigmotactic (they *like* tight hiding enclosures) so covering a container makes it attractive to them. They will bite if you put a hand near their mouths, but their weapon of choice is the spray. Move slowly.

Skunks are considered rabies vector species in most states. Use protective measures when handling them. To pick up a skunk, use a soft cloth to cover the back and head and scoop one hand under the rear. Trap the tail down and against the skunk's rear and underside. It can still spray but usually won't. Using even pressure on the back to prevent the animal from arching the tail may also help to prevent spraying. Do this all in one smooth motion but not too fast. Good luck. **Remember:** It is just a smell.

If the skunk does spray, there are many enzyme products available at hardware stores that will quickly neutralize skunk odor in an indoor space. White vinegar also removes the smell effectively if applied to all sprayed surfaces or skin and allowed to remain wet for at least five minutes.

Don't wash the area with soap and water first. This will spread the oily skunk fluid around and make your job more difficult.

Skunk Odor Removal

The Humane Society of the United States recommends a recipe using common household items to remove skunk odors from clothes, fur, and skin:

- 1 quart of 3 percent hydrogen peroxide
- ¼ cup baking soda
- 1 teaspoon of any liquid dish detergent.

Mix the solution and immediately apply it directly to the area sprayed. When cleaning an animal, avoid the animal's eyes. Don't store the solution. Make a new batch each time you use it because hydrogen peroxide spontaneously degrades to oxygen and water.

Whatever odor control you use should be left on the area to be cleaned for at least five minutes and allowed to dry. Then rinse the area. You may need to repeat the process.

Bats

Bats can be grounded for a variety of reasons in addition to illness and injury. Stormy weather may cause disorientation, hypothermia, or difficulty navigating. Young bats become separated from their mothers before they can fly well and find food. Sudden high temperatures can bring bats out of hibernation at the wrong time of year, only to be cold-shocked when the temperature drops again.

Being mammals, bats are susceptible to the rabies virus and should always be handled carefully with the protection of gloves or a cloth. Humans outside the United States most commonly become infected with bat rabies virus when exposed directly through cryptic vampire bat bites or exposure to saliva of infected hoof stock bitten by a rabid bat. Within the United States,



Striped skunks.

on the other hand, people are primarily exposed to bat rabies because they pick them up when they find a downed bat. Use protection, every time.

Crevice-dwelling bats such as **big brown bats** can be temporarily housed in an aquarium with a secure top. Hang several layers of clean cloth (not a towel) down one side of the aquarium for the bat to hide between. A rough surface like a huck towel allows them to easily hang, but loose strings can strangulate toes and feet. Be careful to choose cloth with minimal loose strings.

Tree-dwelling bats such as **red bats** can be housed similarly but should also be offered a branch from which to hang. If you are not sure which kind of bat is in your care, provide both a cloth and a branch and let the bat decide. Check for areas of escape. Bats can escape through an opening smaller than a dime. An opaque enclosure allows it to be darker than a transparent container, but covering the container may be sufficient.

Rehydrating solution fed from a cannula tip and a small syringe will work well to care for both adult and young bats for a few hours until a rehabilitator can take them.

Injured adult bats and juveniles must be "hand-fed" mealworm viscera (guts) until they decide to eat entire mealworms or insects whole by themselves. Always use forceps or other tool. Rubber tipped or covered forceps are best to avoid dental damage. Bat infants (pups) can be offered a puppy milk replacer after being rehydrated. They use up calories quickly, so rehydration for a newborn bat should be done once and then be followed by a dilute formula of puppy milk replacer, then undiluted milk replacer.



Brown bat.

The bat rehabilitator who takes the pups will need to take some of the formula you've been feeding so the pup can be transitioned easily onto whatever its formula will be in rehabilitation.

Rabbits

Rabbit mothers feed their infants only two to three times in a 24-hour period. The infants hide in the nest for the rest of the day alone. Rehabilitators also use this feeding schedule to feed rabbit babies with kitten milk replacer. An infant rabbit's stomach capacity is greater than that of most mammals. When calculating formula amounts, use 8 to 10 percent of their body weight. Juvenile rabbits may benefit from

a single low dose of trimethoprim sulfa, maybe just a drop orally of (Bactrim) antibiotic and Bene-Bac, acidophilus or a digestive aid enzyme to help them adjust to substitute formulas.

An infant rabbit's urine can sometimes be dark brown. This usually happens when it has been a long time since it last urinated. Diarrhea can be sudden and fatal with rabbits. At the first sign of diarrhea, treat aggressively. *Clostridium difficile* is a common cause of diarrhea in cottontails of weaning age. Penicillins may be toxic to a rabbit's GI tract, so avoid using these antibiotics (see **Medication Precaution/Warnings section**).

Reintroduction of beneficial organisms should be a part of almost any therapy regime for rabbits, particularly gastrointestinal disease. Probiocin, yogurt, and *Acidophilus lactobacillus*, among others, may be beneficial.

Rabbits readily die from stress. Try to be extra careful in avoiding noise and sudden

movement. Have just one person do all the care and handling if possible. They can easily "squish" out of your hands while you're feeding them so keep one finger in front of the rabbit's chest while you feed. Rabbit kits are able to be on their own when they are about the size of a chipmunk (four to five inches long) and only three weeks old; their ears will be erect at this age.

Rodents: Squirrels, Chipmunks, Woodchucks, Beavers, and Porcupines

Infants and very young of these rodent species can be fed puppy milk replacer. They are herbivores, so older juveniles and adults of the species can be fed field greens, and can be offered rodent chow and monkey chow, as well as dark green leafy vegetables, carrots, sweet potato, and apple slices, and for the squirrel species, acorns and other nuts in the shell (no peanuts). Calcium and phosphorus can be supplemented with a sterilized bone to chew and may provide a distraction to more destructive behaviors.



Infant Eastern cottontails.

Large Rodents: Beavers and Muskrats

If you care for infants of these species, be aware when they are very young and while their eyes are closed, they need to remain dry and be stimulated to urinate and defecate like most mammals. Juveniles (eyes open) need access to water to urinate and defecate. Both species will need puppy milk replacer as infants, but their diets differ by species if they are juvenile or adult.



A weasel kit.

Beavers can be fed branches and leaves of poplar, aspen, willow, and an assortment of water plants. They can also be fed rodent chow or greens such as collards, kale, spinach, mustard greens, and turnip greens and small bits of apples, sweet potatoes, bananas, and grapes. Beaver kits stay with their family units until two years of age; if they cannot be fostered into a wild family, they will need to be kept in rehabilitation for two years before releasing into a carefully chosen area.

Muskrats' natural diet is mostly water plants but they can be fed temporarily with field greens, sod, corn, acorns, and young leafy branches to chew.

Mustelids: Weasels, Mink, Ferrets, Fishers, Badgers, Wolverines, and Otters

Mustelid species are carnivores. Otters prefer to urinate and defecate in water. Most mustelids appreciate water access

sufficient to immerse. More mature otters, mink, and some other mustelids benefit from a pool of fish or shrimp to play with and consume. All infants of these species can be fed puppy milk replacer.

Weasel young have a very high metabolism and should be fed more often than other species. Check their stomachs for fullness to help determine frequency of feeding. If they are of weaning age, (eyes opened, fully furred) they can be fed in the short term with scrambled eggs, and canned or kibbled cat or dog food.

Ferrets, fishers and badgers can be fed commercial ferret weaning formula at standard amounts. Ferret Zupreem (a high-quality dry diet) can be softened with dilute infant milk or water. Otters eat fish and crustaceans but are opportunistic foragers and, when they can find them, will eat reptiles and amphibians, birds, aquatic insects, small mammals, and mollusks.

Avian

Young Birds

Building a "Nest"

Bird chicks need extra heat until they're feathered. Build a nest from paper towels, toilet paper or tissues. Place the paper nest into a small bowl or empty margarine container to hold it together. Place several layers of tissues over the edges, and finish by placing a crumpled tissue to cover the bottom of the nest. The bottom of the nest needs to be scrunched, not smooth, so that the chicks can get a grip on it with their feet. The nest should be snug, since a chick's legs are made strong by pushing against the sides. Joints can become dislocated and bones may actually twist if the legs are not given adequate support by a proper nest.

At each meal the chicks will lift their rear ends up over the edge of a nest of appropriate height and release a "fecal bubble" or "fecal sac," which is their stool and urates contained within a film that has the appearance of a plastic baggie around it. Nests should be cleaned after each feeding. This can be done by lifting the soiled top layers of tissues around the edge and replacing them with a new clean set of

layers. Clean the bird right away if any food has soiled his or her beak or feathers.

Feeding Passerines: Songbirds, Doves, and Crows

Hatchlings

Hatchlings are totally bald or have just a few downy feathers. They may have trouble holding their heads upright. They need to be fed every 15 minutes regularly from dawn to dusk. Hatchlings need to be kept at 90 to 95 degrees Fahrenheit.

Nestlings

Nestlings are beginning to get feathers, can hold up their heads, and have control when gaping and reaching for foods. Young nestlings must be fed every 15 minutes; then every 30 minutes as they near fledge age. These chicks need to be kept at 85 to 90 degrees Fahrenheit.

Fledglings

Fledglings will be standing and moving around in the nest area. They may be perching and even trying short flights. It is at this stage in the wild that their parents teach them to self-feed. Check them often at first to make sure they are adjusting well to a normal room temperature of about 70 degrees Fahrenheit and don't feel cold to the touch. They should have food and water available.



Hatchling.



Nestling.



Fledglings.

Fledglings need to be fed every hour, gradually tapering to every hour and a half to two hours over several days, until you are sure they are eating enough on their own.

They may not recognize motionless food in a bowl. Insectivorous birds are stimulated by motion. Many omnivorous adult birds start out as insectivores. Offering a food item via forceps may yield the best results, ideally with minimal sight of the caregiver.

These young birds may gape and peep as though they are starving or thirsty whenever there's movement in their vicinity. This gaping is a normal response to the sounds or movement of air currents.

Young birds should **NEVER** be given liquid into their open mouths. They may aspirate the fluid and suffer subsequent respiratory problems and even death. Rehydrate them using a small clean paintbrush dipped into rehydrating fluid and then brushed on the edge of their beak, or by placing the fluid drop by drop at the edge of the beak, and allowing it to roll down in to the bird's mouth.

Adult Birds

Physical Exam

Warm the bird in a dark, quiet area. While performing a physical examination, check for external parasites. Birds are often infested with feather mites or lice. Throw away any original nesting materials as these often harbor parasites.

Stress can kill birds. Watch for open-mouth breathing, severe struggling, or a sudden limpness. Any of these symptoms can signal extreme stress. The exam should be stopped if these appear excessive, and you can continue the procedure when the bird has calmed down. Handle

the bird as little as possible. Hold the bird firmly but very gently. Birds need to expand their chests to breathe, and wild birds may associate squeezing and excessive handling with being attacked by a predator. Specific restraint techniques depend on species, age, and procedure.

Rehydrating and Feeding

Rehydrating birds can be tricky. The glottis is more easily visualized in birds as compared to most mammals. It can be seen immediately at the base of the tongue rather than further down the esophagus. Because of the close proximity of the glottis, oral fluids can accidentally enter the trachea. Aspiration may drown the bird, even if the fluids are sterile and no pneumonia ensues. For this reason, especially with small birds, don't place fluid directly into the bird's mouth. Instead, place one drop at a time on the tip of the beak and allow it to roll down the sides, and into the mouth. It may take a few tries but eventually the bird will begin to swallow the water drops. Give only a few drops at a time. Wait 15 minutes, and then give more drops. Another technique is to use a clean artist paintbrush, dip it in the water or fluids and let the bird bite the brush, or simply brush fluid onto the edge of the beak.

The bird should be rehydrated over a period of at least an hour. Rehydration can also be done by gavage if you have the experience. Appropriate gavage circumvents the oral cavity, glottis, and trachea, thus mitigating the risk of aspiration and allowing precise dosing.

Gavage can best be accomplished in most birds and neonatal mammals with naso-gastric orange feeding tubes or ball tip curved stainless steel rigid luer lock syringe tips. With the latter method, the luer lock prevents the tip from slipping off under compression. The steel prevents most species from damaging the tube. Ball tips are unlikely to injure the esophagus after gentle insertion. The tubes come in a variety of sizes and are valuable tools even in domestic species, so every veterinary hospital should maintain a

complete set. They are easily cleaned and sterilized and are inexpensive. Straight versions of the same can be used but are more difficult to orient correctly.

Red rubber feeding tubes can be used, but the flexibility can make insertion challenging. The openings in the red rubber tubes are on the side and may become more easily clogged with food. Mammals may damage them by biting as well. They are softer and less likely to cause problems during insertion. They are preferred by some rehabilitators for that reason. **Caution: It is critical to avoid hot fluids or food slurry when tube feeding, since these may be life-threatening.**

Try to identify the bird species so you know how to house and feed the bird and what to expect in terms of behavior. A good bird identification book such as *Peterson Field Guide to Birds of North America*, the *Stokes Field Guide to the Birds of North America*, or the *Sibley Guide to Birds*, should be informative.

Provide a rough perch appropriate to the size and condition of the bird's feet. Provide a place where the bird can hide and feel safe, such as behind a leafy branch or a cover over the front of the cage, or both. Put food and water into the cage if it's appropriate to that bird's condition or age. Most adult songbirds can eat Hill's Prescription Diet a/d canned food fed as a gavage, soaked-until-tender cat or dog chow cut into small pieces, fruit cut into small pieces, and mealworms. Pigeons and doves will accept mealworms, cracked corn, or birdseed. Wild adult piscivorous birds may refuse to eat anything other than whole prey. Pelagic birds,



Gavage feeding.

cormorants, and reluctant feeders commonly require force-feeding.

Digestive Issues/Parasites

Try to pay careful attention to the fecal droppings. Parasites may not be the main problem but they further compromise a bird that needs all of its energy to recover and be ready to go back to the wild.

When diarrhea is present, the fecal material does not hold its tubular shape. Instead, its consistency is that of pudding. Diarrhea, as well as colors of fecal material, can indicate internal parasites, or be a sign of stress, overhydration, disease or the effect of certain foods. The white component is not fecal, but rather urates, and is an indicator of renal function. Consult a veterinarian with experience caring for wildlife before treating for internal parasites as the parasite treatment could further compromise the bird.

Treating for External Parasites

To rid the bird of external parasites, you can use either a spray made especially for caged birds or flea powder that's safe for kittens. The powder or spray should not be placed directly on the bird. Instead, apply to a tissue and pat

it onto the back of the bird, taking care not to get any of the powder aerosolized. Avoid the eyes, mouth, and nares when applying it. You can also use a soft, clean paintbrush to brush the powder on. Alternatively, pesticides may be placed below the cage substrate where it may work more slowly, but does not come in direct contact with the animal.

Special Species Information

Songbirds

Mealworms (that have been gut-loaded with an appropriate diet) would be a perfect food for most songbirds, but are not usually available in veterinary clinics. Songbird chicks can be fed Mazuri nestling formula, dog or cat kibble that has been soaked until soft and then cut into tiny pieces, or canned puppy or cat food (especially Hill's Prescription Diet a/d) for a short time. It may be blended with water to a slurry. To feed, use a small paintbrush, a Q-tip with the cotton end removed, or a toothpick. Gavage of the slurry can be very effective, but the extreme fragility of the hatchling esophagus makes it best if done by someone with experience.

An infant bird will open its mouth very wide but will have difficulty swallowing and digesting large pieces of food. When feeding swallow-type birds, offer ladybug-sized pieces of food. When feeding robin-sized or larger birds, use housefly-sized pieces. It's sometimes impossible to determine what kind of chick you have, but do your best. Numerous small pieces are better and safer than a few large ones.

Older birds can be fed mealworms, dry cat or dog chow soaked and cut into small pieces or canned cat or dog food. You might also offer tiny pieces of cut fruit, or high-quality birdseed. However, since birds cannot masticate their food, grit is required to grind open seed shells. Seeds without shells may be best. If you aren't sure about the proper diet for that bird, offer

a buffet of choices in small amounts, until contact can be made with a bird rehabilitator.

Pigeons and Doves

Pigeon and dove chicks (squabs) are different. The good news is they don't need to be fed as often as songbirds. The bad news is that they are fed a substance called crop milk, which both the mother and father produce and allow the young to suck from their throats. This can sometimes make feedings a little difficult, since normal bird feeding techniques are not practical for these young animals.

Techniques for Feeding

For very young doves or pigeons, many wildlife rehabilitators use Exact baby bird formula, or Zupreem Embrace Plus—commercial foods designed for hand-raising parrots. Add hot water and stir until the desired consistency is reached—thinner for very young or dehydrated birds, thicker for older birds. Use a strainer to work out any lumps so that the formula will flow through the feeding tube without clogging. Measure the distance it needs to travel to get to the bird's crop, and mark that distance on the tube with a permanent marker or a piece of tape, so you can see how far it has to go into the throat.

Test it with a thermometer if possible or at least on the back of your hand. If it burns you, it will burn the bird's crop. Thermal crop trauma is very common with inexperienced individuals and it is usually a lethal injury.

The mixture is tubed directly into the bird's crop with a syringe and feeding tube. Measure the amount of formula the bird needs and draw it up into a syringe.

Before inserting the tube, identify the location of the crop, hold up the feeding tube up to the animal, and mark the approximate length to just reach the crop. Attach the tube you have marked, and lubricate it with water, water-soluble sterile lube, or the liquid food mixture.



Pigeons.

Hold the bird's head firmly, but gently, with the left hand. The index finger should be placed on the top of the skull, with the thumb on the bird's right mandible and the middle finger on the left mandible. The body should be restrained to prevent struggling. Gently open the bird's beak so that the neck and esophagus is gently stretched upward.

Make sure the tube goes across and over the top of the tongue and against the bird's right palate (to the feeder's left) at the back of the throat. Be sure you can see the glottis at the base of the tongue and avoid it. When you've reached the crop, release the food slowly. If the bird starts to regurgitate, remove the feeding tube immediately and give the bird a moment to recover. Gentle downward massage of the neck and esophagus may be beneficial.

