Liberty Wildlife Medical Services

Medical Services
Training Program

• Section One •

Introduction to Medical Services
Safety and Wildlife Protocols

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267
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Medical Services Training and You

Thank you for participating in the Medical Services program!

We are fortunate to have a tremendous amount of skill and experience within the Medical Services group. Volunteers in this program have different levels of knowledge and experience that they have brought with them. Just as backgrounds vary from person to person, the learning processes are different, too.

The Medical Services program offers several different ways in which you will be trained: formal instruction including hands-on workshops, self-guided programs, one-on-one mentoring with senior Medical Services staff, and cross-training in other departments.

As training progresses, you may see other volunteers completing procedures that you have not yet been taught. Do not be discouraged. Each volunteer's experience, comfort level, assigned shift, and personal background will affect the progress of his or her training.

The training program is broken down into small focused workbook units. Each workbook unit will contain study guides, procedures, vocabulary lists, additional reading materials, and often a workshop. A practice workshop will be given on each unit prior to continuing on to the next topic.

Remember, this time is for learning. Designate time between training classes to complete your worksheets and study the materials that have been provided. This training period allows you to build the crucial foundation you will need for the future.

Thank you for volunteering. Have fun!

Program Objectives

The Medical Services group at Liberty Wildlife has been developed to provide comprehensive medical support for the sick, injured, or orphaned wildlife that arrive at our facility throughout the year.

This program mirrors other successful volunteer departments in its structure. Each day is divided into four shifts which will provide onsite medical coverage at the facility continuously from 8:00 a.m. through 7:00 p.m.

The Medical Services program was developed for a variety of reasons, some of which are listed below:

- **The response time for treatment will be equalized.**

Onsite medical support during the daylight hours benefits wildlife by having immediate treatment available. Having scheduled shifts of service allows the necessary time for each case to be addressed thoroughly, including completion of all routine treatment and follow-up care, monitoring of general health on outdoor wildlife, accurate paperwork, and computer processing of dispositions.

- **Expand volunteer expertise.**

To involve more individuals in the medical care aspect of the rehabilitation process is a benefit to both the individual and the organization, providing a solid group of experienced volunteers to support Liberty Wildlife on a daily basis.

- **Medical Services department will be prepared for the organization's relocation.**

Liberty Wildlife will be relocating to a new facility. Our new location will greatly increase the number of animals that are brought to us each day. We are preparing Medical Services *now* for the transition to a busier and more visible operation.

- **Other services and needs will be supported.**

Having a person at the facility at all times provides an additional resource for emergencies or for other needed work at the facility.

- **Public access to drop-off wildlife year-round.**

Continuous daytime coverage at the facility has proven to be a tremendous convenience for both the person bringing in the animal and for the Hotline volunteer who is coordinating assistance for the community.

- **Increasing Liberty Wildlife's visibility.**

Hundreds of people are introduced to Liberty Wildlife by dropping off an animal. This accessibility provides an identifiable image of "Liberty Wildlife" rather than having the public identify with a clinic or other drop-off point.

Medical Services Staff Responsibilities

Dr. Kathryn Orr, Veterinarian

Liberty Wildlife's founder. Established protocols for standard medical care and reviews treatment plans on rehabilitating wildlife. Conducts surgeries and other complex or advanced procedures.

Dr. Tanya Wyman, Veterinarian

Establishes treatment plans on rehabilitating wildlife. Conducts surgeries and other complex or advanced procedures. Assists with training of new personnel.

Jan Miller, Animal Care Coordinator

Train and mentor new Medical Services volunteers, and perform advanced medical procedures.

Medical Services Staff Volunteers

Experienced Medical Services volunteers have a diverse list of responsibilities that change according to the time of the shift, the day of the week, the volume of animals under treatment at the time, and any special needs at the facility.

Their responsibilities may include:

- Checking in wildlife and conducting initial assessments
- Following treatment protocols and maintaining quality medical care
- Administering medication doses
- Processing paperwork
- Conducting visual wellness checks

Advanced skills and responsibilities may include:

- Dosage calculations
- Applying splints
- Suturing
- Care or treatment of mammals (rabies pre-exposure required)
- Conducting wellness physicals
- Mentoring new volunteers

New Medical Services Volunteers

New volunteers are considered trainees. Initial responsibilities include checking-in wildlife, providing the correct set-up for incoming animals, and processing paperwork. In addition to these duties, the main responsibility of new volunteers is to learn. This includes independent study of the natural histories of active rehabilitating, non-releasable, and educational animals at the facility.

Medical Services Training Schedule

The step-by-step approach of the Medical Services Training Program allows you to build a solid foundation of knowledge and experience as you learn.

Week	Topic
One	Introduction to Medical Services Safety and Wildlife Protocols
Two	Paperwork and Charting Handling and Restraint
Three	Avian Skeletal System and Feathers
Four	Assessment
Five	Medications / Dosages
Six	Fluid Therapy
Seven	Wing Bandaging
Eight	Leg Bandaging
Nine	Wounds and Wound Management Trauma, Disease, and Other Conditions
Ten	Well Care Program Nutrition and Housing

Training Methods

Liberty Wildlife provides care for all native wildlife—birds, mammals, and reptiles. The majority of animals we receive are birds. Although information may be provided on mammals and reptiles, the Medical Services Training Program focuses on avian species.

This program is provided for volunteers that are *actively* volunteering in Medical Services. It provides the core of information critical understanding and following the medical protocols that have been established.

Medical Services training uses four methods: formal instruction including hands-on workshops, one-on-one mentoring, self-guided instruction, on-the-job training during your shift, and cross-training in related departments.

- The formal instruction is provided through a series of classes which review basic information on avian anatomy and structure, common medical conditions, and established treatment protocols for those conditions.

- As new Medical Services volunteers begin their normal shifts, they will work closely with existing Medical Services staff. This close observation and one-on-one mentoring will aid in the development of necessary skills.

- Self-guided instruction provides additional sources of needed information. Journal articles and other reading materials are mandatory components of the program. These articles can be read before or after your shift or at another more convenient time. With the exception of your training materials and manual, all books, reference materials, and articles must stay at Liberty Wildlife unless otherwise indicated.

- Finally, cross-training provides an in-depth understanding of how Medical Services relates to other departments. Cross-training is necessary in the areas of Education, Wildlife Rescue and Transport, Community Information Hotline, Orphan Care, Daily Care, and Administration. Try and become involved in any of these areas to familiarize yourself with them and how the facility runs as a whole.

Training Materials and Communication

Medical Services Reference Guide

The Medical Services Reference Guide is a valuable tool you will use while in training and later in your work as a Medical Services volunteer. This quick reference contains medical protocols that are commonly used at Liberty Wildlife. It is an expanding reference that will be updated as needed.

Journal Entries

A Medical Services journal is used to record the happenings of the shift. Read it! This information is a valuable communication within the department and helps to share exciting and interesting experiences that happen from day to day. Every shift is responsible for writing in the journal. It doesn't have to be long—just write! Date your record and clearly sign your name after each entry.

Medical Services Meetings

The Medical Services department meets on occasion. These meetings will provide a group forum to discuss interesting cases, new procedures, and meet new volunteers. We mostly communicate through email. This is a great way to stay informed.

Feedback

Your feedback is crucial to the growth and development of the Medical Services department. Please bring all comments and suggestions directly to the Medical Services Program Coordinators rather than to each other. Your questions and comments are valuable check points for the program's success.

Teamwork

Communicate! It will make the difference between a good program and one that is truly outstanding. It is important to maintain a positive attitude within the group at all times. Treat each other with respect. Always remember that it takes the effort of all Liberty Wildlife volunteers to accomplish our goals.

Educate

Help each other. If you feel that someone isn't doing something right, please do not discuss the situation with each other-notify the Program Coordinators instead. Understand that these situations are treated as *education* issues. We are striving to raise the level of expertise of a group of very diverse individuals with varying backgrounds and experience—a task that takes time, patience, and understanding.

Read This Twice!

As you complete your training, please remember that we do understand that there is often more than one way to accomplish a given task.

Although you may see more than one solution to a given situation, do not modify the methods you are taught in any way.

Do not vary any treatment plan.

It is our consistency in method and procedure that allows us to work successfully with such a large team of care-givers.

Suggestions and feedback are always welcome. Discuss any ideas you have with Medical Services Program Coordinators prior to taking any action or prior to discussing the situation with others.

To maintain the quality of medical care as Medical Services grows and changes, consistency within the staff and support for the program and its goals must be of paramount importance.

Your Commitment, And Ours

Medical Services volunteers are assured of a unique and rewarding experience. However, this area requires a tremendous commitment from its volunteers.