Generally, the crop needs to be filled two to three times daily, or whenever it has emptied. The crop should always remain soft, and should empty before the next feeding. A nestling pigeon or dove will need up to 5 milliliters at each feeding, while a fledgling will need 10 to 15 milliliters. Gently palpate the crop to ensure it

is not hard or overfilled. Record the appropriate volume consumed for the next time.

If the bird is almost fully feathered, offer it small seeds and water (in a small container at least an inch deep) in the enclosure. Eventually, the bird will start pecking at the seeds, and will begin feeding. This may be a long process. Keep hand-feeding until you are sure the bird is eating enough on its own.

If the crop feels hard or has not emptied since the last feeding, the chick may have crop stasis or sour crop. Warm rehydrating solution should be given instead of formula at the next feeding. The crop should be gently massaged before and after the rehydrating solution is administered. Hopefully this will stimulate digestion.

Never feed cold or unresponsive birds. Dehydrated birds will not be able to digest food and need to be rehydrated first. Hypothermic birds may experience life-threatening intestinal stasis and gas production.

Feeding Schedules

The following feeding schedule can be used as a guideline for times and amounts. You will

need to adapt the schedule to accommodate the individual bird.

Doves

The rule of thumb for mourning doves in their first week of life (nestling) would be five feedings a day, and as the bird moves toward weaning, going to three feedings a day, then two, and gradually weaning.

- **1–25 grams:**
1–3 cc every two hours
- **26–50 grams:**
3–6 cc every three hours
- **50–60 grams:**
6–7 cc every three hours
- **60 grams and up:**
6–10 cc every three and a half hours

Pigeons

Weights for pigeons vary more than for doves, and guidelines for feeding them usually refer to approximate ages rather than weights. Watch the pigeon's crop as you feed and gauge how much formula will fill it comfortably full. The amounts below are suggested guidelines but pigeon sizes vary substantially so the feeder will need to evaluate feeding amounts based on the size of the bird. A general rule of thumb is to fill the crop about three-quarters full. It should be squishy and not hard or packed.

- Feed very young pigeons (two to five days old) about 2 cc, three or four times a day.
- Five days to three weeks of age, feed 6–20 cc, two or three times a day.
- Three weeks to release, feed about 30 cc, twice a day, and begin to offer seeds.

Both doves and pigeons need water as well as formula. Give them access to water after each feeding.

Transitioning to Solid Foods

When the bird is standing up, and looks almost like an adult of the species with mostly adult feathers, but still has wispy feathers sticking

out on the head, this is a fledgling. Offer solid foods such as finch seed, cracked corn, and crumbled cooked egg yolk. Keep gavage feeding until you see that the bird is eating enough on its own. When solids are offered, check that the bird's crop is full several times a day by palpating to see if the crop pouch is rounded. Don't assume that the chick has eaten just because the food has been disturbed.

Don't be fooled by the appearance of these chicks. They're large but need the same care as a tiny songbird. Keep them warm, watch them carefully and don't miss a feeding.

The only objective means to ensure sufficient calories are being provided is to weigh the bird. Ideally daily weights should increase on a gradual curve. Early detection of insufficient caloric intake, systemic disease or poor digestion can be seen in the weight gain chart.

Raptors: Eagles, Hawks, Vultures, and Owls

Handling

When handling raptors, wear appropriate gloves for protection. Heavy gloves offer better protection but are very cumbersome. Raptor feet and talons are more dangerous than their beaks; but watch out for both. The talons should never be clipped since they are essential to capturing and holding onto prey as well as defending themselves.

Picking up or removing the bird from a cage or container depends largely on its size, the nature of the injury, and the species. A towel or heavy cloth of sufficient size is an excellent tool to quickly and easily subdue and restrain raptors and many birds. It is one of the safest means of restraint for the bird. Flapping wings and struggling are the cause of significant trauma and wing fracture. A cloth quickly immobilizes the wings.

Dropping the cloth from behind is ideal, but may be precluded by a bird standing at the rear of a cage facing you, so it may be tossed from the



Raptor feet and talons are more dangerous than their beaks; but watch out for both.

front as well. The first benefit is cover for the eyes, calming the bird. The second is providing the bird the cloth to grasp, thus preoccupying the beak and talons momentarily to allow restraint.

A cloth or towel of sufficient size can immediately be used as a makeshift wrap for a so-called "bird burrito"—one of the best means of avian restraint when done properly.

Caution: Birds have no diaphragm and are completely dependent upon thoracic excursion for respiration. Wrap as loosely as possible to achieve control of the wings. Don't worry, birds can't "crawl out" of the wrapped towel very easily. If appropriately placed, the end of the cloth can still cover the face and eyes until oral access is needed.

Birds with Talons

Raptors and birds with talons can be a particular challenge; however, simple adaptive devices can also be useful. A tennis ball or handball, or even just a wad of gauze, can be placed in the sole of the foot allowing the bird to grasp the object tightly. The foot with the object can quickly be covered with a non-adhesive bandage like Vetrap to simply hold the object in place for the exam. It is easily removed upon completion.

If a staff member is grasped by talons or an object needs to be removed from grasp, it is important to remember the anatomy and reflexes involved. Any tactile stimuli in the sole of the foot will elicit an immediate grasp reflex. When birds sleep on a branch, the hock is flexed and the digital tendons are stretched around the caudal hock. The digits are "locked" in a tight grasping position. If the hock is flexed, it is very difficult to unclench the grasp. You must extend the hock and the leg away from the body to unclench the grip of a large raptor and extract a hand or object.

Owls, Kestrels, and Hawks

If gloves are available, small birds, like screech owls and kestrels, can be approached from behind, and a covering can be placed over the head. Then the bird's body can be grasped, keeping the wings folded. Grasp both legs with the other hand. For larger species, like red-tailed hawks and great horned owls, cover the head, then seize the bird's legs with one hand and restrain the body and wings with the other hand or arm. Birds with leg injuries should be handled with extra care and by the good leg only. Control of both the head and body can be accomplished with one hand in small species.

A stressed hawk or owl may lie on its back. This is a defensive posture and puts him in position to grasp you with his talons if the opportunity arises. This is a good position to drop a towel or cloth over the entire bird to initiate restraint.

Vultures

Vultures have weaker legs and should initially be restrained by placing both hands around the bird's body with the wings folded. They will often bite and may need to have their heads restrained. As with wading birds (herons, egrets), vultures are very prone to regurgitate when upset, so it's a good idea to point a vulture's head away from you!

Feeding and Digestion

Adult raptor species will have different food preferences. You must identify the species and offer appropriate foods.

Osprey

Osprey can be particularly difficult to feed and often require forced feeding of fish. Appropriate fluids can be gavaged until an experienced rehabilitator is located and the animal can be referred for care.

"Castings" are pellets regurgitated by raptors to get rid of fur and bones that can't be digested. These may be minimal or absent if the food does not contain indigestible items such as hair and bones (canned diets, boneless meat, small fish, etc.).

Raptor and owl stools are called "mutes." Normal droppings consist of white urates and darker fecal matter. Red usually indicates internal hemorrhage and is a cause for concern. Lime green from biliary secretions can indicate diarrhea. Normal colors vary with diet.

Permitting

As with all native birds, legal protections for raptors include criminal charges, even potentially for possession of body parts, including feathers. When in doubt, consult regional or federal wildlife officials. Ensure the rehabilitator has appropriate raptor permits before transferring any raptor.

Rehabilitating raptors takes a different skill set from rehabilitating songbirds. Include the

name of an experienced raptor rehabilitator on your contact list.

Raptor Young

Raptor young need an extra heat source. Temperatures should be around 99 degrees Fahrenheit for hatchlings and can be lowered as downy feathers start to grow. Chicks will pant if too hot and huddle and complain if too cold. Hang a good-quality, chemical-free feather duster in the cage to provide a place to hide, and some warmth and security. Bedding should be terry-toweling so the chicks have good footing.

Avoid visual contact and talking as much as possible.

Hatchlings should be fed at four to eight hours after hatching. Ideally the meal should be tiny pieces of chopped fresh pinkie mice, moistened with lactated Ringer's solution. After some feces appear, feed the next meals—a few bite-size pieces of mouse—every few hours. If the chick is digesting this well, and its feces appear normal, feed every four hours.

When they are three or four days old, raptor chicks need bone meal added to the diet; then a few days later, a little fur. Consult with a raptor rehabilitator to get recommendations for a feeding schedule.

Nestlings (four to seven weeks old) will preen after being fed and will begin to flap their wings, trying them out.

Fledgling times will vary with species, but fledglings will be able to eat on their own if provided with small mice, or whatever food is appropriate for their species.

Chicks in a clutch may hatch over several days, the first hatched will be larger and the smaller chicks may have a hard time getting their fair share of food unless food is given directly to them at feeding times.



A. Common merganser duckling: notice the long bill that comes to a dull point.

B. Mallard duckling: note the dark eye stripe that runs from the base of the bill, through the eye to the back of the head.

C. Canada gosling.

D. Wood duckling: note the dark eye stripe that runs only from the back of the eye to the back of the head.

Waterfowl

Adult Waterfowl and Other Water Birds

Waterfowl and other water birds can be difficult to handle. Large waterfowl, primarily geese and swans, will use their wings to defend themselves and should be restrained by placing a towel or sheet around their body to keep their wings folded when being handled. Many species of wading and pelagic birds, such as herons and loons, are accustomed to using their beaks to hunt fish and other prey. They strike quickly with their beaks, particularly at shiny objects like eyes. When handling any of these species, face protection should be worn (face shields or goggles at a minimum) and the bird's head gently restrained.

Identify the Species

Any birds being cared for must be properly identified to ensure that they receive appropriate foods, and to help determine if certain behaviors are normal, (for example, it is normal for ruddy ducks to have difficulty walking because they are built for swimming and diving).

Critical Care

Waterfowl and other water birds are often severely dehydrated and require oral or intravenous fluids. They may also present with some degree of emaciation (total solids less than 2g/dL) and will require gavage feedings with a diet designed for debilitated birds. Each species has different nutritional requirements. Veterinary staff should work with local rehabilitators to



A net-bottomed pen.

better understand the feeding needs of adult waterfowl and water birds.

Common gavage feeding products for waterfowl and water birds include Ensure, Hill's Prescription Diet a/d, Lafeber's Omnivore care and Mazuri nestling hand-feeding formula. If a bird cannot be quickly transported to a rehabilitator, the bird must be either gavage-fed or offered appropriate food items (and then carefully monitored to ensure that the bird is self-feeding).

Specialized Avian Substrate/Bedding

Some pelagic and highly aquatic birds seldom stand on terra firma (for example, grebes, loons, and diving ducks). Many have legs at the most caudal aspect of the long torso for efficient swimming, but it makes walking or even standing very difficult. They are also extremely prone to decubital ulcers and pododermatitis. In captivity, these species may require specialized substrate if they cannot be housed in a pool. A slung hammock around a makeshift frame mitigates pressure points and maximizes comfort.

Waterfowl and Other Downy Young

Waterfowl and other precocial chicks are easily separated from their mother. If a parent does not return to the location where the bird or birds were found within 30 minutes, the chicks

should be considered orphaned and in need of rehabilitation. All orphaned waterfowl should be properly identified on intake.

Critical Care

Ducklings that are chilled or wet can easily die from shock or hypothermia. They should be warmed upon admission. The plastic tub setup described on page 33 is a good option until they can be transported to a rehabilitator:

Short-Term Care

- Ducklings or goslings should be kept in a quiet, dark area of the hospital.
- Ducklings should be encouraged into their hide pocket so they can rest.
- It is common for orphaned waterfowl to be reluctant to eat, particularly if they are alone.
- Orphans can be placed in the plastic tub setup described on page 33 with a shallow lid of water containing floated invertebrates to stimulate self-feeding. Sensitive species like wood ducklings and mergansers are difficult to get self-feeding and should be transported to a rehabilitator as soon as possible.
- Don't feed bread to any waterfowl or water bird.
- Lafeber's Piscivore Care is a good choice for seabirds.
- Never feed medicated feed to waterfowl or water birds (Mazuri waterfowl products are unmedicated).
- Don't provide any swimming water for ducklings or goslings.
- Don't mix birds of different species or different sizes as this can spread disease or lead to aggression between birds or groups of birds.
- Change food and water every three hours to prevent spoilage.
- Weigh all birds on an appropriate scale upon arrival to make sure that they are self-feeding and maintaining weight.

Plastic Tub Setup for Waterfowl Young

1. Use a 30-gallon plastic tub with lid. Cut a large hole in the lid and cover with fiberglass screening attached with hot glue or cable ties.
2. Place a heating pad set on low or medium over half of the tub bottom. The temperature on the heated side of the plastic tub should be 80 to 85 degrees Fahrenheit.
3. Cover the entire bottom with a soft towel, white or light in color.
4. For ducklings only, arrange a "hide pocket" on top of the heated section of the container to provide a safe place to retire. The sides of the hide pocket can be fashioned from three rolled towels set in a U-shape around the edges of the plastic tub. The top portion of the hide pocket is made by draping a folded towel over the U-shaped rolled towels.
5. Goslings do not require a hide pocket, but will cuddle against a single rolled towel placed along the heated side of the plastic tub.
6. Place three layers of white paper towels over the cloth towel on the unheated section of the container. White paper towels are changed easily and allow food to be highly visible to ducklings.
7. Sprinkle Mazuri Waterfowl Starter crumbles on top of the paper towels.
8. Provide water in a small poultry fount no deeper than a half-inch (or 1.3 centimeters). Small pebbles are added inside the lid of the fount to ensure ducklings have access only to drinking water and cannot submerge themselves. If a poultry fount is not available, a shallow lid no deeper than a half-inch and no more than four inches in diameter is acceptable.
9. For ducklings only: any available aquatic invertebrates (freeze-dried bloodworms, daphnia, or brine shrimp) can be floated in the lid or poultry fount. Sprinkle live mini-mealworms and crickets on top of the paper towels and in the shallow lid of food to stimulate feeding.
10. Float chopped lettuce in the water.
11. The tub setup can hold up to six ducklings or three goslings temporarily until transport can be arranged to a rehabilitator.



The plastic tub setup.



Red-eared slider.

Special Supplement Section on Turtle Care

BY HARRIET FORRESTER, TRAINED VETERINARY TECHNICIAN AND
LICENSED WILDLIFE REHABILITATOR, SPECIALIZING IN TURTLE CARE

THIS ADDITIONAL SECTION ON CHELONIANS (turtles and tortoises) has more detailed species-specific information because fewer resources are available on turtle rehabilitation.

First Question to Ask Upon Intake: Where Did You Find the Turtle?

This is crucial information to ensure that turtles are releasable when they recover from their injuries. Turtles must be released in the same area where they were found, so ask the rescuers for the street, cross street, town and county to make sure you have the exact location. Without this information, turtles are not releasable. Relocation of a turtle, however well intended, carries the potential for disease introduction, genetic disruption, and an increased risk of mortality for both the introduced turtle and the resident population.

Handling and Physical Examination

Always pick up turtles with both hands—one supporting the plastron and the other resting on the carapace. Being off solid ground is stressful to turtles, so allow them to rest their feet on your hand or another surface while you hold them. Snapping turtles may be more difficult to handle. To pick them up, hold the rear of the turtle's shell on either side of the tail. Provide support with four fingers below and thumbs above the carapace. Never pick up any turtle by the tail (even snapping turtles) as this can injure the spine.

Immediately treat emergencies like an inability to breath or severe bleeding without an initial physical examination. After addressing those conditions, proceed with a complete physical exam. The same exam priorities that apply to other wildlife also apply to turtles. Turtles are often marginalized because they do not scream, most do not bite, and they have no facial expressions to show pain or fear. Perform a physical exam with the same respect, care, and compassion shown to other wild creatures.

Most wild turtles arrive at veterinary hospitals with shell fractures or other traumatic injuries. Do not get caught up in the “drama” of shell repair during the initial physical examination. Treat the whole turtle—warmth, fluids, analgesics, and stress relief are priorities.

Stress

Stress can kill wild animals—and turtles are no exception. The same things that are stressful to other wildlife can cause stress in turtles: handling, temperatures, and human activities. No matter how “friendly” that little box turtle appears, it is stressed by handling because it views people as predators.

To reduce stress, the initial physical exam should be thorough, but brief. If there is shell damage, stabilize the shell, but do not do elaborate shell repair at this time. Limit handling to the shortest period possible. As soon as the turtle is stabilized, put it in an enclosure and leave it alone. More definitive wound care can take place after the turtle's initial stress is relieved.

Housing must contain a hide box so the turtle or tortoise can escape from the stress of observation. Hide boxes also relieve stress by allowing a turtle to withdraw from exposure to lights or to self-regulate temperature by moving to the cooler hide box. Simple cardboard boxes cut in half make useful hide boxes that are easily replaced when soiled.

Warmth

The most important aspect of turtle emergency care is warmth. Start warming the turtle while performing the physical examination. If a correct temperature is not maintained, turtles cannot digest food, metabolize drugs, or recover from injuries.

Turtles are ectotherms; they depend on external sources to regulate their body temperature. Turtles must have a temperature gradient in their enclosures so they can regulate their body temperatures by moving away from or toward the warmth.

Keep injured turtles at the higher end of their preferred temperature range; however, hotter is not always better, and constant temperatures above 90 degrees Fahrenheit are usually fatal. To avoid overheating, make sure an injured turtle can move itself away from the heat.

Temperature requirements vary by species. However, most U.S. native semi-aquatic and aquatic turtle species prefer water temperatures from 70 to 79 degrees Fahrenheit and basking temperatures from 85 to 88 degrees Fahrenheit. Most box turtle species are comfortable at 72 to 78 degrees Fahrenheit, with a basking area around 82 to 88 degrees Fahrenheit. U.S. tortoise species prefer warmer temperatures of 80 to 85 degrees Fahrenheit with a warmer basking area around 90 degrees Fahrenheit. Always check references for the exact temperature range of individual species.

Fluid Therapy

Next, assess the turtle's hydration status. Shock, dehydration, and blood loss require fluid therapy. If fluids are necessary, warm the turtle to proper temperatures, then administer warmed

fluids (85 to 90 degrees Fahrenheit). Normosol-R and Plasma-Lyte A are two isotonic replacement fluids used for reptile rehydration.

Estimating the percentage of dehydration:

- Dehydration of less than 4 percent is usually difficult to detect.
- 5 to 7 percent
 - Increased thirst
 - Slight lethargy
 - Dull corneas
 - Tacky mucous membranes
 - Loss of skin elasticity
 - Skin “wrinkling”
- 8 to 10 percent
 - Sunken eyes
 - Skin remains tented after pinching
 - Severe lethargy
 - Thick, ropy saliva
 - Dry skin folds

To determine the required fluid volume, calculate the percent of dehydration, the turtle's weight, and the recommended maintenance fluid rate (10 to 30 milliliters per kilogram of weight per day for reptiles). Fluids can be given in divided doses. Total fluids should not exceed 3 percent of body weight.

Example: A 300-gram box turtle dehydrated 5 percent

1. Determine state of dehydration to calculate deficit
 - $300 \times 0.05 = 15$ milliliters.
 - Replace deficit over three days.
 - $15 \div 3 \text{ days} = 5$ milliliters per day.
2. Determine maintenance rate (10 milliliters per kilogram per day)
 - $0.300 \text{ kilogram} \times 10 \text{ milliliters per kilogram} = 3$ milliliters.
3. Deficit + maintenance = total fluids per day
 - $5 \text{ milliliters} + 3 \text{ milliliters} = 8$ milliliters per day.

Fluid routes include:

Oral (fluids by gavage)

- Head must be fully extended.
- Rapid uptake.
- Prompts gastrointestinal activity.
- Stressful—not useful for long-term fluid therapy.
- Limited to mild dehydration—5% or less.
- Can cause regurgitation in weak turtles.

Subcutaneous (Figure 1)

- Multiple sites.
- Easy.
- Not as stressful as PO.
- Limited to mild dehydration—5% or less.
- Variable absorption rate.
- Limited subcutaneous space.

Intracoelomic (Figure 2)

- Site must be surgically prepared.
- The coelomic cavity can be accessed through the prefemoral fossa. Place turtle on its side and insert the needle close to the plastron and parallel to the bridge.
- Useful for severe dehydration.
- Rapid uptake.
- Large IC space.
- Highly invasive.
- Compromises lung space.
- Potential for perforating lungs, bladder, oviducts, eggs.



Figure 1.

- **Caution:** do not administer intracoelomic fluids if there is a torn coelom, any respiratory problem, or if the turtle is a gravid female.

Epicoelomic

- Needle is inserted ventral to the scapulo-humeral joint, parallel and just dorsal to the plastron, directed caudally toward the opposite rear leg.
- Useful for severe dehydration.
- Can be accessed even if turtle is withdrawn into shell.
- Easy.
- Rapid absorption.
- Little to no risk for perforating organs.

Intravenous

- Effective method for severely dehydrated turtles.
- Difficult—requires a surgical cut-down to access jugular vein.

Intraosseous

- Rapid uptake.
- Useful when access to veins is not possible.
- Difficult to place catheter in femur.
- Catheter can be displaced if turtle withdraws into shell.
- Painful if using certain sites (such as the bridge).
- IO injections in turtles require training and familiarity with turtle anatomy; IO fluids should be used only if familiar with the technique.



Figure 2.

Analgesia

Reptiles feel pain! They possess both the anatomical structures and physiological means necessary for the perception of a painful stimulus. Pain increases stress, makes the turtle reluctant to eat, and can cause immunosuppression. Effective pain management reduces stress, and leads to more rapid healing. Most commonly used analgesics for chelonians include:

- Local anesthetics:
 - Lidocaine (Stay at or below 2 milligrams per kilogram of weight—at higher doses there are risks of systemic and cardiovascular effects)
- Opioids:
 - Buprenorphine: 0.075 to 0.1 milligrams per kilogram of weight IM
 - Morphine: 0.5 to 2 milligrams per kilogram of weight (can cause respiratory depression)
- NSAIDs:
 - Carprofen: 2 milligrams per kilogram of weight, IM or PO (use with caution in chelonians with liver or kidney damage)
 - Meloxicam: 0.1 to 0.2 milligrams per kilogram of weight SQ

There is still much debate on proper analgesics in chelonians. One limited study with red-eared sliders suggested tramadol at 5 mg/kg PO. Higher doses caused clinically important respiratory distress, though less so than morphine. More research must be done before unreservedly recommending tramadol, since the correct dosage for reptiles has not been definitively established and it has yet to be proven safe for all chelonian species.

Drugs and Chelonians

The Federal Drug Administration has approved no drugs for use in reptiles. Most of the published drug information for reptiles derives from limited experimentation and extrapolation from mammal and avian dosages, not based on long-term scientific research. Vastly

different dosage recommendations abound, so use caution and only the most recent information from respected journals and publications.

Drugs that are safe for birds and mammals can be dangerous or fatal to turtles. Ivermectin, for example, is deadly to chelonians due to the drug's ability to permeate the blood-brain barrier in these species. There are much safer drugs for treating turtle parasites. Nitenpyram (Capstar), for example, is useful for treating maggots.

Not all turtles are the same; drugs used safely with some species may not be safe with others. Enrofloxacin (Baytril) is usually well tolerated, but there are anecdotal reports of adverse reactions in certain tortoise species.

Lastly, the dosage listed for one reptile species may not be correct for another; for example, the dosage for a snake may be different from that for a tortoise.

Disregard old myths that mention subtracting the weight of a turtle's shell when determining drug dosages. Shell is metabolically active bone, and calculations are based on the turtle's total body weight.

Before using any drug, warm turtles to their preferred optimal temperature, and make sure they are well hydrated. Hydration is vital when using potentially nephrotoxic aminoglycosides such as gentamicin and amikacin. If hydration is not optimal, these drugs can cause tubular nephrosis and predispose the turtle to hyperuricemia.

Use other therapeutics with care when treating turtles. For example, turtles presenting with swollen eyes are often treated with injections of vitamin A. Since vitamin A is easily overdosed in turtles and can cause skin sloughing and death, it should be used only if the turtle has been tested and diagnosed with true hypovitaminosis A. Many factors cause swollen eyes in turtles, including respiratory ailments, corneal irritation, trauma, environmental factors, para-

sites, etc., and those factors should be examined before using vitamin A treatment.

Shell Damage

All shell repairs begin with basic wound management. Clean the area surrounding the wound to prevent introducing contaminants into the wound. Flush the wound with a few hundred milliliters of sterile water or saline to remove all debris. If an antiseptic wound lavage solution is required, use 0.05 percent chlorhexidine diacetate (Nolvasan). Concentration of the lavage solution is critical. At 0.05 percent, chlorhexidine works well; greater concentrations can be harmful to wound healing. Debride the wound as necessary.

Clean wounds with shell loss

Part of this snapper's shell was completely removed by a lawn mower, exposing the muscle beneath. After cleaning and flushing the wound, cover this type of injury with alginate or hydrocolloid dressings. These dressings keep the wound moist, absorb exudate and cause no tissue trauma when changed. This type of wound heals well by second intention. Analgesics, fluid therapy, dressing changes, appropriate antibiotics (local or systemic), basic nursing care, and great husbandry complete the treatment. (Figure 3).

The following are instructions for performing two non-invasive shell repair techniques.

Clean fracture—technique No. 1

Clean and flush the wound. Fractures that have perfect apposition can be quickly stabilized. Draw the edges of the break together. Put drops of glue on either side of the fracture site (Krazy Glue gel works well). Apply a strip of adhesive tape across the break and press into glue (recommended tape is Johnson & Johnson waterproof adhesive tape). This simple technique is often all that is needed to repair the fracture. (Figures 4 and 5).



Figure 3. Clean wound with shell loss.

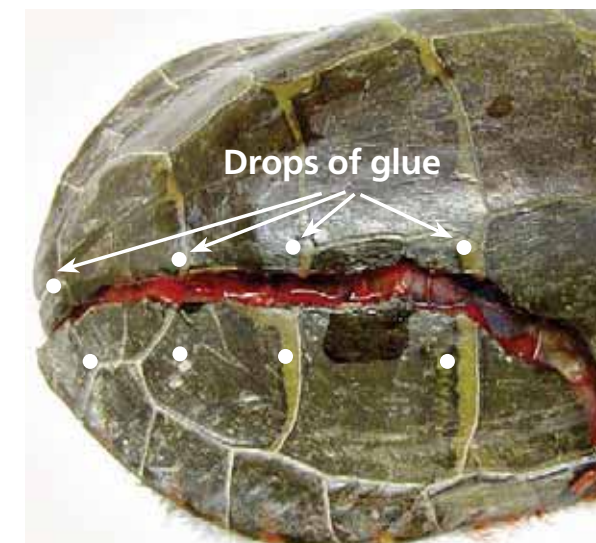


Figure 4. Put drops of glue on either side of fracture.

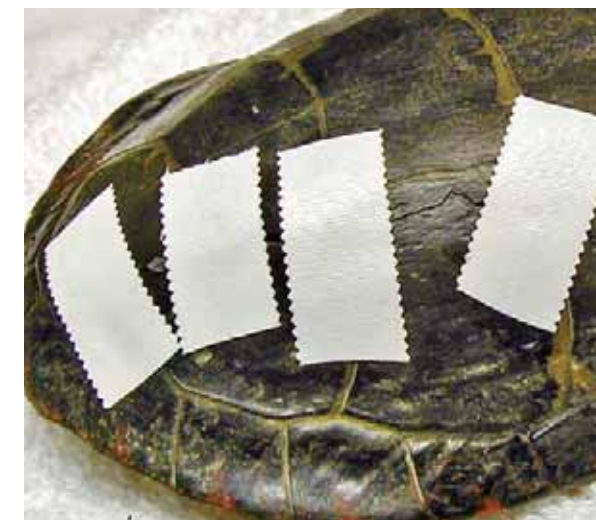


Figure 5. Draw fracture edges together and apply adhesive strips.

Clean fracture—technique No. 2

Repair of most chelonian shell fractures can be performed without screws, wires, drilling, or patches. This technique does not damage the shell in any way, and allows easy monitoring and cleaning of the fracture site. The process is quick and minimally stressful for the turtle. The materials are inexpensive and are found in any hardware or electronics store (Figure 6):

- Any instant glue (Instant Krazy Glue Gel or Instant Krazy Glue Pen are good choices).
- Two-ton waterproof epoxy (Devcon).
- Cable tie mounts.
- Cable ties.
- Cable tie gun. The tie mounts and the cable ties come in a wide variety of sizes to fit most fracture sites.

After cleaning and flushing the fracture site, position the cable tie mounts with superglue (Figure 7). After positioning, cover the mounts with waterproof two-ton epoxy, allowing the epoxy to form a “skirt” around the mount that



Figure 6. Shell repair materials.

contacts the shell (Figure 8). Let the epoxy set for 24 hours. During this 24-hour period, the turtle can receive fluid therapy, and be brought to optimum body temperature. This is an important step in stabilizing the turtle and reducing stress.

After the epoxy is dry, insert the first cable tie (blue) through the tie mounts (Figure 9). Slip the second cable tie (red) over the end of the first (Figure 10).



Figure 7.



Figure 9.



Figure 8.



Figure 10.

Place the end of the blue cable tie in the cable tie gun. Slowly press the trigger to tighten the red cable tie against the tie mount (Figure 11). The cable tie gun exerts enough force to close the fracture completely. After tightening the cable tie, cut the long tails off with scissors or wire cutters (Figure 12).

If fractures are small, only one set of mounts and ties may be necessary. Two, three, or more sets can be used for large or complex fractures. (Figure 13).

When healing is complete, simply pop off the mounts with a flat-edged tool like a small metal spatula or knife (Figure 14). In this case, healing took four months. The turtle was released with no complications.

Contaminated/infected fractures

Clean and flush copiously. Treat the fracture as an open wound, clean the area frequently, use dressings to keep it moist, and use topical or systemic antibiotics as required. Close the



Figure 11.



Figure 12.

fracture after the resolution of the initial contamination or infection.

Epoxy patches

Shell repair using fiberglass mesh and epoxy is not recommended. This outdated technique seals in infection, does not allow wound drainage, and distorts growth in young turtles. Most chelonians with this type of repair develop osteomyelitis.

Notes on shell repair

Never glue the shell together like a broken plate. The shell is bone and the glue will interfere with the healing process. Also, do not overlay the fracture with a layer of glue. The glue will seep into the fracture and, again, interfere with healing.

Do not release a turtle with any repair materials still on the shell. The shell should be completely healed and all mounts, cable ties, or any other materials should be removed before release.



Figure 13.



Figure 14.

Euthanasia

Euthanasia is always the last resort. Turtles are extremely resilient and they heal very slowly. They can take up to five times longer to heal than birds or mammals, so euthanasia criteria for turtles are slightly different from those for birds and mammals. Turtles often heal well from injuries that would be devastating to birds or mammals, so do not give up too easily.

If euthanasia is truly indicated, use two-stage euthanasia. Start with a pre-euthanasia tranquilization like Telazol at 25 to 50 milligrams per kilogram of weight in an intramuscular injection, or Ketamine HCl, also intramuscularly, at 100 milligrams per kilogram of weight. At these high dosages, the drugs take effect in 15 to 20 minutes. An injection of euthanasia solution can then be administered intravenously. Access the subcarapacial vein from a 35- to 45-degree angle toward the junction of the carapace and the first cervical vertebra (Figure 15). The coccygeal vein in the dorsal midline of the tail can also be used for euthanasia. Euthanasia solution can also be administered I/Ce or intramuscularly; these methods are effective but slow.



Figure 15.

The following are NOT accepted methods of euthanasia for turtles:

- Freezing (inhumane).
- Inhalant (ineffective).
- Exsanguination (inhumane).
- Decapitation.

Other methods of euthanasia require a surgical plane of anesthesia:

- Pithing.
- Injection of euthanasia solution into the brain.

Housing

Wild turtles in rehabilitation should be housed individually to reduce stress, prevent further injuries, and prevent the spread of disease. Unlike some species of birds and mammals, chelonians do not benefit from being housed with others.

There are a number of possibilities for housing turtles: large plastic bins, pre-formed ponds, cement-mixing tubs, or livestock watering tubs. Avoid glass aquariums—they increase stress since the turtle is exposed to human

movements. Aquariums can even contribute to health problems because they are too small for a temperature gradient, have poor air circulation, and lack space for exercise.

In addition, all turtle enclosures must:

- Be large enough to provide a thermal gradient.
- Be opaque to reduce stress.
- Have a hide box where the turtle can feel secure.
- Have good quality full-spectrum light with a photoperiod suitable for the species (if the turtle is being kept for more than a few days).
- Provide humidity levels appropriate for the species.
- Have fresh drinking and bathing water available.
- Have good ventilation and drainage.
- Be escape-proof.

Damp towels can serve as a substrate for injured turtles in a hospital enclosure. Newspaper is not an acceptable substrate. Although it is cheap and easy to clean, it does not supply a microclimate. It is too dry for box turtles. It also prevents them from engaging in normal behaviors, like burrowing for thermoregulation.

Lighting and Heating

Correct lighting is important for both the physical and psychological health of chelonians in captivity. If the turtle remains at the hospital for more than a day or two, the indoor artificial lighting must duplicate the type, intensity, and photoperiod of natural sunlight as closely as possible.

Chelonians have evolved to raise their body temperature by basking in the sun. They associate light from the sun above them with the heat source. Basking spots

should have both a full-spectrum light (for ultra-violet-B exposure) and a heat source. ReptiSun 5.0 fluorescent bulbs are a good choice for UVB exposure, and ordinary incandescent light bulbs serve as a separate heat source for basking.

ReptiCare ceramic heat emitters are also excellent for providing heat for basking during the day. Since these heating elements emit no light, they can also be used if additional warmth is needed at night after the lights are off. Ceramic heat emitters get very hot and must be installed in heat-resistant porcelain sockets with wire guards like Zoo Med's porcelain clamp lamps.

Nutrition

Wild turtles eat a tremendous variety of natural foods. Resist the temptation to use prepared, pelleted "turtle food" for injured turtles. Adult wild chelonians usually do not recognize commercial processed products as food, so they may not eat at a time when nutrition is crucial to recovery. Hatchlings' feeding behaviors and preferences can be altered by feeding commercial food.

In addition, turtles fed only on pelleted diets receive much less water from the food than a natural, wild diet, which can raise the problem of dehydration. Pelleted foods contain around 10 percent water. Compare that amount to the 85 percent water content of fresh salads, or the 60 percent content of invertebrates.

Offer food to hospitalized turtles every day. Good nutrition will help in healing wounds and alleviating stress. One of the keys to good nutrition is variety, so offer a wide selection of foods based on the nutritional requirements and dietary preferences of the individual species.



Aquatic turtles will not eat on land, so all food must be offered in the water.

Below are a few suggestions for feeding aquatics, semi-aquatics, box turtles, and tortoises. Turtles' natural food preferences can vary with species, age, geographic location, and even gender. For example, painted turtles in general are omnivorous, but the young consume more animal protein while the adults eat more vegetation. Some species are food specialists and the lists may or may not apply to chelonians in a specific geographic area.

Keeping in mind that one size does not fit all, the lists can be used in different ratios depending on the needs of the individual species. For example, softshell turtles are highly insectivorous, so add insects and larvae (mayflies, caddisflies, beetles, cicadas, aphids, grasshoppers) to the general aquatic diet. The diet for diamondback terrapins and many map species must emphasize snails and mollusks over the other items on the list. Feed adult cooters and red-bellied turtles a diet high in plant items, but they

can still be offered a variety of the other items. The food lists are starting points, and diet choices are certainly not limited to these items.

Food for Aquatics

Aquatic turtles are a large group consisting of cooters and red-bellied turtles, sliders, maps, common snappers, alligator snappers, muds, musks, painteds, western ponds, chicken turtles, softshells, and diamondback terrapins.

Aquatic turtles will not eat on land, so all food must be offered in the water. Food for aquatic turtles can include the following:

- Fish, thawed mice, crickets, snails, crabs, crayfish, clams, freshwater mussels, shrimp.
- Earthworms, waxworms, blackworms, bloodworms, tubifex worms. Earthworms are an excellent natural food and a good source of copper, zinc, manganese, and iron.

- Aquatic plants (duckweed, water lettuce, water hyacinth, elodea, water shield). Keeping aquatic plants available at all times satisfies the foraging instincts and enrichment needs of many aquatic turtles.
- Greens (kale, romaine, dandelion).
- Fruits (especially berries) and vegetables.