Training is mandatory. Even individuals with previous medical backgrounds are required to complete portions of Liberty Wildlife's training program. Some training, by necessity, may be scheduled at times other than your assigned shift.

It is crucial that you are able to follow both written and verbal directions accurately. You must be comfortable receiving instruction.

You must be able to work comfortably as a member of a group. The ability to work well with others is crucial.

You *must* arrive on time for your shift.

Your shift *cannot* be missed.

Take time right now to evaluate your situation, your team-playing ability, and your personal habits to determine if this demanding position is right for you. Because the responsibilities of this department are so critical, volunteers that cannot meet the needs of the program will be immediately moved to other areas that better suit their interests and skills until such time as their situation changes. The Program Coordinators are responsible for making these decisions.

In exchange for your commitment to this program, Liberty Wildlife is committed to helping you—to grow as a volunteer, to provide a means of expanding your knowledge in the field of wildlife rehabilitation, and to offer you this unique opportunity to help Arizona's wildlife in a very rewarding way.

Areas of Responsibility

There are many tasks that are the responsibility of the Medical Services staff.

Medical care

Triage or prioritize incoming wildlife
Assess conditions of incoming wildlife
Provide continued monitoring of wildlife as indicated
Move wildlife as needed
Provide treatment and care for wildlife as indicated

Well care

Conduct visual or physical exams on Active Rehabs and Non-releasables (outside)
Conduct visual or physical exams on Education Wildlife (outside)
Inspect enclosures and aviaries

Work area

Clean work area
Take out trash
Wash and fold laundry
Clean inside refrigerator
Put away medical supplies and donations
Clean cabinets, drawers, exam areas, and supply bins
Stock supplies in medical cabinets

Paperwork

Log incoming animals
Prepare and update medical and food charts
Record notes daily in the Medical Service journal
Record final dispositions

Educate

Yourself and others!
Listen and observe
Continue to read new materials

Liberty Wildlife Facility

Clean, clean, clean!
Answer the window
Perform a daily “walk-through” of the entire facility and act upon what you see
Provide assistance in other areas of Liberty Wildlife as needed

Shift Duties

There will be four shifts to provide constant coverage from 8:00 a.m. to 7:00 p.m.

First shift	8:00 a.m. to 11:00 a.m.
Second shift	10:00 a.m. to 1:00 p.m.
Third shift	1:00 p.m. to 4:00 p.m.
Fourth shift	4:00 p.m. to 7:00 p.m.

The first shift is from 8:00 a.m. to 11:00 a.m.

Jump in and get started. The day only gets busier!

(Fall and winter pick up at clinic and still be at the facility by 8:00am)

- Administer once-daily medications
- Administer regular morning medications
- Provide morning feedings when specified or needed
- Assess clinic drop-offs and other new arrivals
- Evaluate critical animals
- Accept new arrivals from the public and check-in wildlife
- Clean and stock work areas
- Conduct well care exams on wildlife in outside enclosures
- Use over-lapping one hour at 10:00 a.m. to conduct physicals or other procedures requiring two people
- Assist Daily Care staff with wildlife movement as needed
- Assist other departments and complete special projects as requested
- Complete other duties as assigned or needed

The second shift is from 10:00 a.m. to 1:00 p.m.

This shift is critical for completing wellness checks on recovering animals in the outdoor flights and aviaries as well as exams on non-releasable and educational animals.

- Accept new arrivals from the public and check-in wildlife
- Use over-lapping half hour at 10:00 a.m. to conduct physicals or other procedures requiring two people
- Conduct the majority of well care exams on wildlife in outside enclosures
- Administer mid-day medications
- Clean and stock work areas
- Assist other departments and complete special projects as requested
- Complete other duties as assigned or needed

The third shift is from 1:00 p.m. to 4:00 p.m.

This shift is critical! Assessments arriving during the afternoon must be processed, treated, and set-up in enclosures. This avoids a "snowball effect" hitting the closing shift. Wellness checks will be completed on rehabilitating animals in the outdoor flights and aviaries as well as on non-releasable and educational animals

- Accept new arrivals from the public and check-in wildlife
- Conduct the majority of well care exams on wildlife in outside enclosures
- Administer mid-day medications
- Clean and stock work areas
- Assist other departments and complete special projects as requested
- Empty and refill foot baths. Clean containers as needed.
- Complete other duties as assigned or needed

The fourth shift is from 4:00 p.m. to 7:00 p.m.

The last shift of the day has a heavy medical care load and requires experienced staff. You may sometimes need to stay late if a critical animal is arriving.

- Administer twice-daily medications
- Provide evening feedings
- Accept new arrivals from the public and check-in wildlife
- Conduct well care exams on wildlife in outside enclosures
- Clean and stock work areas
- Assist other departments and complete special projects as requested
- Complete other duties as assigned or needed
- Close and lock-up center

Work Habits

Every Medical Service volunteer is assigned a shift. Learn the responsibilities for your shift. In addition, make sure you follow the important points listed below.

- **Be on time.** If you have been assigned the first shift of the day, you must arrive by 8:00 a.m. – and, yes, this does apply to you! The Hotline volunteers inform the public that they can drop-off wildlife at 8:00 a.m. and people often stop on their way to work in the morning. During the late summer, fall, and winter this means the first shifts must arrive early at the drop-off clinic in order to pick-up wildlife and still be at the facility by 8:00 a.m..

- **When you arrive, *get started*.** Wildlife will arrive constantly during the day. As soon as you arrive, jump in and begin. For example, morning medications must be given early enough in the day so that evening medications are administered with the correct time span in between. No matter what shift you have, if you delay starting your responsibilities, you are causing someone else later to work harder to catch up. Each shift has priorities and getting those out of the way early leaves you for the emergencies and extra duties that always arise.

- **Plan.** Allow yourself enough extra time at the end of your shift. This will always be needed to assess arriving birds and handle other unexpected issues that arise.

- **Be considerate.** Before you leave, take a few minutes to discuss any new cases with the person who is relieving you. If you are in the middle of helping with a procedure, stay until it is completed.

- **Honestly evaluate your situation.** If you are constantly having problems getting a substitute, if you find that your shift is not working for you, or if you find yourself unable to leave when you need to go, let us know. Perhaps timing is not right for you just now. We may be able to switch your day or time slot or, if things cannot be worked out, we can replace you with another volunteer until such time as your schedule changes. Liberty Wildlife must be able to depend on you. Wildlife is depending on us.

Substitutes

Everyone at some point will have a conflict with their scheduled time. Life does have a way of throwing the unexpected at us! There are several things to keep in mind:

- **Get a substitute.** If you have a conflict with your schedule, it is YOUR responsibility to make sure qualified personnel cover your shift. Liberty Wildlife, the animals, your fellow volunteers, and the public are relying on YOU to be there.

- **Be a substitute**. It's a fact that there will be a time when YOU will need a substitute, so try to help when you can. You can always offer to trade with someone rather than substituting outright if needed.

- **Be courteous**. Return all calls about substituting, even if the answer is no.

- **Start early**. As soon as you know you need a substitute, start calling. Call until you speak with someone. Do not rely on messages posted at Liberty Wildlife.

- **Get creative**! If you cannot locate a substitute, try to have someone trade with you. Maybe two different people can split your shift. One option might be to ask the person before you to stay a little later and ask the person after you to come in a little earlier.

- **Be prepared**. A list of substitutes will be given to you. Keep it on hand so you do not need to call the office for phone numbers. Notify the Program Coordinators of any changes in your availability, address, or phone number.

Vet Night

Each week, Medical Services personnel conduct a formal review of the status and treatment plans on the animals in intensive care at Liberty Wildlife. This activity is called Vet Night.

Each case is discussed including the current condition, treatment history, and prognosis. This is a “group-think” activity and learning opportunities abound!

Vet Night tasks are numerous and varied, with volunteers playing the part of a well-oiled machine in order to complete a large amount of work in a reasonable amount of time. Vet Night activities tend to begin whenever there may be a veterinarian available. Sometimes it is at 6:30 p.m. and last until about 10:00 p.m. There have been occasions when they have started as early as 10 a.m. or started as late as 8:30 p.m. The session may end by 10:00 p.m. or go as late as midnight. Because of the busy schedules of our Medical Services staff, it is often impossible to predict the timetable in advance, so patience and flexibility are necessary.

After training is completed, new volunteers will be invited to attend Vet Night on a pre-determined schedule that will be posted up on the medical cabinet. Please note: Attendees must be available to stay for the duration of the evening, including clean-up!

Safety

Your first concern while volunteering at Liberty Wildlife should be for your own personal safety. Do not attempt any action unless you are completely comfortable with the procedure and have been thoroughly trained.

Always take measures to protect your health.