Food for Semi-aquatics

Semi-aquatics include species like Blanding's, bog, spotted, and wood turtles. Foods for these species can include these items:

- Fresh fish, worms (earthworms, waxworms, blackworms), crickets, beetles, grubs, sowbugs, pillbugs, slugs, snails, and thawed mice.
- Aquatic plants (duckweed, water lettuce, water hyacinth, elodea, water shield).
- Greens (kale, romaine, dandelion).
- Fruits (strawberries, blackberries, blueberries).

In addition to the food items listed above, wood turtles will also eat:

- Additional fruits (apples, peaches, cantaloupe).
- Vegetables (squash, sweet potatoes, mushrooms, carrots).

Food for Box Turtles

As opportunistic omnivores in the wild, box turtles are relatively easy to feed because of the wide variety of foods they will accept. Hatchling and juvenile box turtles require a higher percentage of animal prey in their diet. Food for box turtles can include the following:

- Earthworms, waxworms, beetles, sowbugs, pillbugs, grubs, crickets, slugs, grasshoppers, snails, and thawed mice.

- Fruits (apples, peaches, strawberries, blackberries, blueberries, mulberries, cantaloupe).
- Greens (kale, romaine, dandelion).
- Vegetables (squash, sweet potatoes, tomatoes, peppers, mushrooms, carrots).

Food for Tortoises

Native U.S. tortoises include the desert tortoise, Texas tortoise, and the gopher tortoise. All of these tortoises are strictly herbivorous and need a diet high in calcium and fiber, and low in phosphorus, protein, and fat. Think of these tortoises as cows with shells—their digestive systems are simply not designed to process animal protein, sugars, or large amounts of fat.

- Cacti (spineless prickly pear/opuntia pads).
- Grasses and hay (Bermuda grass, wheatgrass, bentgrass, orchard hay, broomsedge, panic grass).
- Leafy greens (kale, romaine, endive, grape leaves, mulberry leaves).
- Assorted flowers (hibiscus, coreopsis).
- Assorted weeds, including dandelion, hawkbits, sow-thistles, hawkweeds, hawkbeards, plantains, clovers, honeysuckle, cat's ears, vetches, trefoils, mallows, bindweeds, and sedums.

Assist Feeding

Turtles that cannot or will not eat on their own require assist feeding. Tube feeding will supply the necessary nutrition until chelonians regain their appetites.

Some circumstances prevent tube feeding by hand—broken jaws, highly aggressive turtles, or turtles that are unduly stressed



Turtles that cannot or will not eat on their own require assist feeding.

by handling. In those cases, a surgically placed feeding tube may be necessary. This makes feeding easy, quick, and less stressful. It has the added advantage that the turtle can also eat on its own with the tube in place.

Oxbow has two formulas for tube feeding: Carnivore Care (obviously for carnivores), and Critical Care (for herbivores). When feeding omnivores, the two products can be mixed together. For box turtles, mix one part carnivore and one part herbivore. For adult red-eared sliders, mix one part carnivore and three parts herbivore.

References:

Ernst, C.H., and J.E. Lovich. 2009. *Turtles of the United States and Canada*. Johns Hopkins University Press, Baltimore.

Highfield, A. C. 1996. *Practical Encyclopedia of Keeping and Breeding Tortoises and Freshwater Turtles*. Carapace Press, London.

Mader, D., editor. 2006. *Reptile Medicine and Surgery*. Saunders Elsevier, St. Louis.

McArthur, S., Wilkinson, R., and J. Meyer. 2004. *Medicine and Surgery of Tortoises and Turtles*. Blackwell Publishing, Oxford, England.

McDougal, James. 2000. *Conservation of Tortoises and Terrestrial Turtles*. Turtle Conservation (Michael W. Klemens, ed.) Smithsonian Institution Press, Washington, D.C.

Tseng, F.S., and M.A. Mitchell. 2007. *Topics in Wildlife Medicine—Emergency and Critical Care*. National Wildlife Rehabilitators Association, St. Cloud, Minn.

Top Ten Turtle Rehabilitation Tips

- 1. A turtle is not a mammal in a shell.** Don't automatically assume that things that apply to mammal and bird rehabilitation apply to turtle rehabilitation. Reptile rehabilitation is altogether different.
- 2. Don't focus on the "drama" of shell repair.** Many times, a fractured shell is the least of the turtle's problems. Extensive shell repair at the initial exam will stress the turtle and could result in its death. Check airways, control bleeding, give fluids and stabilize the animal before attempting shell repair.
- 3. Correct temperature is crucial to haling, digesting food, and metabolizing medications.** Turtles are ectotherms and depend on external sources to regulate their body temperature. Unlike birds and mammals, they cannot produce body heat. Know the optimum temperature ranges for the turtle species in your area.
- 4. Do culture and sensivity tests to determine the appropriate antibiotic.** It's not all about Baytril!
- 5. Never use Ivermectin—it is deadly.** Ivermectin is FATAL if used with turtles.
- 6. Do not assume a turtle needs vitamin A if it has swollen eyes.** Injectable vitamin A is easily overdosed in reptiles and can cause skin sloughing and death.
- 7. Do not hibernate turtles that are recovering from injuries.** If a turtle is too sick or injured to be released, it is too sick or injured to be hibernated. During hibernation, the metabolism slows down and the healing process is also slowed or stopped.
- 8. Address pain.** Relief from pain may contribute to better and faster healing in wildlife.
- 9. Turtles have remarkable recuperative abilities—euthanasia is a last resort.** Don't give up too easily on injured or ill turtles. Turtles often heal well from injuries that would be devastating to other species. Euthanasia decisions should be made based on experience with turtles, not birds or mammals.
- 10. Have patience—turtles do everything slowly, including healing.** Turtles need longer than birds and mammals to recover from most injuries. Prepare to learn the meaning of patience with these amazing creatures.



Adult red fox.

Additional Medical Considerations

Emergency Conditions and Treatments

Shock

Assume there is some degree of psychological shock in most wild animals that have been brought to you for care.

Symptoms of shock may include a drop in body temperature, a fast pulse, shallow breathing, and pale mucous membranes (lips, tongue, and gums). These signs could also indicate internal bleeding. There may be vomiting, weakness, and loss of bowel and bladder control.

Physiological shock may result from severe psychological stress, dehydration, hypovolemia, or neurogenic vasodilation. The hallmark of physiological stress is a drop in blood pressure to a potentially lethal low.

Treatment: Warm, dark, and quiet are recommended. Further treatment may be initiated at the discretion of the veterinary staff.

Treatment for physiological shock in wildlife is similar to that for domestics. A bolus dose of fluid therapy and a non-steroidal anti-inflammatory drug should be implemented if the animal appears in serious condition or may not survive. More dramatic medical intervention may be required based on the physical exam. Even with oiled animals, physiologic stabilization is essential before any decontamination is initiated, often a hard decision when removal of the oil is the most obvious therapy.

Dehydration

Symptoms of dehydration include sunken eyes, shrunken appearance, loss of skin elasticity, tacky mucous membranes, ropey saliva, and non-responsiveness.

Treatment: Restore body fluids according to your clinic's protocol. Our shortcut works well, too. Refer to the section on birds for a safe way to rehydrate birds.

Head Trauma

Treatment: Immediate medical treatment for head trauma in wildlife is essentially the same as with domestics. No steroids should be used and the patient should never be warmed unless severely hypothermic (based on human and animal studies, induced hypothermia decreases cerebral metabolism helping prevent catabolic damage). Head injury patients should always receive supplemental oxygen (this improves oxygenation of damaged central nervous system tissues and helps prevent secondary neuronal injury). The patient should always be placed in a position with the head elevated (which helps reduce intracranial pressure) and pain medications should be administered to increase patient comfort and ensure more normal respiration.

Contact a rehabilitator with a veterinary associate and appropriate pharmaceuticals to treat head trauma, and arrange to transfer the animal as soon as possible. If the animal can't be transferred the same day, obtain specific advice from the rehabilitator's veterinary advisor about what should be done next, and make arrangements for transferring the animal at the first opportunity.

Veterinary treatment of head trauma follows the same general rules as in small animals, and can be initiated at the discretion of the submitting veterinarian, following consultation with the rehabilitator or the veterinary associate. Moving the animal should be done at the discretion of the veterinarians and rehabilitators involved.

Unconsciousness

The animal may be unconscious because of a concussion, or from numerous etiologies such as head trauma, hypothermia, starvation, or systemic illness. An animal with a mild head trauma or concussion requires treatment for neurogenic shock and cerebral edema. A more serious concussion may cause trouble with balance and may require treatment with NSAIDs.

Handle all unconscious wild animals as though they might become fully conscious any second.

Treatment: Treat for neurogenic shock, hypothermia, or the underlying illness. Position the unconscious animal with the head elevated to reduce further inflammation. Supplemental oxygen may be provided as needed.

Poisoning

Wild animals are subject to both accidental and intentional poisonings. The types of poisons are often impossible to determine. When admitting an animal, try to find out what might be happening in the area in which the animal was found. There may have been chemical lawn treatment done, a homeowner or exterminator may have put poisons outside to eliminate pests, there may be stores of moldy food or grains in the area, or any number of fertilizers or

insecticides may have been scattered. Obtain all the information you can. Wear gloves when handling the animal to avoid exposing yourself to the same toxins.

Treatment: Specific antidotes are ideal but seldom identifiable. Key numbers to keep handy are: ASPCA Animal Poison Control Center 1-888-426-4435 (there may be a \$65 consultation fee), the National Capital Poison Center 1-800-222-1222 or poison.org.

Liquid activated charcoal gavage may help to lessen the effects of some poisons, but not all. Aspirated charcoal will not dissolve and cannot be removed from the lungs or air sacs; it will most likely result in death. Combine this concern with the propensity for birds to defensively regurgitate (especially wading and sea birds) and the risk elevates. Together, these risk factors indicate that charcoal should be used only judiciously. Supportive care may be all that you can offer animals in some cases.



Mute Swan with lead poisoning.

Poison Resources

ASPCA Animal Poison Control Center
(There may be a consultation fee)
1-888-426-4435

The National Capital Poison Center
1-800-222-1222 • poison.org

Malnutrition or Starvation

Adult wildlife brought in with signs of starvation or malnutrition may not have been able to reach a food source, or may have an underlying medical reason for their condition. Wild orphan infants who have been without their mothers to provide food for them may be brought to the clinic malnourished or starving.

An animal that is malnourished or starving will present a bony appearance, be weak and listless, and will usually be dehydrated as well.

Treatment: Rehydrate thoroughly as a first step in treatment. Once the animal is rehydrated, feed small amounts of easily digested foods such as Ensure, Isocal, or critical care formulas used for domestic animals. Progress to easily digested prescription canned foods and then gradually to a normal substitute diet as suggested in the **Sample List of Supplies to Have on Hand** in the Appendix.

Internal or External Parasites

Infestations of parasites in wild animals are often more severe than in domestic animals. You may also see parasite species you would not normally see in a veterinary practice. However, even if the precise species of parasite cannot be determined, appropriate treatments may be extrapolated based on similar organisms.

Treatment: The greatest risk is the possibility of toxicity from parasiticides. Many preparations used for domestic animals may be used in wildlife of similar age. Perform a direct saline smear or flotation on a fecal sample to identify any internal parasite or parasites and treat accordingly. Do not give ivermectin to chelonians, or fenbendazole to doves or porcupines as it can be fatal.

Heatstroke or Hypothermia

Heatstroke (hyperthermia) may cause an animal to pant, breathe through an open mouth, and have an elevated body temperature. The animal may stagger, convulse, and then collapse.

A victim of hypothermia may be sleepy or non-responsive. The body temperature will be well below normal. The animal will feel cold to the touch.

Using a rectal thermometer in very small animals can be difficult without the risk of injury, but it is the most objective means of evaluation. References are available for normal body temperatures for various species and each cannot be precisely described here. However, some general guidelines can be helpful. The larger the species, the lower the normal body temperature will be. Marsupials like opossums typically have lower normal temperatures. Small species almost always are higher.

The critical life-threatening considerations are brain damage from hyperthermia and unconsciousness from hypothermia. Both may cause additional clinical pathology, but the immediate mortal concerns fall within a narrow range for almost all species. A general guideline is that most species lose consciousness.

Treatment: If the wild animal presents with symptoms of either, be sure to correct the abnormal temperatures SLOWLY while treating for shock. Alcohol can be applied to the

extremities of a hyperthermic animal, and the animal placed in a well-ventilated area. Hot water bottles, heating pads, incubators, and the like can be used to slowly heat hypothermic animals.

Cat Caught

Cat-caught animals need to be treated with antibiotics as soon as possible. The bacteria in cat saliva will result in infection and may cause death if untreated. *Bartonella henselae* has been determined to be nearly exclusively responsible for cat-scratch disease. *Afipia felis* and *Bartonella clarridgeiae* may produce a fraction of cases.

Treatment: Any animal that may have been caught by a cat, or has been found in an area where there are free-roaming cats, should be treated with antibiotics immediately.

Even if there are no visible wounds, there may be tiny invisible puncture wounds. In most cases with a history of a cat involved, it's best to assume that puncture wounds are present and to administer antibiotics.

Any animal that may have been caught by a cat, or has been found in an area where there are free-roaming cats, should be treated with antibiotics immediately.



Antibiotics may have adverse effects as well, so evaluation of each patient and species idiopathic responses should be considered before most antibiotic therapy. Penicillin derivatives may cause toxic gastrointestinal upset in lagomorphs (rabbits) and many rodents, which are frequent cat bite victims.

Where wounds are visible, clean with antiseptic wash such as chlorhexidine or povidone-iodine and flush with copious lavage. Be careful not to cause hypothermia or hyperthermia especially in animals of minimal body mass. Then give oral or injectable antibiotics (if using injectable antibiotics for birds, dilute 50-50 with saline, to avoid tissue damage at the injection site).

Several studies have shown that Clavamox is the most effective antibiotic for treating cat bites. Recent studies have described the use of long-acting formulations as effective. Care must be taken when dosing very young animals since prolonged antibiotic use may cause harm during development.

Oiled Wildlife

If possible, oiled animals should be transferred immediately to a rehabilitator with experience in treating this condition. Transfer the animal to a trained rehabilitator or oiled-wildlife responder. Do not attempt to wash it.

When handling any oiled animal, wear appropriate protective equipment. Appropriate attire would be a Tyvek apron or suit, and nitrile or chemical-resistant gloves. Work should be done in a well-ventilated area to avoid additional health problems to the animal, you, your staff, or other patients.

Remember, petroleum-based oils are hazardous waste for both the animal and staff. Rinse water is also legally considered hazardous waste and should not be disposed of down a drain, so do not attempt to wash the animal.

Treatment: Oiled wildlife, like any compromised animal, needs to be stabilized before treatment begins. Treat for stress and psychogenic shock by placing the animal in a dark, warm and quiet place. Clean the eyes, mouth and nares or nose with gauze or cotton swabs. Flush the eyes using a warmed standard saline eye solution or buffered eyewash and protect the eyes with medicated or non-medicated eye drops. **Never** place ointment in the eyes of an oiled animal, as this may trap the oil against the cornea and cause further damage.

The internal effects of oil from aspiration, ingestion, or absorption can cause oil toxicosis and is just as life-threatening as the external effects. Gavage with a clear electrolyte solution at about 15 to 20 cc/kg to rehydrate while at the same time flushing some of the ingested oils from the intestines. Then administer K-P antidiarrheal liquid or Pepto-Bismol to soothe the intestines, and to adsorb toxins.

Oils will act as laxatives so some diarrhea may be present. Feces can be dropped in water to

evaluate the presence of oil; however, this does not check for oil present in the upper GI.

Subcutaneous Air (Air Bubbles)

Subcutaneous crepitus (air bubbles) may appear in traumatized birds, bats, or other species that have been injured, and whose air sacs or lungs have been damaged. The bubbles can be anywhere there has been trauma, or may include the whole body. Crepitus is generally nonpathogenic and aseptic, although it may have secondary effects due to pain or obstruction (for example, near the trachea or esophagus). If a subcutaneous bulla exists near the trachea, examine closely to ensure it is not due to a tracheal perforation.

Treatment: If obstructive, large, or coalescent air pockets exist, they may be deflated via fine needle aspiration. Puncture may however introduce pathogens into this sterile lesion, so care should be taken to use aseptic or sterile technique. Eventually they will almost always spontaneously resolve on their own. Seal the needle hole with a water-soluble antibiotic cream. Be aware that the bubble may return.

Some birds hold and grind their food in the ingluvies (crop), a pregastric dilatation of the esophagus just above the clavicles. The esophagus is usually to the bird's right of the glottis and continues down the bird's right side of the trachea. Be sure that what you are seeing is truly an air bubble, and not the crop. A full crop will have food in it and should get smaller as the bird digests the food. An air bubble will be empty of everything but air. It can also be easily palpated to determine when it is full. Force-fed food or liquid should only fill the crop to a soft full consistency or regurgitation may occur and increase the chance of aspiration.

Feather Injury

Blood Feathers and Hemostasis

Birds have a very poor intrinsic clotting cascade. However, the extrinsic clotting cascade starts with tissue thromboplastin. Clinical relevance is most frequently a concern with sharp laceration injury and traumatized blood feathers.

Mature feathers are hollow, devoid of blood and keratinized just like nails or hair. Fracture of a mature feather does not bleed. However, as new feathers emerge from the follicle, they are highly vascularized and full of blood, thus called blood feathers.

Blood feathers are most common in fledglings with numerous simultaneous feathers developing at once. Adult birds (excluding ducks and geese) tend to molt only a few feathers at a time throughout the year, thus only have one blood feather, or just a few, at any time, but those may be very large in diameter. Ducks and geese can molt all flight feathers at once.

Blood feathers have little or no tissue thromboplastin, therefore when even one large mature bird blood feather is fractured, a bird can become hypovolemic or bleed to death. If a blood feather is hemorrhaging, the bleeding must be stopped. Pulling a blood feather is no longer recommended since it can cause damage to the feather follicle and subsequent abnormal feather growth. This is particularly important in primaries, which are crucial for flight. Bleeding can be stopped with styptic powder or by pressure application to the broken feather. Once bleeding is stopped, the end of the injured feather should be trimmed to minimize movement.