Tetanus Vaccination

Make sure you are protected by a current tetanus vaccination. Contact your personal physician or local health care facility to determine if you are up-to-date. You must have a current tetanus vaccination to volunteer at the Liberty Wildlife facility.

Gloves

Whether you are handling an animal or simply cleaning up after one, gloves are a necessity. Always wear protective gloves when working with animals, their body fluids, or their enclosures.

- Latex gloves should be worn when cleaning cages and preparing food. Use them, they are a great first line of defense. These gloves will also protect other animals from conditions that might be contagious. Vinyl gloves are available for individuals with latex allergies.

- Small, leather work gloves come in handy when dealing with smaller raptors and medium-sized waterfowl.

- Heavy-duty leather gloves are also available. They are at least mid-forearm length and have as few seams as possible. You want the fit to be loose—the idea here is "function over fashion." A tight-fitting pair of gloves can easily be pierced by a talon or tooth. These large leather gloves work well for medium-to-large raptors, such as red-tailed hawks, Harris' hawks, and great horned owls.

- A third type of gloves is made especially for handling larger animals. Similar to the large leather gloves, these are even longer—extending almost to the shoulder—and have a thicker lining. If you are faced with ferruginous hawks or eagles you will be better protected. Even with the thick lining in these gloves it is a good idea to double-glove your palm with a small pair of leather work gloves. Canker gloves are also specified to be used with infected birds.

* • As a special note, gloves used for wildlife rehabilitation or rescue are dedicated to this purpose and should not be used in situations involving educational wildlife or with your domestic or exotic pets.

Eye Protection

Eye protection is extremely important. Safety glasses or goggles are a must when dealing with animals with sharps beaks or talons. Some waterfowl, such as herons, have long, pointed beaks which they use to stab prey or possible predators with deadly accuracy. The sharp talons on raptors can be a risk, too. Don't take a chance with unprotected eyes. Safety glasses and goggles will fit over normal eyeglasses.

Foot Wear

Wear closed-toed shoes when working in the outdoor enclosures.

Masks

Wear an appropriate mask if you have a respiratory condition or are sensitive to respiratory problems. This is particularly important when cleaning or when working with wildlife with contagious respiratory conditions or unknown conditions such as necropsy procedures.

Protective Clothing

You wouldn't go hiking in the desert without sturdy boots, comfortable clothing, and protection from the sun, would you? The same principal applies here! Clothing is important. Wear long pants to protect your legs. Protect your arms and torso, too. Also it's a good idea to keep an old shirt or coverall in your vehicle to protect your clothing if you take on an unusually dirty project.

Rabies Pre-exposure Vaccine

A current rabies pre-exposure vaccine and the necessary training on mammal handling and restraint are required to work with most mammals. There are no exceptions.

Some important safety points are listed below:

- Do not eat or have open beverages in animal areas
- Wash your hands regularly!
- Do not put markers, pencils, pens, or other objects in your mouth
- Thoroughly clean all work surfaces after medical procedures
- Thoroughly clean all work surfaces at the end of each shift

Lindsey Wildlife Museum

Basic Health and Safety For Wildlife Rehabilitators

Susan Heckly, 1999

Your health and safety should be your first priority when you are working with wildlife whether you rehabilitate at home or in a center. For many rehabilitators, thinking of yourself first is very difficult. Taking the steps needed to protect yourself from injury or illness is not selfish, but rather it is the best way to make sure you are able to continue to rehabilitate wildlife. Health and safety for wildlife rehabilitators are of utmost importance. This cannot be stressed too much.

There are two main areas of concern: injury prevention and infection control.

SAFETY

The animals we work with can be dangerous. Aside from the obviously dangerous large mammals and raptors, there are many less obvious threats from many other species. Protective gear such as leather gloves, goggles, and/or latex gloves are required for handling some animals and their bedding to prevent injury to yourself or the possibility of disease or parasite spread. Think about how an animal makes its living: is it a raptor that grasps and kills its prey? Is it a squirrel who can gnaw through walnut shells? Is it a great blue heron that spears fish with its bill? You should select protective gear based on what kind of damage an animal could do.

Gloves

Injuries seem to happen more often to the fingers, hands and arms than any other part of the body. Gloves act as a second layer of skin protecting hands from chemicals, biological agents, abrasions, lacerations and punctures. Latex or nitrile gloves can protect against microbial contamination and against some chemicals. Leather gloves can protect against scratches and some bites. Sometimes, however, gloves can give you a false sense of security. For instance, many species of squirrel can bite through the leather gloves right into your finger and great horned owls have been known to puncture leather welding gloves with ease. You will need to balance the need for heavy protective gloves with the need for good manual dexterity. Gloves that are sized correctly for your hand will give you more dexterity than gloves that are several sizes too large. There are specialty gloves: eagle gloves with long gauntlets and more protection, kevlar gloves that will prevent punctures from mammals.

Goggles

Eyes are a very vulnerable part of your body. You should wear goggles when working with birds with relatively long, pointed bills such as many sea- and

shorebirds. Some species such as herons and egrets also have long necks making very real the possibility that a bird could reach your face with its bill even when its body is at a distance. Other times that goggles or other protective eye wear should be worn include when going into an aviary or pen with free-flying birds and when there is a danger that something might be splashed in your face.

Masks

Contaminants and infectious agents such as *Chlamydia psittacii* and feather dander easily become airborne because of the particle size, activity of the animal, and cleaning methods. When inhaled, these can cause infection or lung damage. Masks (more properly called respirators) designed to prevent inhalation of particles should be worn especially when working with birds or their feces. If you are working in an area without heavy dust, any respirator rated for dust or mist should be adequate protection. Surgical masks were developed to prevent the exhalation of particles but their efficacy in preventing inhalation of particles is low and should not be used for protection of your lungs. Make sure the mask you are wearing fits correctly; follow the instructions on the package.

Aprons

Aprons, smocks or other protective clothing can protect your clothes and make it easier to change should you become contaminated with fecal material, blood or other contaminants. You can prevent the spread of disease from animal to animal by changing your protective clothing after working with ill animals.

Scents

When working with mammals, it may be advisable to use only unscented personal care products. These are anecdotal stories of pet mammals reacting badly to certain perfumes. Some perfumes are formulated to smell like musk or other animal products and these scents may trigger a reaction in some mammals.

Clothing/hair

Loose or frayed clothing, dangling ties and scarves, earrings or other loose jewelry, and rings may get tangled in a cage or snagged by an animal. Long hair should be tied back or otherwise controlled for the same reason. Wearing long pants, long sleeves and closed-toed shoes will protect your arms, legs and feet from possible scratches and some bites if you lose control of an animal during handling. Steel-toed shoes may be advisable when moving equipment or cages.

Vaccinations

Everyone working with animals should have a current tetanus shot. Tetanus can result from any scratch, puncture or bite wound that breaks the skin, whether the injury was from an animal or its cage. If working with rabies vector species, you should also have the rabies pre-exposure vaccine.

HYGIENE IS IMPORTANT

The simplest precaution you can take is to wash your hands. Even if you take no other precautions to protect yourself, appropriate hand washing will protect you from a myriad of diseases and will prevent the spread of many diseases and parasites from one patient to another.

When to wash

When should you wash your hands? A basic rule of thumb is that when working with wildlife, you can't wash you hands too often. The following are some instances when you should wash your hands:

Before and after handling any animal
After cleaning a cage
After handling dirty laundry
Before and after feeding baby animals
Before preparing food for an animal
Before eating or drinking anything
Before and after using the rest room
Before going home

What to use

What soap to use should be based on the degree and type of contamination as well as how germ-free you need to be for your procedure. Do you need to reduce the resident flora in addition to reducing the transient microorganisms you are carrying? In most cases, thorough washing with regular soap and plenty of water will be good enough. Soap works by suspending dirt, microorganisms and other contaminants that then can be flushed off by running water and the friction of rubbing your hands together. The Centers for Disease Control (CDC) is currently recommending that people use plain soap for most general patient care; it is adequate when the purpose of washing is to remove soil and transient organisms. For invasive procedures or when working with immunocompromised or neonatal patients, antimicrobial products can be used. Antimicrobial soaps work mechanically to flush away contaminants as well as chemically to reduce or kill microorganisms present. Some antimicrobial soaps have a residual effect, remaining active for a period of time after you have washed your hands. There are much antimicrobial soap on the market. You should work with your veterinarian to determine which product would be best for your situation.

How to wash

How you wash your hands may be as important as when you wash them and with what product. Basic hand washing techniques:

- Wet your hands with water.
- Lather your hands with enough soap to produce lather and a slippery

surface.