The poor avian intrinsic clotting cascade is also clinically relevant in relatively atraumatic lacerations. However, injuries are commonly traumatic and sufficient to release the tissue thromboplastin. If bruising exists, clotting is usually sufficient. If a "clean" edge laceration occurs or if a scalpel incision is made, pinching the edges before direct pressure or minor compression to the edges may assist hemostasis.

A nighthawk with two subcutaneous emphysemas.



Feather Injury and Flight Recovery

Protection of critical feathers must be accomplished immediately upon presentation of some large birds. Once they have been broken or damaged, it is too late. Mature feathers cannot be repaired. Mature feathers are dead tissue and only removal will stimulate feather regrowth before the normal molting schedule.

Tail feathers are critical to predatory bird hunting capability and thus essential to a successful release. Tail feathers are easily damaged when large birds are placed in a small container or enclosure. However, a "splint" can be made for the entire tail with many thin lightweight materials. Radiographic film makes an excellent protective splint. A sheet trimmed to the approximate shape of the tail can be attached to the underside of all the tail feathers together.

Adhesive tape should seldom be attached directly to feathers and rarely to avian skin. Adhesive tape can stick to feathers and severely damage them when removed and the feathers will not be repaired until the defective feathers are removed. An exception to the above is masking tape and Micropore. Both of these products do not leave residue so they can be used directly on bird feathers. Roll gauze and non-adhesive tapes such as Vetrap are usually the best choices for avian bandaging.

Diagnostic Procedure Considerations

Radiology

Birds of all ages have hollow bones filled with air rather than marrow. Most of the avian abdomen is composed of air sacs. The bones of neonatal mammals and birds are incompletely calcified, compounding contrast challenges. Radiography can be difficult to expose properly,

particularly in birds. Many veterinary radiograph machines cannot provide sufficiently low KVP (peak kilovoltage). Portable large animal extremity radiograph machines, also used in some small animal practices, may not set below 50 KVP.

A KVP of 50 or more is far too high for diagnostic tissue density contrast in all but the large adult birds such as anseriforms (geese, swans, and ducks) raptors (eagles, hawks, owls, and vultures), guiforms (cranes and herons), and many large pelagic oceanic birds. A passerine (songbird), or columbiform (dove and pigeon), may require KVP of 40 or lower to achieve diagnostic radiographs. Fledgling and hatchlings may require even lower. Juvenile mammals similarly require a low KVP setting, but should have minimal air density except in the lungs.

Decrease in mA (milliamperes) settings will not increase contrast significantly in small wildlife.

Fluid Therapy Options with Wildlife

- **Intravenous fluids are often difficult to dispense in wild animals because of several factors.** Vein location and visualization can be extremely challenging in mammals and reptiles for even experienced wildlife veterinarians. If catheterization is possible, stabilization and prevention of removal is difficult where domestic species might tolerate it well. Bird vasculature is more readily visualized, but vessel fragility is compounded by mobility. Bolus administration is more rapid and can be performed relatively rapidly under brief physical restraint.
- **Intraosseous fluid administration works well in many species, but mammals and reptiles seldom require this level of invasive technique.** However, it is an excellent means of administration in larger birds (raptors, anseriforms, oceanic birds). General or at least local anesthesia

is necessary when placing catheters for intraosseous fluid administration as this process can be painful for the bird. Intraosseous administration can be used via the distal ulna and may be indwelling for extended periods. Often a large bore needle (20 ga.) is all that is required. The wing must be wrapped for restraint (for example, a figure-8 bandage), but is very well tolerated. The IV line may be suspended above a small enclosure.

- **Parenteral or oral fluid administration is usually the best method where practical for all species, but many wildlife may refuse to drink spontaneously.** Gastric intubation is frequently the best choice for dehydrated birds or those refusing to drink. Nursing mammals obviously get most of their water intake from milk, but opossums may require gastric intubation to ensure sufficient intake. Pelagic piscivorous birds normally get all the water they need from their food. However, they may also refuse to eat dead fish from a bowl and may have to be force-fed. Water can also be provided at that time. If aquatic birds can be held in a pool they are more likely to drink.

Adult mammals seldom refuse water from a bowl or nipple thus mitigating the need for gastric fluid administration. Solid food may sometimes be diluted with additional water to a slurry to increase intake, particularly if the slurry is administered via gastric tube.

- **Subcutaneous fluids are an excellent means of hydrating mammals and most reptiles.** Like domestic species, the dorsal intrascapular subcutaneous space is usually a good option. For birds, three percent of the body weight can be given in the intrascapular region of all birds on admission regardless of their condition and as a presumptive measure. It is safe and easy to do so.

Care must be taken when delivering large volumes of fluid since the skin may be easily torn during delivery.

- **Cautious intracoelomic fluid administration may work well in reptiles and may be the sole choice in chelonians (turtles and tortoises).** **Air sacs should be avoided.** Mammals accept intra-abdominal fluid well, but it has few advantages over subcutaneous administration. This method should always be avoided in avian species as the abdominal air sacs connect directly to the lungs and NO diaphragm exists to prevent the flow directly into the pneumonic parenchyma.

Remember, large volumes of fluids can have a significant effect on thermoregulation, both therapeutically as well as detrimentally. When in doubt, attempt to target the normal body temperature.

Medication Precautions/Warnings

Most medication used for domestic animals can be used for wild animals as well.

Some important exceptions are:

- **Ivermectin** can be fatal to turtles, tortoises, and terrapins.
- **Any of the penicillin-related drugs** should be avoided for rabbits, porcupines, beavers, and woodchucks.
- **Dexamethasone (and any other steroid)** should not be used for rabbits, hares, or birds.
- **Cephalexin** is not recommended for rabbits, hares, woodchucks, or beavers.
- **Clindamycin hydrochloride** should not be given to lagomorphs, ruminants (deer) or rodents (including beavers, porcupines, and woodchucks).

- **Drontal Plus** (praziquantel/pyrantel pamoate/febantel) should not be used for cormorants, anhingas, and porcupines.
- **Febendazole** should not be used for porcupines.
- **Frontline, fipronil** should not be used for rabbits.

Basic Zoonoses

INFORMATION BY DEBRA GODE

If you use standard precautions, excellent hygiene, and good ventilation in your work area, you will eliminate risks from most zoonotic diseases. Always wear veterinary exam gloves when handling wildlife. (Petroleum oils digest latex, so nitrile or other types may be required for oiled animals.) Check with your state wildlife agency to determine what diseases are prevalent in your area. The diseases described here are some of the most common affecting wildlife brought in for care. Affected humans should consult with their physician for appropriate treatment.

Bacterial Diseases

These diseases can be transmitted by contamination through broken skin of wounds or abrasions, accidental ingestion or contamination of the mucous membranes with urine or feces, and sometimes through bruised skin. Treatments listed are for both humans and animals.

Brucellosis

Hosts—White-tailed deer, raccoons, fox, and others.

Transmission—By contact with blood, urine, feces, vaginal discharge, tissues, or fetuses of infected animals.

Signs—It may appear as septicemia. The source of infection to humans may be from lymph nodes, the spleen, reproductive organs, or joints of affected animals.

Treatment—Streptomycin, tetracycline, or sulfonamides.

Psittacosis

Hosts—Birds, including pigeons, raptors, and finches.

Transmission—The infectious agent is found in tissues, droppings and nasal discharges of infected birds. The most common route of infection to humans is through fecal-oral contamination and inhalation of dried droppings and discharge.

Signs—Signs in animals may include respiratory distress, conjunctivitis, green diarrhea tinged with blood, and emaciation due to decreased appetite. Other birds may be asymptomatic carriers.

Treatment—Tetracycline or tetracycline derivatives.

Salmonellosis

Hosts—Birds, reptiles, and mammals.

Transmission—Through fecal contamination, usually fecal-oral contamination. The bacteria may be found in food or water or may live on surfaces that have not been properly cleaned.

Signs—In animals the signs are not always as obvious as in humans. When signs are present, they may include weakness, drowsiness, depression, convulsions, trembling, gasping for air, vomiting, diarrhea, and a slight fever. The shedding period of these bacteria lasts for some time after infection. Some animals can become carriers.

In humans, the symptoms are diarrhea and abdominal pain, often resulting in dehydration.

Treatment—Treatment can include anti-diarrheals like loperamide (Imodium) to help relieve cramping, but unfortunately these may also prolong diarrhea associated with a *salmonella* infection.

If it is suspected that *salmonella* bacteria have entered the bloodstream, antibiotics may be prescribed.

Check with your state wildlife agency to determine what diseases are prevalent in your area.



The patient should be tested, and the treatment should be based on the culture and sensitivity of the sample.

Leptospirosis

Hosts—Raccoons, skunks, opossum, rodents, and other mammals.

Transmission—Contact with infected food, water, soil, and especially urine, or direct contact with an infected animal. This disease can be transmitted by contact with open wounds, abrasions, or intact skin.

Signs—Signs are usually not apparent in animals. In humans, disease is indicated by fever, nausea, chills, muscle pain, vomiting, depression, marked thirst, labored breathing, mild conjunctivitis, kidney infection, fatigue, and diarrhea or constipation.

Treatment—Streptomycin and tetracyclines are effective if given early.

Tularemia

Hosts—Rabbits and rodents.

Transmission—Handling infected animals, inhalation of bacteria, contamination of cuts, or mosquito, tick, or fly bites.

Symptoms—In humans, one of the symptoms is an ulcer or ulcers on the skin where the organism enters. If the bacteria are inhaled, there may be a pneumonia-like illness.

Treatment—Streptomycin or gentamycin.

Mycotic Diseases

Fungi often found in the environment cause these diseases. Treatments listed are for both humans and animals.

Aspergillosis

Hosts—Birds, especially raptors and seabirds.

Transmission—Infected animals shed spores of the disease that may be inhaled by humans. Seabirds should never be housed on straw or hay since this is a significant source of *Aspergillus*.

Signs—Birds may or may not exhibit respiratory signs. Affected animals may be emaciated and have problems breathing. Wings may droop. People whose health is compromised may become infected and display respiratory symptoms.

Treatment—Antifungal drugs including Amphotericin B, Flucytosine, Fluconazole,

and Itraconazole. Immunostimulants may also be helpful. Immunocompromised raptors and seabirds are highly susceptible. They should go on prophylactic Itraconazole.

Histoplasmosis

Hosts—Bats and birds (especially chicken, pigeon, starling and blackbird droppings).

Transmission—Through the inhalation of infective spores. The organisms are present in the soil, and may grow in soil that contains decayed bat or bird droppings. This mainly occurs around roost areas that have been established for at least three years.

Symptoms—A mild infection will present as a mild upper respiratory infection, with a chronic persistent cough, and weight loss.

Treatment—Usually no treatment is needed in the case of a mild acute infection. Severe or chronic cases are treated with one or more antifungal medications, such as Amphotericin, Flucytosine, Fluconazol, and Itraconazole. Specific drug choices and length of treatment will depend on the patient's overall health and the severity of the disease.

Viral Diseases

Treatments listed are for both humans and animals.

Rabies

Any wild mammals that come to your facility should be considered potential carriers. When handling a raccoon or skunk infant or even a wild kitten it's easy to forget that age has no bearing on whether or not the animal is carrying the virus. To be safe, use standard precautions, and handle all mammals as though they might carry the rabies virus.

Hosts—Any warm-blooded mammals. The animals to be most concerned about are raccoons, skunks, foxes, woodchucks, and bats. Squirrels, chipmunks and other rodents, opossums, and rabbits are rarely found to

have rabies when brought in for rehabilitation, either because they are resistant to the virus because of body temperatures and metabolism, which are not supportive of the virus, or because when attacked by a rabid animal, they seldom survive.

Transmission—The virus is transmitted in the saliva of the host animal and may enter the body by introduction of saliva into cuts and abrasions or contact with mucus membranes.

Signs—In animals, signs can include restlessness, aggression, unusual friendliness, lethargy, salivation, ataxia, paralysis, and convulsions. In humans, it may appear as fever, general malaise and eventually paralysis, delirium, and convulsions.

Treatment—Exposure in humans is treated by allowing the wound to bleed, with careful and thorough washing of the contaminated area, and then prompt post-exposure treatment via a rabies vaccine series.

Many people have misconceptions about rabies. It is important for you to know the facts and to be able to calm exaggerated fears. Please see the handouts on **Common Misconceptions About Rabies and Solving Wildlife Problems** in the Appendix for more information.

Parasitic Diseases

Treatments listed are for both humans and animals.

Roundworm

Most ascarids are related to specific definitive hosts. *Toxocara canis*, *Toxocara cati* and *Toxascaris leonia* are the most common parasites of dogs, cats, and foxes, respectively. *Baylisascaris columnaris* are commonly found in skunks.

Numerous roundworm species, including common canine roundworms, can penetrate intact skin and cause fetal defects and death, adult blindness, and permanent brain damage.

It's important to specifically note the following roundworm as one of the most dangerous:

Baylisascaris Procyonis

Hosts—Raccoons.

Transmission—Through fecal-oral ingestion of the roundworm eggs, or larval migration through intact skin.

Signs—In adult raccoons there is often no sign of infection. Young raccoons may have diarrhea, general malaise, and fussiness. Roundworms may be present in the feces, and ova may be seen on fecal examination. In other animals, irreversible central nervous damage and possible death may occur. In humans, the larvae migrate to the eye, brain, and spinal cord. They can cause blindness or damage to the central nervous system, liver or lungs, and be potentially fatal for unborn as well as adults. Even with treatment, the pathology may remain (blindness, dementia, etc.).

Treatment—In raccoons, any antiparasitic agent for roundworm may be effective. In other animals and humans, the parasite is not treatable with the exception of some ocular lesions. Ocular lesions may be treated with laser surgery. Some anthelmintic such as albendazole may prevent or treat the infection. Considering the seriousness of this disease and limitations of diagnosis and treatment, prevention of infection is of utmost importance. No one should handle raccoons without protection for intact skin such as exam gloves. Raccoons should not be kept on dirt or porous substrate unless the substrate is later removed and destroyed.

Sarcoptic Mange

Hosts—Each species has its own species-specific mites but some can cross-transmit to humans. Sarcoptic mange mites can cross-transmit to humans.



Carried by raccoons, Baylisascaris Procyonis is one of the most dangerous roundworms.

Transmission—This mite transfers by direct contact during handling.

Signs—In mammals, the mite causes skin irritation and itching, often with a fur loss. In humans, although there is irritation and itching, the mites will not reproduce and the infection will resolve in a few weeks.

Treatment—In animals, the treatment is ivermectin. Isolate the animal from other animals. Always handle the animal and its bedding with gloves.

Affected humans should consult with their physician to ask about appropriate treatment.

Protozoal Diseases

Treatments listed are for both humans and animals.

Giardiasis

This disease is caused by a one-celled parasite.

Host—Beaver, muskrat, waterfowl.

Transmission—Ingestion of soil, food, or water that has been contaminated with the feces from infected humans or animals. People can become infected after accidentally swallowing the parasite.

Signs—A variety of intestinal symptoms may include chronic diarrhea, abdominal cramps, bloating, weight loss, and frequent pale stools.

Treatment—Metronidazole, tinidazole.

Tick-Borne Diseases

Treatments listed are for both humans and animals.

Lyme Disease

Lyme disease is the most common tick-borne disease documented in the northeastern United States.

Hosts—Deer ticks, as well as other ticks.

Transmission—The bite of infected ticks.

Signs—In animals, the most common sign is an arthritic condition. In humans, an early sign is an expanding bull's-eye-shaped rash. Later signs include malaise, fatigue, fever, muscle ache, joint pain, headache, a stiff neck, and lymph node enlargement. Untreated, the disease may cause chronic arthritis, or neurological or cardiac problems. The symptoms vary widely.

Treatment—doxycycline or amoxicillin.

Ehrlichiosis

Ehrlichiosis is becoming a more frequently diagnosed tick-borne disease.

Host—Deer ticks.

Transmission—The bite of infected ticks.

Signs—The disease is difficult to diagnose because it may mimic other diseases. The disease suppresses the immune system. Signs in animals include weakness, cough, labored breathing, intermittent fever, arthritis, discharge from nose or eye, increased thirst or urination, anorexia, seizures, nose bleeds, and swelling of the legs or lymph nodes.

In humans the symptoms are mainly characterized by a flu-like illness, fever, headache, myalgia (muscle aches), and thrombocytopenia (abnormal destruction of blood platelets). Ehrlichiae infections can be life-threatening.

Treatment—Susceptible to tetracyclines or doxycycline.

Note: Steroids should not be given if this disease is suspected.

Euthanasia

Euthanasia decisions about incapacitated wild animals must be made according to different standards than those used to make decisions about domestic pets. It is recommended that euthanasia be performed in conformance with the guidelines detailed in the Humane Society of the United States' Euthanasia Training Manual. Federal requirements for migratory birds specify:

You must euthanize any bird who cannot feed itself, perch upright, or ambulate without inflicting additional injuries to itself where medical and/or rehabilitative care will not reverse such conditions.

You must euthanize any bird that is completely blind, and any bird that has sustained injuries that would require amputation of a leg, a foot, or a wing at the elbow or above (humero-ulnar joint) rather than performing such surgery, unless special permits are applied for and granted.

Some raptors in particular have strong protective legislation, so local or federal authorities should be consulted.

Wild animals have to be able to function without help in the wild.

If there is any doubt about a decision, call one of the numbers on the advice sheet developed for your clinic (see sample form in the Appendix) and discuss the situation with a person experienced in handling an animal of that species.



Pine warbler.

Appendix

Sample List of Supplies to Have on Hand

Reference Materials

- Wildlife formulary.
- Bird identification field guide. (See reference list on page 87 for suggested field guides.)

Emergency Foods

Songbird chicks may be fed:

- A slurry of warm water and Hill's Prescription Diet a/d canned food.
- Mazuri nestling diet.
- Dry puppy or cat chow that has been soaked in hot water and cut into tiny pieces.

Note: A chick will open its mouth very wide, but will have difficulty swallowing and digesting large pieces of food.