- Vigorously rub together all surfaces for at least 15 to 20 seconds*. More time may be necessary for particularly soiled hands or with a slow-acting antimicrobial soap.
- Pay special attention to the area around your fingernails or rings where microorganisms may adhere.
- Rinse thoroughly under running water.
- Dry with a paper towel. Use the paper towel to turn off the water faucet so you don't re-contaminate yourself.

* If you are using an antimicrobial soap, follow the directions from the manufacturer. Some soap must remain in contact with your skin for a longer time.

Even better protection for your hands than washing is wearing protective gloves, such as disposable latex or nitrile gloves. You can wash your gloves just as you would wash your hands between animals unless you use new gloves for each animal or activity. In fact, latex gloves are easier to wash than your hands because your hands have cracks, crevices and fingernails for germs to hide in. An important caveat with gloves, however, is that gloves can easily develop holes that allow contaminants to enter and the moist environment between your skin and the glove is ideal for microbial growth. Wash your hands before and after wearing gloves.

Zoonosis

People always ask, “Can I catch anything from these animals?” The answer is “Yes.” This is referred to as zoonosis or disease of animals that is transmissible to humans.

Zoonosis is definitely a concern to wildlife rehabilitators. Keep your personal physician advised of the work you do so that if you are ever ill he or she will know to consider zoonotic conditions. If you visit a physician that is not aware of your history be sure and inform him or her of the possibility of zoonotic diseases.

Read this section carefully. It contains articles on zoonosis and zoonotic diseases from several different sources.

For example, you will read about rabies, a deadly virus. A current rabies pre-exposure vaccine, necessary training on mammal handling and restraint, and authorization from the Medical Services Program Coordinators are required to work with mammals. There are no exceptions.

Always take precautions to avoid transmission of any of these diseases. Follow the proper safety procedures at all times.

Zoonoses: What You Don't Know Can Hurt You

By Linda Wolf, DVM
White Bear Lake, MN

When you first begin to drive a car, you don't just take the keys get into the vehicle, and go sixty-five miles an hour down the freeway. Driving has inherent dangers to both you and the others on the road. Without being given the proper instruction on defensive driving, the risks of injury are obviously increased. In driving, it makes a lot more sense to learn to prevent accidents from happening than to try to repair the injuries after they happen.

As a wildlife rehabilitator, you are automatically placed in a segment of the populations that is high risk of experiencing a zoonotic disease. A zoonosis, (plural – zoonoses), is an infection or infestation shared in nature by man acquired (transmitted) from an infected animal to man. In order to decrease the chanced of acquiring a zoonotic disease, wildlife rehabilitators should know the essential factors that enable a disease to pass to man, gain knowledge of the zoonotic diseases, and be constantly aware of the preventative measures that must be taken to break the passage of the disease from animal to man.

Essential Factors for Disease Transmission

There are six essential factors that need to be present for transmission of a disease. These include: 1. a causative agent, 2. a reservoir of the infectious agent, 3. a portal of exit, 4. transmission of that agent from the reservoir to the new host, 5. entry of the organism from reservoir to the new host, and 6. a susceptible host.

First, there must be a causative agent. This is the bacteria, virus, parasite, etc. that causes the disease. It is important to know what zoonotic diseases are prevalent in the animals to which you are exposed in the area where you reside. This knowledge is especially important in case where a rehabilitator experiences an illness and may have to inform his or her physician of zoonotic disease possibilities.

Second, there must be a reservoir. This is the natural habitat of the disease agent or its main residence in nature. The reservoir can be animate (i.e. skunk can be a

reservoir for rabies) or it can be inanimate (i.e., wet straw can be a reservoir for aspergillosis). Although it seems apparent that the best way to prevent zoonotic disease is to avoid the reservoirs, this obviously would be counter productive to wildlife rehabilitation, since almost every species with which we deal has the potential of being a reservoir.

Third, there must be an exit portal. This is the route by which an agent escapes form a live reservoir host. This can be a normal routed (respiratory, gastrointestinal secretions, urogenital), or abnormal (lesions).

Fourth, there must be a way for the causative agent to transfer from the reservoir to the host. This is its route of transmission. Transmission can be direct, (contact, injection, inhalation, ingestion), or indirect, (needs an agent for survival outside the host). Indirect transmission is by a vehicle or a vector. A vehicle is an inanimate object, (soil, air, water, etc.). A vector is an animate object which can be mechanical; (where the agent is just carried without changing form,), or it can be biological (where the agent undergoes a change during transmission). The method of transmission is perhaps the most important information to know if order to present disease spread. For example, if you know that a parasite is transferred to many by ingestion (e.g. roundworm eggs in the feces, then the way to prevent zoonotic roundworm infection would be by not ingesting feces.

The fifth factor is the entry of the organism into the new host, which is called the portal of entry. Types of entry portals include respiration (e.g. breathing in aspergillosis), ingestion, (swallowing roundworm eggs via fecal ingestion – we hope no one would intentionally do this but it is easily done unintentionally), lesions (e.g. saliva containing rabies virus via a cut in the skin). This is another area where preventative measures can make a tremendous difference.

Last, there must be a susceptible host. In this area, the way we can decrease our chances of disease is to increase our personal resistance. Here are primary resistance factors and secondary resistance factors. Some primary resistance factors include species type (here we really have no say in the after, intact skin (keeping the skin surface healthy and unbroken) and acquired immunity (vaccinations). Secondary resistance factors can include pathologic states, nutritional states, physiologic adaptations, sex, age, and occupation. As wildlife rehabilitators, we tend to ignore our own health and allow our resistance factors to fall. Most of us freely admit that the animals for which we care probably get better nutrition and care than we give ourselves, especially in the busy season.

It is almost impossible to have a thorough knowledge of every zoonotic disease. However, knowing the primary causative agents that you are likely to encounter (which animals are likely to be the carriers, and how he disease in transmitted), will increase our ability to interrupt the transmission of the disease and to safeguard yourself as much as possible from zoonoses.

Etiological Agents

The book *Zoonoses and Communicable Diseases Common to Man and Animal* by Pedro N. Acha and Boris Szyfres lists over two hundreds causative agents in zoonotic disease. Obviously, it is not possible to cover every etiological agent (any living or nonliving thing capable of causing a disease), in this article. Some of the more common agents in each category will be discussed. It is not as important that you know the exact agent as it is to start to understand the relationship between the agent and how it transfers to the new host (in this case as the wildlife rehabilitator). It is in this way that you will be able to assess the measures necessary to prevent the disease transmission. You will also notice that many of the clinical signs of these diseases in people can present with flu-like symptoms. This is where it becomes important to realize if there is a risk of exposure to a specific zoonotic disease and be able to inform your physician of any possibilities.

Bacterioses

Leptospirosis

This disease is caused by more than one hundred eighty known varieties of the spirochere bacterium *Leptospira* interogans. Its distribution is worldwide and it affects a wide variety of rodents and other wild animals. The causative agent (leptospires), are shed in the urine contaminating the environment. Bite transmission has been reported but is most likely occurred from urine contaminating the bite wound.

The disease in man normally has an incubation period of primarily one to two weeks, and the classic signs include sudden fever, headache, nausea, vomiting, diarrhea, and/or constipation.

Control measures include personal hygiene, protective clothes, and rodent proof structures.

Lyme Disease

The agent involved in Lyme disease is another spirochete, *Borrelia burgdorferi*. Once only of a concern on the east coast, its distribution has spread throughout the northeast, Midwest, pacific, and southern regions. Some of the reservoirs include white-tailed deer, white-footed mice, raccoons, and squirrels. Transmission is indirect by vector. The most common vector is the tick *Ixodes* dammini prevalent in the northeast and Midwest, *Ixodes pacificus* on the west coast and *ixodes scapularis* in the south and southwest. Research is also being done to verify whether the common “dog tick” *Dermacentor variabilis* has the ability of transference of *Borrelia*.

The clinical disease in man can very tremendously. A classic (but not always present) early symptom is a characteristic skin rash called erythema chronicum

migrans. This is a red circular patch varying in shape and size that appears usually three days to one month after the bite of an infected tick at the site of the bites. Some symptoms and signs may not appear until weeks, months or years after an infected tick bite: arthritis (especially in the knees,) nervous systems abnormalities (pain, facial, nerve, paralysis fever, stiff neck, and sever headaches, and irregularities of the heart rhythm.

Control measures consist of avoiding endemic areas and tick bites. Use of protective footwear, clothes, repellents, and control of ticks and fleas in the rehabilitation area and on the animal are imperative.

Salmonellosis
This is bacteria with over three hundred serotypes and has a worldwide distribution. Its primary reservoir of concern in wildlife has usually been rodents and cold-blooded animals (turtles). The transmission of bacteria is normally by consuming contaminated food or ingestion via a contaminated environment. This is often a fecal – oral route.