Older songbirds may be fed:

- Canned cat and dog food.
- Soaked chow cut into small pieces.
- Small pieces of fruit.
- A high-quality birdseed.
- Mealworms.

Note: Different species of birds have different dietary preferences.

Squirrels and Chipmunks

- Juveniles and adults may be fed rodent chow, parrot chow with the dried peppers removed, gerbil mix, or a woodpecker mix of birdseed, dried fruits, and nuts. Older squirrels may not recognize rodent chow as a food, but younger ones will eat it if it's the only thing offered. Rodent chow is nutritionally complete and the best choice to offer if the animal will accept it.



Bluebird nestlings.

- They will willingly eat corn and sunflower seeds but these foods are not good for them and should be used sparingly. Unsweetened Cheerios are a readily available food that is suitable for short-term use with most rodents.

Raccoons, Skunks, Foxes, and Other Carnivores

- These species will eat canned or dry cat or dog food, and mice.

Woodchucks and Other Herbivores

- These animals may eat rabbit chow, rodent chow, or monkey chow.
- Adult herbivores may not accept rabbit chow and will have to be

fed field greens, deep green leafy vegetables such as spinach or dandelion greens, Queen Anne's lace, plantain, chickweed, timothy hay, alfalfa, or an assortment of native grasses.

- Be sure the area from which you are gathering has not been treated with chemicals.

Many juvenile or adult mammals or birds that come to your facility will eat Cheerios (unsweetened whole-grain cereal), and cut grapes and apples. These can be great starter foods to get an animal eating. This is by no means a complete diet and should be used sparingly.



New England cottontail.

Generic Food List

- Puppy and kitten milk replacers.
- Caged bird hand feeding formula such as Exact or ZuPreem for doves and pigeons.
- Mazuri Waterfowl Starter, duck pellets, non-medicated chick or duck starter.
- Game bird starter crumbles.
- Lafeber's Omnivore Care.
- Dry puppy chow.
- Dry cat chow.
- Canned cat and dog food.
- Hill's Prescription Diet a/d.
- Critical Care liquid diet for compromised animals.
- Rodent chow and monkey chow.
- Frozen mice or beef heart strips for raptors.
- Frozen silversides, krill, smelt, or capelin for water birds. (Note: Fish should be fed whole and not gutted or filleted.)
- Parrot chow.
- Rabbit pellets.
- Cracked corn.
- Mealworms.
- Mazuri raptor gel.
- High-quality birdseed.

Generic Supply List

- Caging appropriate for smaller species.
- Gram scale—digital is easiest to read.
- Heating pad or light bulb set up for heat source.
- Incubator.
- T-shirts or sweatshirts.
- Baby blankets or towels with no loose threads or loops.
- Margarine tubs.
- Disposable gloves.
- Heavy leather gloves.
- Teat infusion cannulas, Catac nipples and syringes for feeding.
- Feeding tubes.
- Cardboard boxes to contain animals or to use as nest boxes.
- Fish net or other nets for recapture.

Where to Find Supplies

Items mentioned in the text, manufacturer information, and where the items can be found:

Animal Stopper Trash Can—This 32-gallon Animal Stopper Trash Can has a lid defense system making animal break-ins nearly impossible. It is a product of Newell Rubbermaid of Atlanta.

Bactrim—a drug combining sulfamethoxazole and trimethoprim antibiotics. (prescription)

Baytril—Enrofloxacin antibiotic sold by the Bayer Company of Germany. (prescription)

Catac Nipples—made by Catac Products, in Buckinghamshire, England. (online, pet stores)

Cheerios—a whole grain oat cereal from General Mills of Minneapolis. (supermarket)

Clavamox—is a combination of amoxicillin and clavulanic acid that act together to treat a broad spectrum of infections. It is from Pfizer Animal Health in Exton, Pa. (prescription)

Drontal Plus—is a broad spectrum dewormer from the Bayer HealthCare, Animal Health Division, Shawnee Mission, Kan. (veterinarian)

Ensure—This nutritional supplement drink is a product from Abbott Laboratories of Abbott Park, Ill. (pharmacy, supermarket)

Exact Hand Feeding Baby Bird Formula—is produced by Kaytee Products, a part of Central Garden and Pet of Walnut Creek, Calif. (pet stores, feed stores, supermarkets)

Hill's Prescription Diet a/d—manufactured by Hill's. (Prescription food available from veterinarians.)

Imodium AD—is loperamide sold by McNeil-PPC of Fort Washington, Pa. (pharmacy, supermarket)

Isocal—is a therapeutic nutrient offered by the Mead Johnson Nutrition Company of Glenview, Ill. (pharmacy)

Mazuri Exotic Animal Diets—PMI Nutrition International of St. Louis. (*mazuri.com*)

Mylanta—is manufactured by the Johnson & Johnson-Merck Consumer Pharmaceuticals Company of Fort Washington, Pa. (pharmacy, supermarket)

Odors Away—This one-drop deodorizer is made by the Wrap-On Company in Bedford Park, Ill. (discount stores, hardware stores, or supermarkets)

Ominvore Care—manufactured by LaFeber. (pet stores and online)

Pedialyte—is a rehydrating solution specifically for the young, produced by Abbott Nutrition Laboratories in Columbus, Ohio. (pharmacies and supermarkets)

Pepto-Bismol—is made by Procter & Gamble of Cincinnati. (pharmacy, supermarket)

ReptiCare and RepitSun Bulbs—manufactured by Zoo Med. (pet stores and online)

SnuggleSafe disks—are microwave heat pads manufactured by Lenric C21 of West Sussex, England. (pet stores, online)

ZuPreem—is the trademark for a line of foods designed to provide proper nutrition for exotic animals and for zoos. It is owned by Premium Nutritional Products of Shawnee, Kan. (pet stores, feed stores, and supermarkets)

Sample Wildlife Contact and Advice List

List the names, telephone number, and other information of nearby rehabilitators who are willing to help you with wild animals. Call them for advice and a quick transfer as soon as a wild animal comes into your care. Call your state wildlife division or search online for a list of wildlife rehabilitators and which species they rehabilitate. When adding names of rehabilitators to your contact list, ask which permits they possess.

Mammal rehabilitators: _____

Bird rehabilitators: _____

Raptor rehabilitators: _____

Turtle rehabilitators: _____

Snakes or other special species: _____

Oil Spill Responders: _____

Special Permit Rehabilitators (Rabies Vector Species, Deer Permit): _____

State Wildlife Division:

Main Number: _____

After-Hours Contact: _____

Sample Transporter List

Wildlife rehabilitators cannot always leave their facilities to pick up animals who need help. Rehabilitators may have trusted contacts who will transport for them. Or you may have technicians, assistants, or clients with wildlife experience who are willing to transport the animal from your facility to a rehabilitator. When arranging for transportation, write out all the important information for the rehabilitator (admission forms, physical examination, and treatment forms) and make other copies for your transporter, and your clinic records. Be sure to include directions, and the expected delivery time, name, address, and telephone number of the rehabilitator.

Transporters should be instructed to keep the noise in the car to a minimum, with no radio or conversation. There should be no smoking and no show-and-tell.

Animals should be transported in a covered carrier. The carrier should be covered with a relatively opaque cloth to dim the light. Ask that they drive carefully so as to keep the animal's stress to a minimum.

Check to make sure the delivery has occurred as planned.

Transporter	Phone Number

Sample Wildlife Admission Form

Date of Admission: _____

Finder Contact Information

Name _____

Address _____

Telephone _____ Cell _____

Email _____

Animal Information

Species (if known): _____ Number of animals: _____

Age (estimate): _____ Date animal(s) was found: _____

Location animal(s) was found: _____

Circumstances in which animal(s) was found: _____

Condition of animal(s)—any known injuries? _____

What happened since the animal(s) was found? _____

Was the animal(s) fed? Given water? (please specify what and how much) _____

Who handled the animal(s)? _____

Was the animal(s) handled with bare hands? _____

Was the animal(s) cat or dog caught? _____

Are there free-ranging cats in the area? _____

Any additional information about this animal(s) you can provide: _____

Common Misconceptions about Rabies

BY LAURA SIMON, FIELD DIRECTOR, URBAN WILDLIFE PROGRAM,
THE HUMANE SOCIETY OF THE UNITED STATES

People often panic about rabies thanks to misleading media and folklore. They may believe that rabies is an easily “caught” airborne virus or that any raccoon, fox, or skunk seen outside must be a threat to their family’s health and safety.

Given all the media attention, it may be surprising to learn that on average only two or three people die from rabies in this country each year. Human fatalities due to lightning strikes, jellyfish, and bad hamburgers, to name some examples, far exceed the number of human deaths to rabies. This doesn’t mean we shouldn’t be concerned about rabies; it just means we should help the public take sensible precautions, and use common sense.

That means your job is to help correct the public’s exaggerated fears and know what sensible precautions they can take to prevent rabies exposure—such as vaccinating their companion animals, not approaching or feeding wildlife, and getting prompt treatment if their involvement with a possibly rabid animal might be a true rabies exposure. The Centers for Disease Control and Prevention has helpful information on its website about rabies (cdc.gov).

General Concerns

Question: Can I get rabies by sitting on grass that a rabid animal drooled on last night?

Answer: The virus cannot penetrate intact skin. People can get rabies only via a bite from a rabid animal or through scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or brain tissue from a rabid animal. In addition, the virus is short-lived when exposed to the open air—the virus isn’t viable after saliva dries. If you are handling a companion animal that has been in a fight with a potentially rabid animal, take precautions like using gloves to prevent contact with any still-fresh saliva.

Q: Can rabies be spread through feces or blood?

A: Rabies is NOT transmitted through the blood, urine, or feces of an infected animal nor is it spread airborne through the open environment. Saliva provides the primary transmission medium when the animal is in the clinical stage of rabies. For the rabies virus to get to the salivary glands, it has to travel first from the site of entry (usually a bite wound) through the animal’s central nervous system, then to the brain. This is what causes most rabid animals to exhibit abnormal behaviors, depending on what part of the brain is infected. Finally the virus travels to the salivary glands during the clinical stage of rabies, just before death. It’s this latter stage of rabies when an animal is most infectious, because the virus is in the saliva.

Q: Don’t many people die every year of rabies in the United States?

A: The Centers for Disease Control and Prevention compiles statistics on the number and type of human rabies cases in the United States since 1980. The handful of human deaths from rabies annually (2.4 per year, nationwide, on average) has been largely due to a bat strain or canine strain from abroad. Most of the bat cases have been of the silver-haired bat strain, which is surprising, since this



species is rarely found in or around human houses. Only one human has ever died from the raccoon strain of rabies, despite people’s growing fears about raccoons.

This low incidence doesn’t mean we can’t contract rabies; it just means we should continue taking sensible precautions to prevent exposures and seek prompt post-exposure treatment when advised to do so by a doctor or local health department.

Q: What should I tell callers who have been bitten by a potentially rabid animal or handled their own animal who was in a fight?

A: They should be advised to wash the wound thoroughly with soap and water, monitor the biting animal’s whereabouts, and immediately contact their local animal control officer for assistance in capturing the animal for rabies testing. Then, they should contact their local health department for instructions and report the incident. Next, they should contact their physician for further advice. If they are unsure about whether or not they have broken skin on their hands, suggest that they put their hands in rubbing alcohol to see if and where it stings. All questions about rabies or other infectious diseases of public health importance should go to the local or state health department.

Liability considerations mandate that no veterinary staff should handle wildlife without rabies pre-exposure prophylaxis.

Concerns about Specific Rabies Vector Species

Bats

Q: Don’t a lot of bats carry rabies?

A: Actually, a very small percentage of bats carry rabies, much less than 1 percent of the population. However, if you suspect that a rabid bat has bitten you, or if a bat is found in the room where a person is sleeping, current health guidelines recommend that the bat be tested for rabies. Contact your local health department for instructions.

Q: Don't bats fly into people's hair?

A: Contrary to popular belief, bats do not fly into people's hair. Their swooping flight pattern is due to their long wingspan and their need to gain momentum when flying in an enclosed space like a room. They will gain altitude near the walls and lose altitude near the center of the room, giving bystanders the feeling that they are being attacked when actually the bat is just trying to stay airborne!

Foxes**Q: If there is a fox running around in the day, does that mean the animal is rabid?**

A: Foxes haven't read the textbooks telling them to be nocturnal. They are active when their prey like mice and chipmunks are active, which is why it's quite common to see red foxes hunting by day. It's normal, too, for the kits to be seen playing by themselves, seeming to have no parents around and perhaps showing little fear of people. This is the period of time when the kits are left behind while the parents go off hunting, until the kits are old enough to go along.

There's usually no need for intervention—soon the parents will appear and soon the kits will learn to be wary of humans. You can bang aluminum pot tops together to help teach the foxes to be more fearful of people. Only if the kits look weak or sickly should your state wildlife agency (like the Department of Natural Resources or Department of Environmental Protection) or fish and game agency be called to euthanize the animal or help locate a wildlife rehabilitator.

Raccoons**Q: I see an infant raccoon outside in the day—does that mean the animal is rabid?**

A: Not necessarily. When raccoons are orphaned, they don't know night from day—they only know that they are extremely hungry. That's when they plunge out of trees. If the mother raccoon does not retrieve the infant after several hours (she rarely leaves her cubs alone for very long), then use gloves, a shovel, or a trowel to put the infant in a cardboard box with



Sometimes as infant skunks get older, they come out to explore while the mother is away—it doesn't necessarily mean they have rabies.

a ventilated top like a window screen and an old shirt or cloth for comfort. The cub can be left out for a few hours after dusk to see if the mother retrieves the animal. Another option is to put an upside-down laundry basket over the cub so he doesn't wander off. Be sure to put a cloth in for warmth and keep an eye on the weather. If the cubs are not retrieved at night, it's a sure sign something has happened to the mother. Advise callers not to touch the raccoons with bare hands. Call your state wildlife agency for the name of the nearest rehabilitator certified to care for rabies vector species, as long as no exposure has occurred. If exposure has occurred, contact your local health department or doctor for instructions and your local animal control officer for assistance with the animal and to help facilitate any rabies testing that might be required.

Skunks**Q: There's an infant skunk running around—is the animal rabid?**

A: It's possible, yet it's more likely that the skunk has lost sight of its mother because skunks are so near-sighted. If there's no risk of human contact, watch to see if the infant finds its den or if the mother retrieves him. Sometimes as the infant skunks gets older, they come out to explore while the mother is away. Most of the time they don't appear without her, however. An orphaned baby will appear frantic. If the skunk appears to be truly orphaned, call your state wildlife agency to locate a wildlife rehabilitator. Keep an eye on, but don't touch the skunk, and keep all people and pets away. You can put a laundry basket upside-down over the skunk to temporarily contain the animal while waiting for the mother to return. Approach the skunk slowly and talk softly—if the skunk gives a warning by stamping the front feet, then stand still or back off. You can approach again after the animal calms down. Do not risk being bitten or sprayed.

Opossums**Q: There's an opossum hissing and drooling at me—is the opossum rabid?**

A: For unknown reasons, opossums are amazingly resistant to rabies. Hissing, drooling, and swaying are part of the opossum's bluff routine to scare YOU off. Unlike other animals, opossums don't always flee when they're scared, they tend to hold their ground and try to scare off the threat. Just leave the opossum alone, keep dogs and cats away, and eventually the animal will wander away when he feels the coast is clear.

Woodchucks**Q: I see a woodchuck circling and falling over—is it rabies?**

A: For some unknown reason, woodchucks are the only rodents with a higher susceptibility to rabies in the eastern United States. Woodchucks are also susceptible to the roundworm brain parasite, which causes behavior that looks exactly like rabies. Roundworm is transmitted through the ingestion of an infected animal's feces. Keep people and companion animals away from any sick-acting woodchuck and contact your local animal control officer or rehabilitator for assistance.

Squirrels**Q: I see a squirrel circling and falling over—is the squirrel rabid?**

A: It's possible, yet squirrels rarely get rabies. A more common, fatal, problem for squirrels is the roundworm parasite that infects the brain and results in behavior similar to rabies. Roundworm infection will prove fatal to the squirrel, unfortunately.

Solving Wildlife Problems

BY LAURA SIMON, FIELD DIRECTOR, URBAN WILDLIFE PROGRAM
THE HUMANE SOCIETY OF THE UNITED STATES

Helping the Public Live with Rabies Vector Species—Some Questions and Answers

Often people encounter a raccoon or skunk in or around their home and don't know what to do. There's no need for the person to panic or pay hundreds of dollars for trapping services when most problems can be easily resolved with some simple advice and household materials. Here are cost-effective, humane, and permanent solutions to the most common calls received by The Fund for Animals/HSUS wildlife hotline in Connecticut.

See humanesociety.org/animals/wild_neighbors/ and wildlifehotline.org for more information.

Q: How do I keep raccoons out of my garbage?

A: Overflowing or uncovered garbage cans provide an open invitation to hungry raccoons. The simplest solution is to put out your garbage cans for pickup in the morning, after the nocturnal raccoons have returned to their dens. If you must put your garbage cans out at night, get the kind of can that allows or can be modified to lock the top closed. Some choices include a plastic garbage can with a tall (four-foot-high) TWIST-ON lid, which raccoons can't open. Rubbermaid makes a garbage can meant to be animal-proof due to built-in bungee cords. You can have this particular can—called an Animal Stopper—ordered through your local hardware store or find it locally by searching for "Animal Stopper Garbage Can."



To keep raccoons out of trash cans, low-tech solutions may work fine, including elastic or other straps across the top of the can, or even a heavy object on the lid.

Another option is to build a simple wooden box outside for storing garbage cans. For easy access, the top should be hinged and have a latch in front secured with a snap hook. Even low-tech solutions may work fine, including elastic or other straps across the top of the can.

Q: I found raccoons trapped in my dumpster—how do I get them out?

A: Often garbage disposal companies don't close dumpster lids after emptying them in the early morning hours. Raccoons are enticed by the food smells, jump in, and then can't climb the slippery sides. This problem is easily resolved by putting some strong branches or plank-like pieces of wood in the dumpster so the raccoons can climb out. Make sure the branch or wood can support their weight and runs from the bottom of the dumpster to the top, at an angle. Advise the caller to put up signs urging people to keep the lid closed so more raccoons don't get trapped.