Perhaps the most widespread zoonosis in the world, the disease in man is characterized by a six to seventy – two hour incubation period after ingestion of infected material. Clinical signs of the disease in man include abdominal pain, nausea, vomiting, and diarrhea. Although the course of the disease is usually benign and clinical recuperation starts in about two to four days, dehydration can be serious. Personal hygiene and protective clothing, (especially gloves), are the best preventative measures.

Mycoses

Aspergillosis
Aspergillosis is caused by the fungus *Aspergillus fumigatus* and related organisms. It is ubiquitous in a wide variety of birds and mammals. It is particularly common n waterfowl and other aquatic birds, casing trauma to the respiratory system. The transmission occurs when an infected animal contaminates the environment. Aspergillus organisms will grow in or on a variety of organic matter including decaying vegetation. The primary route of infection is by inhalation of airborne spores from the environment.

Man has natural resistance to this organism. Germination of the spores in the human system can more readily occur when there are exceedingly numbers of atmospheric spores in the environment or when the person is debilitated, immunosupressed, or on prolonged drug treatment. Respiratory symptoms are the most common clinical sign.

Control measures include maintaining good ventilation, avoiding overcrowding of animals, and keeping the environment clean and dry. Masks can be used to

aggressively decrease the chance of exposure.

Dermatophytosis (Ringworm)
Several species of *Microsporum* and *Trichophyton* are primary causative agents. Dermatophytes, once considered to be imperfect fungi, are now classified as Ascomycetes. Distribution is worldwide and the main reservoirs are rodents, canines, and felines. Transmission is by direct contact with an infected animal or indirectly by contact with spores on the infected hairs of the dermal (skin) scales that are shed by an infected animal

The disease in man is superficial infection on the kerantinized parts of the body (skin, hair, and nails). Signs include inflammation and irritation. Often the lesions tend to be annular and the borders are reddish and sometimes raised. Avoid contact with infected animals in the obvious control method. However, since we must work with and treat infected animals, the first ting that must be done is to control the infection in the animal and to avoid direct contact by using protective clothing and gloves.

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Chlamydioses

Chlamydiosis
This disease, often referred to as Psittacosis or Ornithosis, is caused by the agent *Chlamydia psittaci* (transmitted from birds and mammals to man): It is important to note that this is not agent C. *trachomatic* (the human to human pathogen). With worldwide distribution the primary reservoirs we deal with are pigeons, ducks and psittacines. Transmission occurs by inhaling the airborne agent in a contaminated environment.

Chlamydiosis has an incubation period usually of one to two weeks. Mild forms of chlamydiosis are often confused with common respiratory illness and can often go undiagnosed. Clinical signs can include sudden onset of fever, chills, sweating, aches, loss of appetite and headaches. Some cases produce pneumonia-like symptoms. Since early treatment is important in shortening he illness and reducing symptoms. It is important to inform your physician of the likelihood of exposure.

Control measure includes masks, protective clothing, proper ventilation and thorough area disinfecting.

Viruses

Rabies

One of the oldest of reported diseases, rabies is of major concern in the field of wildlife rehabilitation. The rabies virus is a rhabdovirus: Although it can be quickly inactivated by sunlight, drying, and common chemical disinfectants, it is not a disease to be treated without extreme respect. Even though our major reservoir focus has been on species such as foxes, skunks, raccoons, bats, and coyotes, all warm-blooded animals should be considered to have the capability of being reservoirs. Certain species (opossum, birds) are thought to be too resistant to be of major import. Others (rodents, lagamorphs, deer) are rarely infected. This is possibly a result of their specific habits. Size or resistance factors. Transmission most often occurs when the virus in the saliva of an infected animal comes in contact with nerve tissues of susceptible host, via a bite. However, transmission by airborne passage (in bat caves), and by an owl (thought to have occurred by an owl who caught rabies via a infected animal and had blood on its talons), has been noted.

In animals, the primary clinical picture is one of abnormal behavior or altered disposition and progressive paresis. Often loss of fear, aggressiveness, and "friendliness" or in coordination can be observed. However, in wildlife, there is not an exact duration of onset from infection and many may be carriers of the virus for extended periods of time without any clinical signs being present. \

Rabies is of extreme importance in human public health. It carries a high mortality rate, (one hundreds percent), substantial mental and emotional impact and economic loss. In man, the incubation period is normally two to eight weeks, but there have been cases where the incubation was from ten days to over a year. The disease usually begins with a feeling of anxiety, small increase in body temperature, malaise, and sensory changes. An excitation phase follows, with sensitivity to light and sounds, dilation of the pupils and an increase of salivation. Muscle spasms, swallowing dysfunction, generalized convulsions, and paralysis are often signs receding death.

Prevention is of utmost importance. Avoiding contact with the rabies virus is the obvious best means to prevention. The knowledge of proper restraint techniques, preventive clothing (gloves etc), and recognition of problem species and conscious acknowledgement of the seriousness off the problem are extremely important in rabies prevention. Prophylaxis with pre exposure rabies vaccination should be considered highly desirable if not mandatory for dealing with high-risk animals. Preexposure vaccinations are not without potential risks Especially in people who are immunosupressed or compromised, pregnant or in diseased state) so the procedure should always be discussed with a knowledgeable physician. If a person does become exposes, they should be allowed to bleed and then scrubbed thoroughly. The animals should be identified and submitted for antibody testing.

And a physician should be consulted. Contrary to reports being distributed in some areas, there are no established quarantine time s for wildlife.

Hantavirus

Hantavirus was identified as the cause of a mysterious disease outbreak in the southwestern United States affecting a number of Navajo Indians. The area has since grown, and in 1993 there were fifty-three cases reported in fourteen states. Rodents are the reservoir with the primary host believed to be the deer mouse and the vole. The virus is transmitted via their saliva, urine and feces. Exposure is most likely to occur when dried materials contaminated with rodent excreta are disturbed and inhaled as dust particles, directly into broken skin, or by ingesting contaminated food or water, or by a bite.

Prevention can best be accomplished by reducing the rodent's population, thereby reducing the amount of contaminated materials present. This can be accomplished by keeping food and garbage covered and stored in rodent proof containers, and by eliminating rodents in your centers. Other protective measures include using protective gloves and masks when cleaning contaminated areas or when handling species at risk.

Parasites

Visceral Larva Migrans
The most infamous larva migrans agent in wild life rehabilitation has become the common large roundworm parasite in raccoons, *Baylisascaris procyonis*. However, it is important to realize that other carnivore ascarids can cause this same condition. *Baylisascaris procyonis, Toxacara canis* (dogs and wild canids), *Toxacara cati* (cats and wild felids), and *Baylisascaris columnaris* (skunks) are some examples of ascarids that are capable of infiltrating the human system and causing damage. Human beings become infected by accidentally ingesting infective eggs from raccoon, (fox skink, dog, cat, etc.) feces, contaminated soil, water, fomites, or via contaminated hands. The ingested eggs hatch and become larvae that penetrate the mucus and migrate via the liver to various body organs.

The clinical signs in man are caused by the migration of large numbers of larvae through various body tissues and the resultant physical changes. Clinical manifestations depend on the infective species, the number of larvae, and the route of migration and anatomic location affected, A low number of larvae may present with non-specific or no signs, whereas a high number of larvae may show ocular (eye) problems, central nervous system disease, liver and / or lung damage.

Prevention seems rather simple in this case: do not ingest feces. However, it is complicated by the fact that ascarids nematode eggs are extremely resistant. Primary control measure to decreases the risk of contamination consists of routine fecal testing and worming procedures, prompt removal and proper disposed of feces, glove and mask use, strict personal hygiene and elimination of human personnel food and drink consumption in work areas.

Hydatidosis (Echinococcosis, Hydatid Disease
Alveolar hydatid disease is an infection with the larval form of the *Echinococcus multilocularis* parasite, a species of tapeworm found in wild canids. Once confined to the Alaska coast and sparsely populated areas of the North Central states, it has now been identified in the Dakotas, the Central Plains, the Midwest, and as far south as the Carolinas. Natural reservoirs include the fox, coyote or various rodents. Transmission is via accidental ingestion of infective *E. multilocularis* eggs passed in feces.

In humans, these eggs hatch and travel into the hepatic portal system (liver), where they can produce parasite tumors. These cysts can expand to surrounding tissue. Clinical signs resembling liver cancer and cirrhosis usually do not appear until the hydatid cyst has continued for several years and the damage has become extensive.

Prevention is accomplished by using precaution through personal protection and careful hygiene to avoid hand to mouth transfer of eggs. Routine fecal exams

and worming of all animals should be done to reduce the likelihood of area contamination as well as prompt removal and disposal of fecal matter.