Q: There's a raccoon in my yard but it's daytime—Does that mean the animal is rabid?

A: Even though raccoons are nocturnal, mother raccoons sometimes nap in trees or forage during the day when they have nursing cubs depleting their energy. Call your local animal control officer or police if an adult raccoon seen during the daytime is acting at all sick or showing abnormal behaviors such as partial paralysis, circling, staggering as if drunk or disoriented, self-mutilating, screeching, or exhibiting unprovoked aggression or unnatural tameness. Otherwise leave the raccoon alone and keep people and pets away from the animal.

Q: How do I get nesting raccoons out of my attic or chimney?

A: In spring and summer, mother raccoons often take advantage of chimneys and attics as nesting sites for raising their cubs. The easiest solution is to wait a few weeks for the raccoons to move out on their own. Remember that mother raccoons clean their cubs meticulously to avoid attracting predators. If you must evict the raccoon family, remember that raccoons look for quiet, dark, and non-noxious smelling places to raise their young. By creating the opposite conditions, you can evict them using the following methods.

Eviction of chimney raccoons: Keep the damper closed and put a blaring radio (rock or rap music works best) in the fireplace. Then put a bowl of vinegar on a footstool near the damper. Apply these deterrents JUST BEFORE DUSK; mother raccoons won't move their cubs in daylight. Be patient, it may take a few days for the mother to move her young. Once the raccoons are gone, promptly call a chimney sweep to install a mesh chimney cap (the best kind has a stainless steel top) and this situation will not recur.

Eviction of attic raccoons: Leave all the lights on and place a blaring radio and rags sprinkled with vinegar around the attic. Apply these deterrents JUST BEFORE DUSK; mother raccoons will not move their young in daylight. Since most attics contain clutter, it can be hard to verify the raccoons are gone. Before sealing the entry hole, stuff it with newspaper and see if the paper stays in place for three successive nights. If so, the den is vacated. Be patient, it may take a few days for the mother to move her young.

After sealing the entry hole with hardware cloth, make doubly sure no raccoons were left behind by leaving a sardine in the attic and check if it's uneaten after 24 hours, or sprinkle flour in front of the entry hole and check for footprints of a raccoon trying to get out. Once the raccoons are gone, promptly seal any entry hole and this situation will not recur.

Q: How do I get a skunk out of my garage?

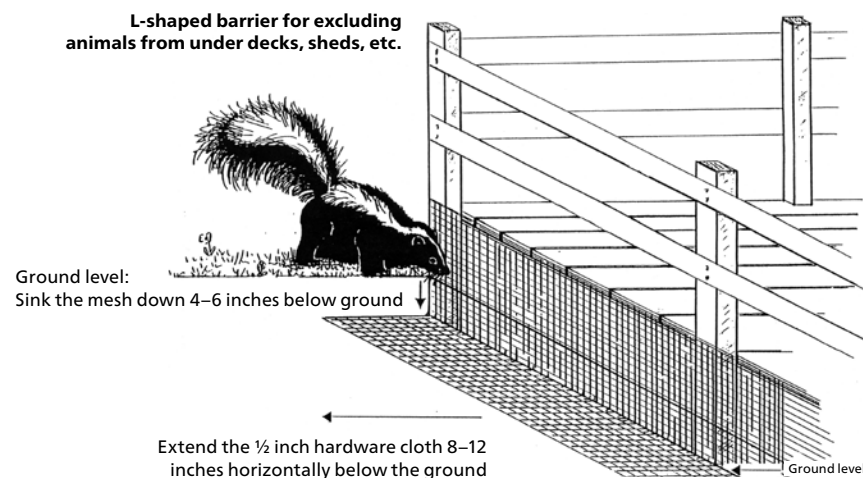
A: Skunks commonly amble into open garages when the door is left open, especially if the smell of garbage or birdseed is in there to entice them. Just remove the garbage or birdseed and leave the garage door open after dark. Skunks have terrible eyesight, so as long as you move slowly and quietly, the skunk will hardly notice you. You can leave a six-inch band of flour under the garage door and watch for exiting footprints to confirm that the skunk has left. Keep checking every half hour after dark, and once you see the footprints promptly shut the garage door.

Q: There's a skunk in my window well; why doesn't he jump out?

A: Skunks are not good climbers. They often fall into window wells and can't get out. If the window well is shallow, place a piece of wood at a 45-degree angle, or less, to serve as a plank. If the window well is deep, put on heavy gloves, place smelly cheese in the far corner of a plastic rectangular garbage can or cardboard box tipped on its side, and slowly lower it into the window well. The skunk will be enticed by the cheese and will walk right in. Slowly raise the can or box to ground level, elevator style, keeping your hands on the outside of the container so you don't risk being bitten. The skunk will amble out once he's eaten the cheese. Skunks have terrible eyesight and will not spray you if you move slowly and talk softly so they're not taken off guard. Remember, skunks also give a warning by stamping their front feet, which gives you a chance to back off! Most important: buy or make a window well cover so this situation doesn't recur. Home supply stores sell premade window well covers.

Q: How do I get a skunk family out from under my deck?

A: Skunks will take advantage of cavities under decks to raise their families. The good news is that the skunks will leave in a matter of weeks as soon as the young are old enough. In the meantime, the skunk will do free rodent and grub patrol. They rarely spray, so the simplest option is to leave them alone until they vacate the den, then seal off their entry hole with hardware cloth. Create an L-shaped barrier (see diagram on next page) by sinking the hardware cloth 6 inches into the ground and then bend it at a 90-degree angle, away from the deck for an additional 12 inches to create a false bottom so they don't dig under the barrier. You can also just run the hardware cloth along the surface, parallel to the ground, and secure it with landscaping staples for an equally effective yet less labor-intensive(!) solution. We don't recommend trapping because it often results in starving young left behind under the deck, creating a foul smell and an obvious humane issue. That's why it's best to wait for the skunks to leave on their own.



It's best to wait for the skunks to leave on their own, then seal off their entry hole with hardware cloth.

Q: I can smell skunk spray in my house—what should I do?

A: The nontoxic deodorizer Odors Away can be cheaply purchased at hardware stores to neutralize any unpleasant odor. Skunk spray, although quite pungent, dissipates within a few days. If the smell lasts weeks, there's probably a dead skunk under your house.

Q: There's an opossum drooling and hissing at me—is the animal rabid?

A: Opossums are highly resistant to rabies. By opening its dinosaur-like mouth, showing off its 50 pointy teeth, and hissing, the opossum is trying to bluff you with a display of fierceness! Opossums don't have many defense mechanisms, which is why they often play dead when scared. Just leave the opossum alone and eventually the animal will wander away.

Q: Help! I need to get a bat out of my house!

A: Often healthy bats fly into houses through open windows or flues. In late summer, fledgling bats leave the roost for the first time, often take a wrong turn, and end up inside a house. If there has been absolutely no chance of exposure, (i.e. bat was not in the bedroom of a sleeping person, was not handled by or could not have bitten a child or person unknowingly), the best way to evict the bat is to open all windows and doors and give the bat a chance to fly out. A bat can be safely captured by putting a coffee can or food container over the bat and sliding a piece of cardboard underneath (unlike birds, bats cannot fly from the ground up so be sure to put the bat on a tree limb or wall, off the ground). Often bats roost in attics and raise their young there, which provides a benefit to the homeowner in terms of mosquito control in the summer. The best eviction method is to create a one-way door over the attic's entry hole so that the bats can get out but not back in (see batcon.org for more information).

WARNING: Baby bats are too young to fly from May to August; therefore, any eviction must take place in the fall or very early spring to prevent orphaning.

Q: Do I need a nuisance control trapper to solve my problem?

A: Nuisance wildlife control companies charge a fee—sometimes hundreds of dollars—for problems that homeowners can often resolve themselves. Some people set a live trap to remove the animal. Be advised, however, that when animals are trapped during birthing season, starving young may be left behind.

We discourage trapping unless an animal is stuck somewhere and can't get out or poses an immediate threat to humans or domestic pets. Trapping is rarely a solution to wildlife nuisance problems. As one animal is removed, another will soon take its place.

Relocating wild animals to other areas may sound like the right thing to do, but it's not necessarily humane: many relocated animals tend to not fare well when released in unfamiliar territory. They are disoriented, often running to find home—in the process, they are subject to increased predation, car collisions, attacks from resident animals, lack of available den or nesting sites, and more. Relocated animals experience a far greater mortality rate.

The far better answer is preventing problems through exclusion: animal-proof homes by closing all holes with hardware cloth or caulking and put a chimney cap on all flues. Of course, before closing off any holes or cavities, it's vital to first ensure that no animals are IN them! Assume animals are present particularly in spring and summer, which is the height of wildlife baby-rearing season. If animals are already in the home, they can be evicted by placing deterrents (blaring radio, vinegar-sprinkled rags, bright lights) close to the nesting area to encourage their departure, and, once they're gone, sealing all entry holes so they can't return.

More information on simple solutions to common wildlife problems can be found at the following websites:

- humanesociety.org/animals/resources/solving_problems_wildlife.html
- wildlifehotline.org



Trapping is rarely a solution to wildlife nuisance problems. As one animal is removed, another will soon take its place.

Advice for Handling Fawn Calls

Information to give to callers regarding fawns:

1. Ninety-nine percent of "fawn calls" don't involve orphans, but rather animals that people wrongly assume are abandoned.
2. Generally, if there is no dead doe in the area or on nearby roads, the fawn is not an orphan.
3. Often does will not return to their fawns until well after dark.
4. Keep yourself and pets far away from the fawn. It may take a good 24 hours for a doe to feel safe enough to return to her fawn. If a mother were to return prematurely, she might risk leading a predator directly to her fawn.
5. Don't touch the fawn! If the fawn has already been "handled," wipe the fawn with a clean towel, put on a clean pair of gloves, and return it to the site of origin.
6. If a fawn has wandered into someone's garage or other precarious position, gently coax the fawn out or move it to a quiet nearby site while wearing gloves. Don't move the fawn too far from where it was found.
7. Coyotes, dogs, cats, raccoons, construction, and more are not reasons for fawn removal. These are things that deer must encounter on a daily basis in most states. A mother deer will move her fawn away from danger if given the chance.
8. Fawns are born in late May through the end of June, with the peak number born in early June. Mother deer often give birth at night in areas (such as people's front yards) that may seem perfectly safe at night but differ drastically during daylight hours.
9. For the first five days after birth, fawns will not run when approached. Instead they will exhibit "freeze behavior." They lie still when approached, even permitting handling with little resistance. From the seventh day on, fawns will exhibit "flight behavior" when approached. By one month of age, fawns in the wild venture out to browse with their mothers.
10. Fawns raised by humans must be raised in groups of six or more whenever possible, or with one or more adult deer. They are herding animals that need to be raised with a group of their own species. However, vigilance is essential to ensure none of the group is receiving extra aggression, developing suckling wounds to the ears, or other injury from their cage mates. Fawns will imprint on humans very quickly if kept by themselves or with too few other fawns.

If the fawn appears to be orphaned or injured, refer to your state wildlife agency for a list of licensed rehabilitators with a deer permit.

How to Rescue Infant Mammals

REPRINTED WITH PERMISSION FROM *HEALERS OF THE WILD* BY SHANNON K. JACOBS.

Before rescuing mammals, seek guidance from a wildlife rehabilitator

- 1. Prepare a container.** Place a soft cloth on the bottom of a cardboard box or cat or dog carrier with a lid. If it doesn't have air holes, make some. For smaller animals, you can use a paper bag with air holes punched in.
- 2. Protect yourself.** Wear gloves, if possible. Some animals may bite or scratch to protect themselves, even if sick; wild animals commonly have parasites (fleas, lice, ticks) and carry diseases.
- 3. Cover the animal with a light sheet or towel.** Removal of visual stimuli can significantly mitigate psychological stress in any species.
- 4. Gently pick up the animal and put it in the prepared container.** Utilize personal protective gear appropriate for each species.
- 5. Warm the animal if it's cold out or if the animal is chilled.** Signs of hypothermia in neonatal mammals include inactivity, closed eyes, curling into a tight fetal position, somnolence (sleepiness), and anorexia. It is important to note that unlike adult mammals, very young mammals may be unable to shiver to elevate their temperature.
- 6. Put one end of the container on a heating pad set on low.** Extreme care must be taken with any heat pad or lamp as many animals have received thermal injury if they are unable or unwilling to move away from the heat. You may use a chemical hand warmer or fill a plastic soft drink container with a screw lid with hot water; wrap the warm container with cloth, and put it next to the animal. Make sure the container doesn't leak, or the animal will get wet and chilled. A microwave can be used to reheat some containers intermittently so long as room for heat expansion is available in the container or the lid is open. A container with an absorbent such as a wet cloth or paper towel (for example, a zipper-seal plastic bag with wet washcloth) is easy to repeatedly warm in a microwave and is far less likely to leak than a container of water alone.
- 7. Hyperthermia can be more lethal than hypothermia.** Far more animals are born or hatch in summer than winter. In hot weather be sure to protect the container from direct sun and never leave it in a closed vehicle in the sun. Impress this on the transporter as well. The ideal solution is to include a thermometer in the container and aim for about 85 to 95 degrees Fahrenheit, but also check the substrate directly below the animal, not just the ambient air within the carrier.
- 8. Tape the box shut or roll the top of the paper bag closed.**

- 9. Note exactly where you found the animal.** This will be very important for release.
- 10. Keep the animal in a warm, dark, quiet place.** Don't give it food or water. Leave it alone; don't handle or bother it. Keep children and pets away.
- 11. Contact a wildlife rehabilitator, state wildlife agency, or wildlife veterinarian as soon as possible.** Don't keep the animal at your home longer than necessary. Keep the animal in a container; don't let it loose in your house or car.
- 12. Wash your hands after contact with the animal.**
- 13. Wash anything the animal was in contact with—towel, jacket, pet carrier—to prevent the spread of diseases and/or parasites to you or your pets.** Mammals are reservoirs for more zoonotic diseases (shared by both man and animals) than birds or reptiles. Many mammalian diseases and parasites may even be lethal to humans and unborn children (ex: *Baylisascaris*, rabies, toxoplasmosis). Gloves and other protective gear are the best defense from infectious disease or parasites, even if the risk of traumatic injury directly from the animal is minimal.
- 14. Get the animal to a wildlife rehabilitator as soon as possible.**

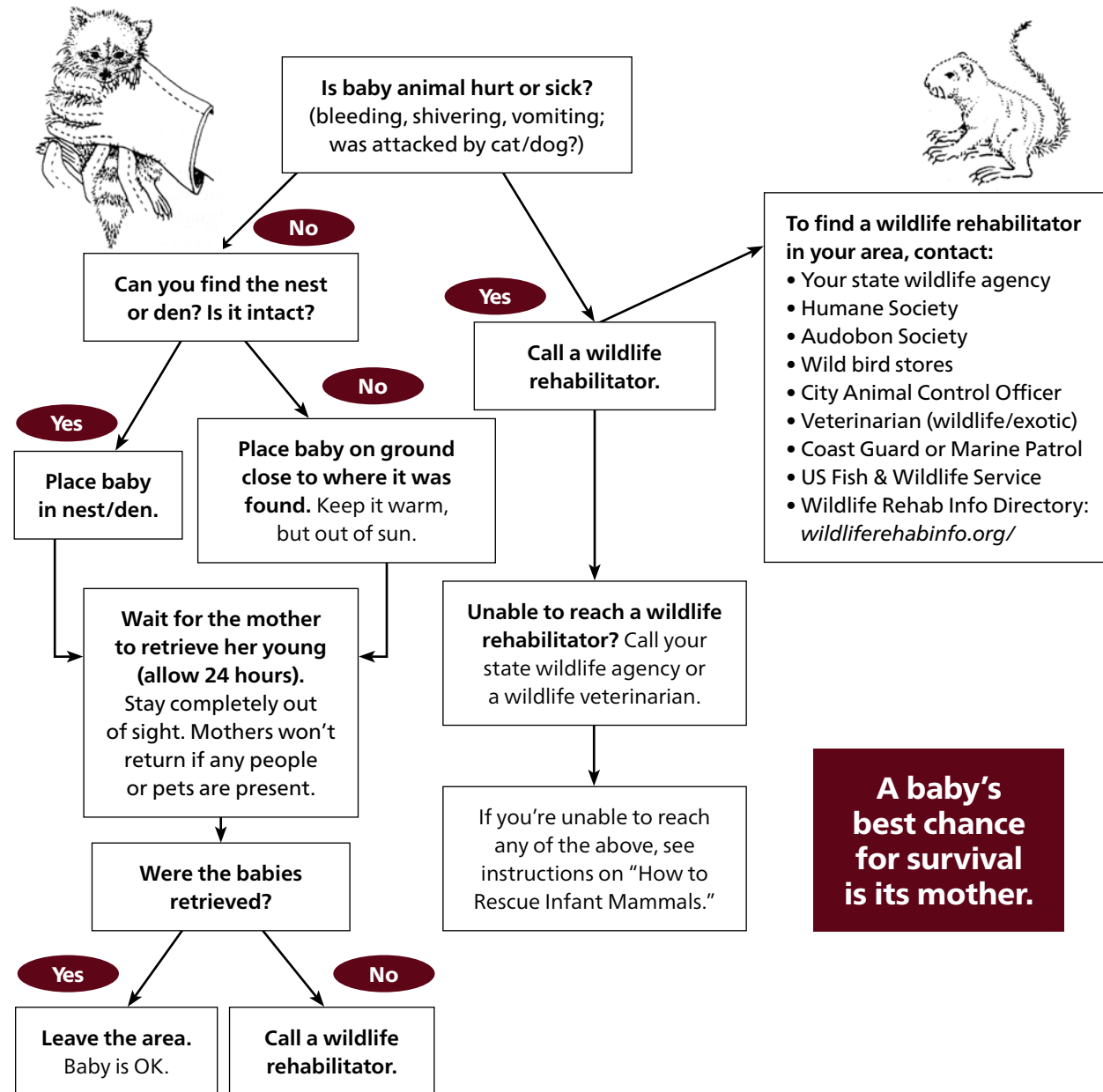
It's against the law in most states to keep wild animals if you don't have permits, even if you plan to release them.



If you find infant mammals that need rescuing, contact a wildlife rehabilitator as soon as possible.