Sarcoptes (Zoonotic Scabies: Sarcotic Mange)
The agent of human scabies is the mite *Sarcoptes scabiei. Notoedres cati*, the agent of head scabies in cats, occasionally causes temporary dermatitis in humans. Each animal species is a reservoir of the mite that attacks its own kind, but cross transmission occurs occasionally between species. One of the main sources of zoonotic scabies is the canine family. The mite transmitted by close contact with animals and contaminated objects

In man, the disease presents itself by skin irritation and pruritis. If the disease is caused by animal mites, it is usually benign and the infection is superficial with possible lesions and vesicles. An intense allergic sensitization with the appearance of vesicles can also occur. Excoriations are frequent. In humans infected with animal *S. scabiei* the parasites either do not reproduce at all or do so only for a short time, thus the infection often heals by itself within three weeks.

The best control is to treat affected animals and clean the environment. Protective clothing, including glove use, is highly effective.

Prevention

As stated previously, is not possible, in this article to list all the zoonoses that exist. What is important is for the wildlife rehabilitators to be aware of the potential zoonotic disease they may encounter, to know the way that transmission occurs, and to be constantly aware of the preventative measures that can be taken to reduce the likelihood of exposure.

Prevention is the key!

Prevention means inhibiting the introduction of disease into an area, herd or individual. When dealing
With infectious diseases, the essential object is to prevent contact between the causative agent and the susceptible host. One way this could be done is to isolate the susceptible host. There are three main areas on which to focus.

1. *Neutralize the reservoir.* This can be accomplished by methods such as proper waste control, conscientious use of insecticides, and proper disinfection methods.
2. *Decrease the contact potential.* Methods include providing adequate ventilation, use of gloves, masks, and other protective clothing, employing proper hygiene.
3. *Increase host resistance.* Vaccinations of high risk groups, proper wound

treatment, better nutrition, and on overall better health status are all areas that will help decrease the chance of infection.

This article was not meant to scare you away from wildlife rehabilitation. Hopefully, it has made you aware that, with properly trained personnel following proper methods and procedures, wildlife rehabilitation efforts can be done safely as well as efficiently.

The following is an introduction to some of the more common Zoonotic Diseases. It is by no means a complete list.

Zoonotic Diseases

Zoonotic diseases are those diseases that can be transmitted from animals to humans. These diseases are of particular interest to wildlife rehabilitators because of the close contract we have with a large number of wildlife species. Your main concern with these diseases should be how to protect yourself. If you do become ill after handling animals, make sure you mention your contact with wildlife when you visit your physician.

Aspergillosis

Aspergillosis is caused by a fungus *(Aspergillus fumigatus*) that is ubiquitous to our environment. It is an opportunistic disease that flourishes when an animal is under stress, such as in captivity. It is common in raptors and waterfowl. Birds should be housed in areas with good ventilation. Straw should never be used in birds' housing; the fungus can thrive in it when wet. Moldy grains and food can also harbor the fungus. Birds with this disease shed the virus when they exhale, but most healthy people have no trouble resisting the infection. Wearing masks will decreases the risk of exposure. Anyone with a compromised immune system, debilitated by illness or long-term antibiotic therapy needs to take extra precautions to reduce the chance of infection.

Raccoon roundworm

Baylisascaris procyonis, a roundworm, is carried by raccoons. Up to a million eggs are shed daily in their feces and can infect other animals and humans if the eggs are ingested. The larva of the roundworm migrates though body tissues, causing damage to the eyes; brain or other tissue and can cause death. Rehabilitators should take extra care when working with raccoons. Always wear gloves when handling feces, food dishes and bedding, and when cleaning their cages. Consider deworming raccoons while they are under your care for the safety of the caregivers.

Hantavirus

Hantavirus was recently identified as the cause of illness when there was an outbreak in the southwestern United States. Rodents are the main reservoir of the disease. While the deer mouse is identified as being the primary host, other rodents have been shown to be carriers. Exposure to the virus is most likely to occur when dried urine and fecal material is disturbed and inhaled as dust particles. Other routes of transmission are through broken skin, a bite from an infected animal or ingestion of contaminated food or water. To prevent Hantavirus infection when caring for wild rodents, use protective gear (masks and gloves) and use wet cleaning methods to avoid aerosolizing the potentially infective particles. Reducing rodent populations around dwellings and animal care facilities will also reduce the risk of infection.

Echinococcosis

Echinococcosis, or hydatid disease is infection with the larval stage of tapeworms belonging the genus *Echinococcus*. Cysts can develop in the liver, spleen, nervous tissue or bone. The route of infection is from ingesting the eggs of the tapeworm, usually by hand to mouth after contact with an infected animal (most commonly canids), but also from substances contaminated by infected feces. Flies can also disperse the tapeworm eggs after they feed on infected feces. *Echinococcus granulosus* is the most common and widespread species. A hydatid cyst enlarges slowly but may rupture causing shock and may cause secondary cysts to develop. The wild animal hosts include foxes, coyotes, deer mice and voles. Rehabilitators should take extra care when working with these species. Always wear gloves when handling feces, food dishes and bedding, and when cleaning their cages.

Leptospirosis

Leptospirosis can affect most species of warm-blooded animals. Because the infective organisms survive in water for extended periods, transmission is often waterborne. Infection is commonly acquired by contact of skin or mucous membrane with urine or by ingesting urine contaminated feed or water. Wild animals that commonly carry this disease include opossums, rodents (especially roof rats) and feral cats, but can also be found in foxes and was diagnosed in black tailed deer fawns in 1998. The common symptoms in humans are fever, headaches, rash, myalgia, and malaise. Prevention should center on personal hygiene and protective clothing.

The following is an introduction to some of the more common zoonotic diseases. It is by no means a complete list.

Rabies

Rabies is caused by a virus. All mammals can transmit the disease, but it is rare in rodents, lagomorphs and opossums. This is a fatal disease with no cure. Symptoms include neurological symptoms, disposition changes, salivation, and voice changes. In wildlife species there is not a well-defined incubation period and many animals may be carriers of the virus for an extended time before showing symptoms. The virus is present in saliva, so bites are the most common mode of transmission, but any breaks in your skin can also allow the virus to enter. The best way to avoid contracting rabies is to avoid contact with the virus through use of protective clothing and proper restraint techniques. Anyone working with rabies vector species should receive a pre-exposure rabies vaccination series and follow that up with a booster or a titer check every two years. If a person is exposed to the virus (even one with pre-exposure vaccine), the animal should be submitted for antibody testing and post exposure vaccine given.

Plague

Plague, found in the Western part of Canada, United States and Mexico, is an infectious disease caused by a bacterium (*Yersinia pestis*). Animal hosts include any mammal that has fleas, most commonly rodents and lagomorphs. Plague is transmitted by infected fleas or a bite from an infected animal. All wild mammals should be checked and treated for fleas before further care. The incubation period is 2-6 days; initial symptoms include fever, chills, muscle aches, a feeling of weakness and swollen and tender lymph nodes. Plague is curable when diagnosed early.

Lyme disease

Lyme disease is caused by a spirochete, *Borrelia burgdorferi*. Transmission is through a tick bite; several species of ticks can be infective. It is carried by a wide range of wild mammals, but primarily deer, mice, wood rats, raccoons, and squirrels. All wild mammals should be checked and treated for ticks before further care. The incubation period and symptoms are variable. A classic, early symptom is bulls-eye rash at the bite location (but not always present), and later arthritis and neurological abnormalities.

Salmonellosis

Salmonellosis is caused by bacteria that can be carried by most animals including, mammals, birds, reptiles, amphibians and fish. Transmission to humans is by a fecal-oral route when food or water is contaminated by droppings. Protective clothing (gloves) and attention to hygiene are the best preventative measures. At

the very least, wash your hands after handling any animal. Incubation is 6-72 hours; clinical signs include abdominal pain, diarrhea, vomiting and fever.

Chlamydiosis

Ornithosis (also called psittacosis or Ornithosis) is caused by a bacterium (*Chlamydia psittaci*) carried by a wide range of birds including psittacines, pigeons, raptors, and ducks. One main route of transmission is by inhaling dried feces that become airborne. It is important to avoid build-up of feces by regular (daily) cleaning of birdcages and aviaries. Wearing masks and protective clothing, proper ventilation and frequent disinfection are good preventative measure incubation in humans is 4- 15 days; symptoms include fever, chills, headaches, a dry unproductive cough and pneumonia.

Tularemia

Tularemia (also called rabbit fever) affects a large number of vertebrate and invertebrate species. It is transmitted by direct and indirect means, Including through tick bites, scratches and contaminated fluids splashed on mucous membranes. The North American wild mammals most often associated with tularemia infection in humans are wild rabbits, hares, beavers, muskrats, and voles. Symptoms begin with a lesion at the site of entry of the bacteria, followed by fever, chills, muscular pains, headaches and vomiting.