I Found a Baby Mammal. Now What?

FROM HEALERS OF THE WILD: PEOPLE WHO CARE FOR INJURED AND ORPHANED WILDLIFE BY SHANNON K. JACOBS.



If you find baby bunnies:

If their nest has been damaged, it can be repaired. Look for a shallow depression lined with grass/fur. Place babies in nest with light layers of grass to hide them. Place an "X" of yarn or string over them to test if the mother returns. Check back in 12+ hours. If the "X" is still perfectly in place, they are probably orphaned.

If you find healthy bunnies that are 4–5 inches long, able to hop, with eyes open and ears up, they do not need help. They are able to survive on their own. Questions? Call a wildlife rehabilitator.

If you find a fawn:

Mothers normally leave their babies hidden.

If baby looks cold, hungry, diseased, or confused, or if dogs, other animals, or people threaten its safety, call a wildlife rehabilitator.

Otherwise, leave the baby alone and leave the area. The mother will not return if people or pets are present.

How to Rescue Baby Birds

REPRINTED WITH PERMISSION FROM HEALERS OF THE WILD BY SHANNON K. JACOBS

(Before rescuing birds, seek guidance from a wildlife rehabilitator.)

- 1. Prepare a container.** Place a clean, soft cloth with no strings or loops on the bottom of a cardboard box or cat or dog carrier with a lid. Soft paper towels may also be used and easily changed when soiled and replaced and have no strings to worry about. If it doesn't have air holes, make some. For smaller birds, you can use a paper bag with air holes. Cloth bags work well and can also be used, but should be turned inside out to ensure loose threads are not inside the bag. They are opaque to calm the bird, cooler, and have excellent ventilation as compared with a paper bag or box.
- 2. Protect yourself.** Wear gloves, if possible. Some birds may stab with their beaks, slice with their talons (claws) and slap with their wings to protect themselves, and if sick, birds commonly have parasites (fleas, lice, ticks) and carry diseases.
- 3. Cover the bird with a light sheet or towel, unless already in an opaque cloth bag.**
- 4. Gently pick up the bird and put it in the prepared container.**
- 5. Warm the animal if it's cold out or if the animal is chilled.** Signs of hypothermia in birds include inactivity, closed eyes, somnolence (sleepiness), and anorexia. It is important to note that unlike adult mammals, birds seldom shiver when cold. Put one end of the animal's container on a heating pad set on low. Extreme care must be taken with any heat pad or lamp as many animals have received thermal injury if they are unable or unwilling to move away from the heat. Hypothermic animals are the most prone to thermal injury. They often remain in excessive heat as they warm and exceed normal core body temperature. You may fill a zip-top plastic bag, plastic soft drink container with a screw lid, or a rubber glove with hot water; wrap the warm container with cloth, and put it next to the animal. Make sure the container doesn't leak, or the animal will get wet and chilled. A microwave can be used to reheat the container intermittently so long as room for expansion is available or the top is open. A container with an absorbent such as a wet cloth or paper towels (ex: zipper-seal plastic bag with wet washcloth) is easy to repeatedly warm in a microwave and is far less likely to leak than a container of water alone.
- 6. Hyperthermia can be more lethal than hypothermia.** Far more animals are born or hatch in summer than winter. In hot weather be sure to protect the container from direct sun and never leave it in a closed vehicle in the sun as well. The ideal solution is to include a thermometer in the container and aim for about 85 to 95 degrees Fahrenheit.
- 7. Tape the box shut or roll the top of the paper bag closed, or tie the cloth bag so it may be easily untied upon arrival.**

8. Note exactly where you found the bird. This will be very important for release, or if the animal may be returned after the initial exam.

9. Keep the bird in a warm, dark, quiet place.

- Don't give the bird food or water.
- Leave the bird alone; don't handle or bother it.
- Keep children and pets away.

10. Contact a wildlife rehabilitator, state wildlife agency, or wildlife veterinarian as soon as possible. Don't keep the bird at your home longer than necessary. Keep the bird in a container; don't let it loose in your house or car.

11. Wash your hands after contact with the bird. Wash anything the bird was in contact with—towel, jacket, blanket, pet carrier—to prevent the spread of diseases and/or parasites to you or your pets.

12. Get the bird to a wildlife rehabilitator as soon as possible.

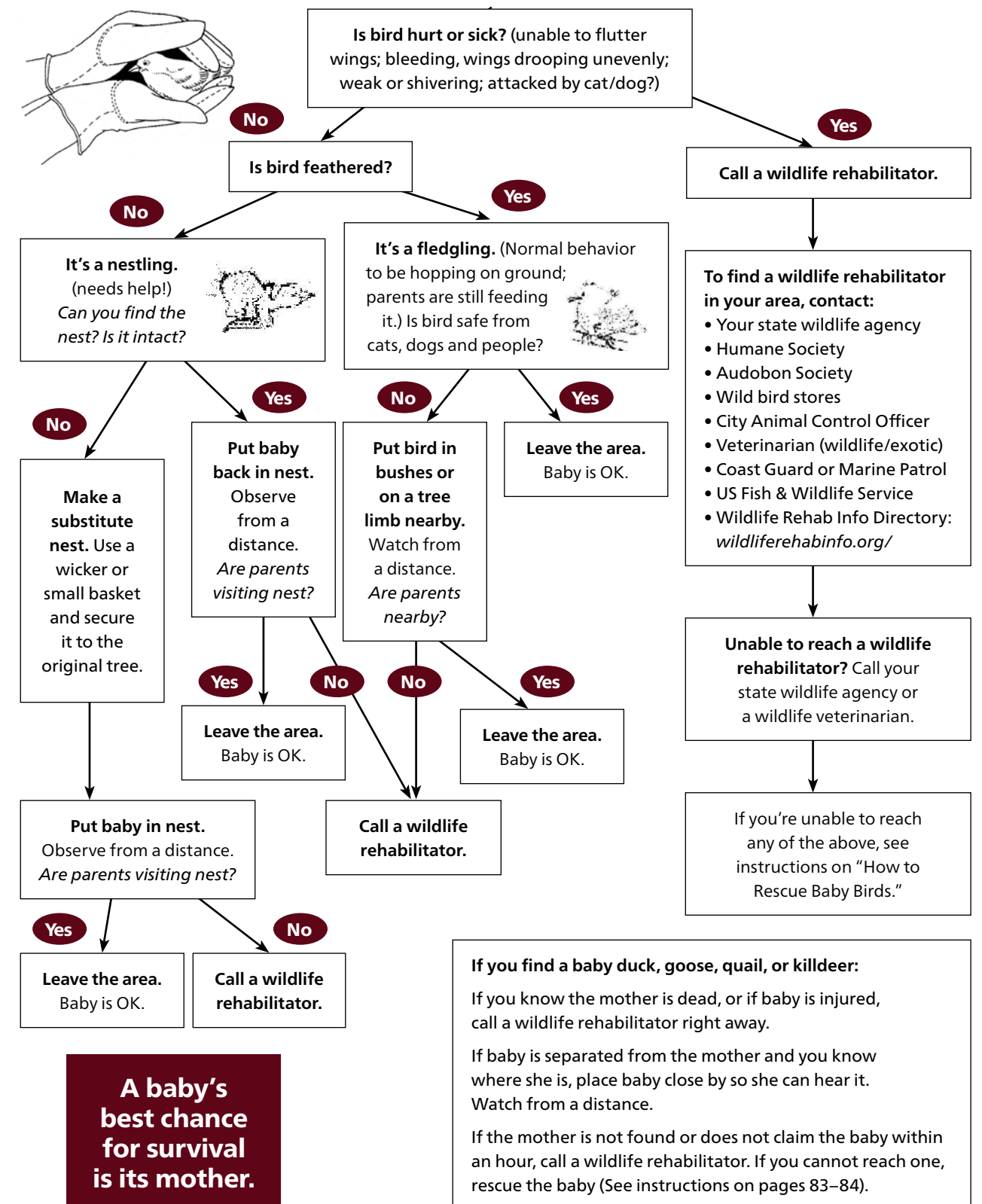
It's against the law in most states to keep wild animals if you don't have permits, even if you plan to release them.



If you find baby birds that need rescuing, contact a wildlife rehabilitator as soon as possible.

I Found a Baby Bird. Now What?

FROM HEALERS OF THE WILD: PEOPLE WHO CARE FOR INJURED AND ORPHANED WILDLIFE BY SHANNON K. JACOBS.



Wildlife Rehabilitation Organizations

Many states have a state wildlife rehabilitator's organization. Membership can provide a resource for information, networking with like-minded people and moral support should you need it. Most state organizations will provide you with a list of licensed wildlife rehabilitators.

National Wildlife Rehabilitators Association

NWRA
2625 Clearwater Rd, Suite 110
St. Cloud, MN 56301
1-320-230-9920
fax: 320-230-3077
nwra@nwrawildlife.org
nwrawildlife.org

Annual rehabilitators meeting, training workshops, newsletter, subscription to the periodical *Wildlife Rehabilitation Bulletin*, numerous other publications and manuals. Discounts on symposium registration and literature orders.

International Wildlife Rehabilitation Council

PO Box 3197
Eugene, OR 97403
Phone/Fax 1-866-871-1869 or 1-408-876-6153
info@iwrc-online.org
iwrc-online.org

Biennial meeting, training workshops, newsletter, technical rehabilitation information, subscription to the periodical *Journal of Wildlife Rehabilitation*. Discounts on symposium and training course registration and literature orders.

Federal Permitting Agencies

National Marine Fisheries Service

nmfs.noaa.gov

U.S. Fish and Wildlife Service

fws.gov

References

Davis, L.E., ed. *Handbook of Small Animal Therapeutics*. New York, NY: Churchill Livingstone, 1985.

Evans, R.H. *Anthelmintic Drugs and Dosages for Use in Wild Mammals and Birds, Wildlife Rehabilitation, Vol. 4*. National Wildlife Rehabilitators Association, 1985.

Hadidian, J., Baird, M., Brasted, M., Nolfo-Clements, L., Pauli, D., and Simon, L. *Wild Neighbors: The Humane Approach to Living with Wildlife*, by HSUS. Fulcrum Publishing, 2007.

Hartup, B., and Miller, E. *Willowbrook Wildlife Center Pharmaceutical Index*. Willowbrook Wildlife Foundation, 1995.

Landau, D., and Stump, S. *Living with Wildlife*. The California Center for Wildlife and Sierra Club Books, 1994.

Lerman, M. *Anesthesia of Selected Wild Species*. Pages 116–122 in *Wildlife Rehabilitation, Vol. 1* (Beaver, P., ed.). National Wildlife Rehabilitators Association, 1982.

Moore, A.T., and Joosten, S. *Principles of Wildlife Rehabilitation—The Essential Guide for Novice and Experienced Rehabilitators*. St. Cloud, MN: National Wildlife Rehabilitators Association, 1997.

Nettifee, J.A. and Aspros, D.G. *Antibiotic Use in the Raptor Patient: Selecting an Appropriate Antibacterial*. *Wildlife Journal*, 13 (4): 6–8. 1990.

Peterson, L.A., and Peterson, R.T. *Peterson Field Guide to Birds of North America*. Houghton, Mifflin and Harcourt Publishing Company, 2008.

Raley, P. *The Brukner Nature Center Primer of Wildlife Care and Rehabilitation*. 1992.

Ruth, I.E. and Gode, D. *Wild Mammal Babies, the First 48 Hours and Beyond*. Self-published, Howard Printers. 2004.

Shenoy, K., ed. *Topics in Wildlife Medicine, Vol. 1–3*. St. Cloud, MN: National Wildlife Rehabilitators Association.

Sibley, D.A. *The Sibley Guide to Birds*. Knopf, 2000.

Stokes, D. and Stokes, L. *The Stokes Field Guide to the Birds of North America*. Little, Brown and Company, 2010.



Eastern gray squirrel.

PHOTO CREDITS

PAGE VI: HEATHER FONE/THE HSUS. PAGE 2: HEATHER FONE/THE HSUS. PAGE 4: HEATHER FONE/THE HSUS. PAGE 6: HEATHER FONE/THE HSUS. PAGE 8: THE HSUS. PAGE 9: HEATHER FONE/THE HSUS. PAGE 11: HEATHER FONE/THE HSUS. PAGE 13: KIM JOHNSEN. PAGE 15: DEBRA GODE. PAGE 16: HEATHER FONE/THE HSUS. PAGE 17: HEATHER FONE/THE HSUS. PAGE 18: HEATHER FONE/THE HSUS. PAGE 20: HEATHER FONE/THE HSUS. PAGE 21: HEATHER FONE/THE HSUS. PAGE 22: HEATHER FONE/THE HSUS. PAGE 23: HEATHER FONE/THE HSUS. PAGE 25: DR. NOHA ABU MADI/CORNELL UNIVERSITY COLLEGE OF VETERINARY MEDICINE. PAGE 27: KIM JOHNSEN. PAGE 29: KIM JOHNSEN. PAGE 31: MICHELE GOODMAN. PAGE 32: DR. ERICA MILLER. PAGE 33: MICHELE GOODMAN. PAGE 34: STEFAN HARSCH/THE HSUS. PAGE 37: HEATHER FONE/THE HSUS. PAGE 39: HEATHER FONE/THE HSUS. PAGES 40–41: HARRIET FORRESTER. PAGE 42: HEATHER FONE/THE HSUS. PAGE 44: STEFAN HARSCH/THE HSUS. PAGE 46: DR. ROBERTO AGUILAR/THE HSUS. PAGE 48: HEATHER FONE/THE HSUS. PAGE 50: DEBRA GODE. PAGE 52: DEBRA GODE. PAGE 54: MICHELE GOODMAN. PAGE 58: HEATHER FONE/THE HSUS. PAGE 60: HEATHER FONE/THE HSUS. PAGE 62: HEATHER FONE/THE HSUS. PAGE 63: KIM JOHNSEN. PAGE 64: HEATHER FONE/THE HSUS. PAGE 71: HEATHER FONE/THE HSUS. PAGE 72: HEATHER FONE/THE HSUS. PAGE 74: ISTOCKPHOTO.COM. PAGE 77: ISTOCKPHOTO.COM. PAGE 78: ISTOCKPHOTO.COM. PAGE 81: CHRISTINE JENSEN. PAGE 84: HEATHER FONE/THE HSUS. PAGE 88: DAVID SOKOL.

Index

Adult Birds.....	7, 24, 25, 50, 54–55	Malnutrition.....	51
Adult Mammals.....	7, 15, 56, 64, 80, 83	Mange (See Sarcoptic mange).....	60
Air Bubbles.....	53	Muskrat.....	22, 60
Analgesia.....	38	Mustelids.....	22
Aspergillosis.....	58	Mycotic Diseases.....	58
Baby Birds.....	23–24, 83–85	Nestlings.....	23, 26–28, 30, 32, 63, 85
Baby Mammals.....	9–15, 80–82	Nutrition.....	4, 11–12, 31, 43, 45, 63, 66
Bacterial Diseases.....	57–58	Oiled Wildlife.....	53
Bats.....	19–20, 53, 59, 71–72, 77	Opossum.....	12, 16–17, 51, 56, 58–59, 73, 77
<i>Baylisascaris</i>	5, 17, 59, 60	Otter.....	22
Beaver.....	21–22, 56, 60	Parasitic Diseases.....	59–60
Brucellosis.....	57	Pigeons.....	25–28, 55, 59, 65
Castings.....	30	Poisoning.....	50–51
Cat caught.....	52	Protozoal Diseases.....	60–61
Chipmunks.....	21, 59, 63	Psittacosis.....	57
Dehydration.....	9–10, 36–37, 43, 49	Rabbits.....	6, 12, 20–21, 52, 56–59
Doves.....	25–26, 28, 51	Rabies.....	1, 5, 8, 16–20, 59, 70–71, 74, 77, 81
Ducklings.....	32–33	Raccoons.....	5, 11, 17–18, 57–60, 64, 70–75, 79
Ehrlichiosis.....	61	Raptors.....	1, 6–8, 28–30, 55, 57–59, 61, 65, 67
Euthanasia.....	42, 47, 61	Rodents.....	21–22, 52, 56, 58–59, 63–65, 73, 76
External Parasites.....	24–25, 51	Roundworm.....	17–18, 59–60, 73
Fawns.....	79, 82	<i>Salmonellosis</i>	57
Feather Injury.....	54–55	Sarcoptic Mange.....	60
Fledglings.....	23–24, 30, 54	Shock.....	11, 32, 36, 49–51, 53
Foxes.....	59, 64, 72	Skunks....	12–13, 18–19, 58–59, 64, 70, 72–74, 76–77
Gavage.....	15–16, 24–26, 28, 30–32, 37, 50, 53	Songbirds.....	26–28, 55, 63
Giardiasis.....	60	Squirrels.....	9, 12, 21, 59, 63, 73
Goslings.....	32–33	Tick Borne Disease.....	61
Hatchlings.....	10–11, 23, 30, 43, 45, 55	Tularemia.....	58
Head Trauma.....	49–50	Turtles.....	35–47
Heatstroke.....	51	Unconsciousness.....	50–51
Histoplasmosis.....	59	Viral Diseases.....	59
Hypothermia.....	12, 14, 19, 32, 49–52, 80, 83	Waterfowl.....	31–33, 60, 65
Internal parasites.....	14, 25	Woodducks.....	32
Leptospirosis.....	58	Woodchucks.....	21, 56, 59, 64, 73
Lyme Disease.....	61	Zoonoses.....	57

Wildlife Care Basics for Veterinary Hospitals

is a joint project of the Humane Society Veterinary Medical Association and the animal care centers of The Humane Society of the United States.

At five animal care centers around the country, dedicated staff and volunteers nurse the wounded, tend the motherless, and restore dignity to the mistreated. In addition, we educate, rescue, and foster change. This life-saving work is an integral part of The HSUS's commitment to making the world a better place for all species.

HSVMA was formed as a home for veterinary professionals who want to join together to speak out for animals, engage in direct care programs for animals in need, and educate the public and others in the profession about animal welfare issues. HSVMA is an affiliate of The HSUS.

[Animal Care Centers]



hsvma.org



**THE HUMANE SOCIETY
OF THE UNITED STATES**

humanesociety.org/animalcenters