CONCLUSION

Personal health and safety do matter for all wildlife rehabilitators. Wildlife rehabilitators need to be as progressive in protecting ourselves as we are in providing the best care to the wildlife entrusted to us.

The most important thing to remember is to use common sense and don't take shortcuts around safety. If you do not feel comfortable doing something, trust your intuition. Get help from someone else or find another way to do the task so you can do it safely. We need to make sure we will be able to rehabilitate wildlife tomorrow.

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Rabies in Wildlife

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Rabies is a zoonotic viral disease, which has been recorded for over 4,000 years. Even today, in some parts of the world rabies is responsible for thousands of human deaths annually. In the U.S. there are on average two deaths per year, however millions of dollars are spent annually on post-exposure treatment.

While domestic dogs used to be the principal rabies vector in this country, today various wild species in different parts of the country are much more commonly affected. The domestic cat has replaced the dog as the most commonly affected domestic specie, but over 80% of rabies cases occur in wildlife. Since wildlife rehabilitators may come in contact with rabid or potentially rabid species and are often called upon by private citizens for advice in this area. It is important that they understand this disease.

Unfortunately there is a lot of misinformation, confusion, and gaps in our scientific knowledge, which can create uncomfortable situations when dealing with this problem.

While all mammals are susceptible to this disease the four most commonly affected species in the country are the raccoon, skunk, bat, and red fox. This virus commonly found in these species can be differentiated by special laboratory techniques and does behave differently in each specie. The disease, rabies, has never been diagnosed in birds or reptiles, and these animals are not considered to play a role in its transmission. The skunk was the principal rabies vector until 1991 when it was replaced by the raccoon.

The skunk is found through out the country and in the primary vector of rabies in the Midwest and the West. Fox rabies is the least common of the four typ0es in this country, primarily seen in the Northeast. The red fox is the specie most frequently affected and it is an important rabies vector in Europe. Bat rabies

is ubiquitous and has been determined to be the cause in the majority of the recent human cases in the U.S., although a history of exposure was not always determined. The big concern currently is with the epizootic of raccoon rabies in the Middle Atlantic states which has spread into New York, New Jersey, and New England. The extension of this epizootic is largely responsible for the 43 % increase in the number of reported cases of animal rabies in the U.S. from 1990 (4,881) to 1991 (6,975). Because this area is so densely populated there is a greater risk of contact between affected species and domestic pets and their owners.

The best news about rabies is that it is a relatively difficult disease to contract. The probability of a person contracting rabies from an animal with confirmed rabies varies from less than 1 percent for contamination of minor wounds to more than 80 percent for severe bites by wolves. The bad news is that the disease is 100% fatal in an un-treated person. There is some evidence to suggest that wild species may become immune to the natural infection.

One of the common questions concerning rabies involves exposure. Exposure to rabies is defined as an animal bite, scratch or contamination of mucus membranes or un-intact skin by saliva or nervous tissue. The virus is most commonly spread in the saliva as the result of an animal bite. Public health laboratories may be reluctant to test a suspect animal unless there has been human exposure due to the cost involved.

Rabies may also be spread across the placenta or through the mammary gland. In this way immature animals will become infected. These animals may be presented to rehabilitators as orphans and subsequently exhibit clinical signs. Such a case recently occurred in a five month old raccoon being raised in Virginia Beach, Virginia. There is a definite risk involved hand raising high risk species in the midst of an epizootic.

One of the principal areas of confusion about this disease concerns its incubation period, the time period between when the virus enters the animal and when signs of disease are produced. The incubation period varies from 9 days to greater than one year depending on the virus strain, host species, dosage and the site of inoculation. An infected animal is usually not shedding the virus until late in the course of the disease. However, bats may shed the virus for weeks without ever showing signs of illness. Thus the quarantine and observation of wild rabies suspects is not very effective and is only practiced with domestic dogs and cats where we know that if they are shedding the virus they will show clinical signs within 10 days.

Adding to the confusion about this disease is the variety of clinical signs seen. In “furious” rabies aggression in the most notable sign. Affected animals will attack on-prey species such as humans, pets, and livestock. In the “dumb” form the animal will be lethargic often exhibition a staring expression and may look like a

sick animal with any number of different diseases. Paralysis and convulsions can be seen in either form of the disease. Canine distemper infection in foxes, skunks, and raccoons can closely resemble rabies. Rabid animals may be presented due to injuries caused by automobiles or other animals. Although rabies is commonly seen in the aforementioned species it has been reported in such diverse species as squirrels, groundhogs, beaver, white tailed deer, opossum, otter bobcats, and coyotes among others. This "spillover" into other species is especially common during epizootics. Any wild mammal, which is not acting normal or is exhibiting other representative clinical signs, should be considered a rabies suspect until proven otherwise. This is particularly important when advising citizens over the telephone and when handling these animals in rehabilitation setting.

It is essential that people working with wild mammals obtain pre-exposure rabies vaccinations. They should seek advice from their local or state public health department concerning vaccinations, boosters, and the monitoring of their titers.

The most accurate method to diagnose rabies in an animal is immunflourescent antibody (IFA) testing of brain tissue. This is a rapid test which usually performed by public health laboratories. It is best if the brain is fresh or cooled, not frozen. This test cannot be performed if the brain has been formalinized. Another procedure which may be done is to look for Negri bodies, but they are only present in 75 to 80 % of infected brains. A mouse inoculation test is run if there has been human exposure and the IFA test is negative. The results of this test take up to 3 weeks. All of the above tests are run on brain tissue from the dead animal. There are some IFA tests which can be run on samples from the live animal but they have not proven as accurate as the brain tests and are not routinely used.

There is now an oral rabies vaccine approved for use in wildlife. Raboral V-RG © (Rhone Merieux, Athens, GA) has been shown to be safe and effective in trials in Virginia and Pennsylvania. However there is no evidence to prove that the existing killed, intramuscular and subcutaneous, rabies vaccines approved for use in dog and cats, are effective in wildlife. While some work has been done to show that they will produce an antibody response in some zoo species, no challenge studies or duration of immunity research has been done.

There has been a lot of talk about controlling the spread of the rabies virus which has moved from Virginia to Massachusetts in 12 years. In 1991, 3, 079 cases of rabies in raccoons were reported, the largest number reported in the history of animal surveillance in the U.S. There were 1, 030 animals confirmed rabies positive in New York State in 1991 with 66% of the positives in raccoons.

While it may be possible to eradicate wildlife rabies in t his country, it is important that control measure be developed. As wildlife rehabilitators we need to understand this disease and assist in the control measures. It is important that we don't let our emotions interfere with our responsibilities to the ecosystem.

We also need to be able to provide accurate scientific advice to the public. There is also no reason to assume that wildlife rehabilitators may not be held legally accountable for the professional advice given to the general public.

Dr. Stuart Porter is a member of the NWRA Board of Directors and one of its Vice Presidents. He is the co-founder and former Director of Veterinary Services of the Wildlife Center of Virginia. He is also Assistant Professor of Animal Technology at Blue Ridge Community College, VA.

The Board of Directors of the NWRA is concerned about the health risks to rescuers and rehabilitators who handle high risk rabies vectors in the midst of a rabies epizootic. Since these species often do not exhibit obvious clinical signs and since non-bite rabies transmissions is possible, every wildlife rehabilitator in these areas must decide on a safe and humane policy towards these species. The Board of Directors of NWRA does not recommend the treatment of housing and translocation of high risk rabies vectors in the midst of a rabies epizootic. State wildlife agencies and public health departments should be consulted and their regulations should be respected.

Rabies Shot

Maricopa County Department of Public Health
Preventative Medical Services
International Travel Immunizations

1825 East Roosevelt Street, Phoenix
On the corner of 18th Street and Roosevelt

Pre-exposure rabies shots
Shots one and two are one week apart
Shots two and three are two or three weeks apart

Call to make an appointment (602) 506-6068 and cost

Wildlife Protocols

Protocols are standard methods of treatment, care, and action that have been established for many conditions or animals you will see at Liberty Wildlife. These apply to incoming wildlife, active rehabilitating animals, non-releasable animals, and educational wildlife. Protocols also specify who, how, and when volunteers or staff can interact with wildlife.

Details on specific protocols will be discussed throughout your training period. Follow these procedures precisely. Protocols are established for your protection and for that of your fellow volunteers as well as for the protection, care, and well-being of the animals.

Protocol Overview

- **Interacting With Wildlife**
  People can unintentionally have a detrimental effect on wildlife. This is the key to our policy on interacting with wildlife. This policy promotes respect and understanding for wildlife and focuses on our ability to retain the wild nature of these animals.

- **Death and Euthanasia**
  Discussion of Liberty Wildlife's philosophy on this difficult topic.

- **Working With The Public**
  Yes, there is a standard for working with people, too!

- **Biosecurity**
  The property at Liberty Wildlife is divided into two sections which separate the rehabilitation wildlife from the education animals. This offers protection for the education animals from possible diseases of incoming ill wildlife. Foot baths are placed around the property to clean feet before entering critical areas. When you see a foot bath, use it! Foot baths must be refilled daily and kept covered at night when not in use.

- **Avian Protocol**
  The avian protocols are detailed throughout the Medical Services Training Program and can be found in Liberty Wildlife's Medical Reference Guide.

• Mammal Protocol
People are mammals too, and therefore are susceptible to many conditions that affect wildlife mammals. Care must be taken when working with mammals to protect yourself and others. You must have proper training and authorization to work with mammals. A separate protocol has been established for bats.

• Bat Protocol
Do not handle or touch bats or their containers, even if the animal has died. A pre-exposure rabies vaccine, training, and authorization are required to treat or provide daily care and food for bats. Special follow-up with the public is required on all bat arrivals.

• Reptile Protocol
Do not handle or touch reptiles or their containers. Reptiles are a diverse group and "designer" breeding sometimes makes identification difficult. Know what you have before proceeding! Venomous reptiles have their own protocol.

• Venomous reptiles
Do not handle or touch venomous reptiles or their containers, even if they are dead. Medical Services veterinarians, Program Coordinators, and specially authorized and trained staff will assess and treat venomous reptiles. They will also provide daily care and food. Remember, venomous reptiles can be a danger even after they are dead.

Interacting With Wildlife

It is crucial that each member of Liberty Wildlife understands the effect that human contact or even human proximity has on wildlife.

Wild animals do not want to be around people. If you approach them in the wild, they will usually retreat to a safe distance. Being held by a human is very stressful for a wild animal. *They do not understand that you are trying to help*. Keep that in mind at all times. Keep any contact short, concise, and as low-stress as possible.

Liberty Wildlife has policies directing contact with wildlife. These guidelines have been established for the best interest of the animals. *If you feel the need to "connect" with animals like you would a pet, please find an organization that will benefit from such behavior such as the ASPCA or the Humane Society.*

Carefully review these points to remember:

- When you arrive for your shift, do not peek in bins, cages, or incubators. A large face peering in at a wild animal is stressful. Read the notes on the cages instead of looking inside at the animal.

- Do not give names to the rehabilitating wildlife, either in intensive care or in the outside enclosures. Liberty Wildlife's Education group goes to great efforts to explain to the public that wild animals are not pets. We need to support that philosophy within our organization at all times. Also, it makes it even more difficult for volunteers to handle the death or euthanizing of an animal that has been "named."

- Nurturing vs. caring. As caregivers of wildlife we are put in the unique position of caring for something that which should not tolerate or accept us. *Do not pet or unnecessarily handle animals that are brought into Liberty Wildlife*. When animals have conditions that make them seem tolerant such as imprinting, habituation, or blindness, they must still be respected. Do not hold wildlife (of any kind) unless necessary for a procedure. Do not allow an animal to stand or perch on you. Of course, we do not pet or kiss a wild animal or attempt any of the other interactions you might with a pet.

- To further reduce potential stress for wildlife, please keep conversations and noise to a minimum in the Intensive Care and

Orphan Care areas. This is particularly important during the spring when there is a danger of young animals imprinting on people.

• Wildlife that is brought into Liberty Wildlife must stay at the facility. *Bringing animals home, is not permitted*. Native wildlife is protected under Federal and State regulations and cannot be kept at your home. Liberty Wildlife holds Federal and State permits allowing the treatment and holding of these animals. Non-releasable animals are placed with approved facilities that have obtained the necessary Federal and State permits and only after approval from these same agencies. Even non-native animals that occasionally arrive must not be taken from the facility without specific authorization from the Medical Services Program Coordinators. This also applies to animals that have been donated to Liberty Wildlife as food. If you have any questions regarding this policy, discuss them with the Program Coordinators.

Death and Euthansia

Death

The death of an animal is by far the most difficult experience you will encounter in wildlife rehabilitation. It is important to understand that death and dying are a very real part of any hospital care.

There will be animals that fight hard to stay alive. There will be animals that have lost their will to live. There will be animals that you will work very hard to keep alive—for days, weeks, or even months—that ultimately won't make it.

As caregivers, we are not exempt from grieving for the loss of an animal. Yet, even in the midst of the most heart-wrenching experiences, there are a few things you can keep in mind to help. The efforts of you and other volunteers have allowed this animal to end its life in a safe, protected environment. In death this animal is now free of any stress, pain, or suffering.

Euthanasia

Euthanizing an animal is a decision that is never made lightly. As difficult as euthanasia is for everyone who has worked to help save the animal, sometimes it is the kindest thing we can do.

The main factors in the decision to euthanize an animal are its pain or suffering and its quality of life. For example, if a bird's wing is severely injured at the shoulder and needs to be amputated, the bird may lose it's entire wing. Loss of an entire wing presents serious balancing problems for a bird. Jumping from perch to perch is a tremendous challenge, often resulting in falls which cause further injury. One-winged birds can find it difficult to right themselves.

There are other conditions to consider in determining quality of life. Just the fact that it is "captive" can be stressful for a wild animal—there are some that never adjust to their new environment no matter how accommodating the structure has been designed. Also, federal or state laws may restrict certain conditions in birds used for educational displays. As you can see, there are many issues that are taken into consideration when making euthanasia decisions.

The education animals at Liberty Wildlife are non-releasable and serve as ambassadors for their species in the hope that they will help wildlife through education. We strive to make their conditions as safe and comfortable as possible, although spending their life in captivity is far from ideal. There will be times that the physical or mental condition of an education animal change and quality-of-life issues become a serious concern. Euthanasia may be the only humane answer. Thinking of the animal's release from pain and suffering, or from a lifetime of captivity may help you to balance the sadness of the moment.

It is difficult to make the decision to euthanize an animal. Again, these decisions are never made lightly.

Euthanasia, The Other Release

By Erica Miller, DVM
Newark, DE

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(Greek: eu = good, thanatos = death)
1. an easy or painless death. 2. the deliberate ending of a life of an individual suffering from an incurable and/or painful disease.

Those are the literal and dictionary meanings, but what euthanasia means to most of us: 3. the most difficult decision we have to make. No matter what the situation; the act of performing euthanasia on a wild animal involves emotions. While we can’t remove the emotion, we can develop guidelines, which will help make he actual decision a little easier and hopefully remove some of the doubt.

First, we need to understand <u>why</u> we should perform euthanasia, and then we will consider <u>when</u> or in which instances euthanasia is our best course of action.

We can all agree that the majority of our patients are received in our care because they have been impacted by humans, either by directly injuring or disturbing the animal, or by damaging or disturbing the animal’s environment. Because human actions have interfered with the animals’ right to live wild, rehabilitators function to fulfill their right to be humanely treated. That is the essence of the rehabilitator’s role. However, we must remember that a key term here is the word “humanely”. We also fulfill the animals’ right to receive euthanasia if the act is more humane than attempting treatment.

The animal with a terminal illness or fatal injury deserves the best treatment we can provide. We have no right prolonging that animal’s pain or discomfort by attempting other treatment or even by allowing the animal to die without our assistance. As Kay McKeever puts it so well, we need to think of euthanasia as “the ultimate GIFT of mercy to a wild creature doomed by its injuries”.

But what about animals which don't appear to be suffering? Animals which we could help over a long period of time? Animals which might fully recover from their illness or injury? How do we determine when to perform euthanasia and when to attempt treatment? How much is too much?

I can't begin to provide answers for every wildlife case we receive, but I would like to provide some guidelines; some are obvious, others may just be something to think about.

If an animal cannot be returned to a normal life in the wild, the only options we have for it are a life in captivity, or euthanasia. If we opt for a captive life, we must be certain that we have just cause for keeping the animal: for use in education, as a surrogate parent, or in a breeding program; and that the animal can be kept in a situation where it has adequate caging with proper stimulation, correct diet, minimal stress, and any other factors we can contribute to provide the animal with a quality life.

So, first we need to determine if the animal can be released in a condition which will allow it to have a normal life in the wild, then we need to determine if we can provide it with a quality captive life or if we should provide it with a humane death. Above all else, when making decisions about an animal's life, we need to remember that these are wild lives, designed physically and mentally for life in the wild.

1. No animal with vision impairment in both eyes should be released.
2. No bird can survive normally in the wild with any portion of the wing missing.
3. No fracture involving the joint (or even very close to the joint) in a bird's wing will heal well enough for that bird to regain normal flight.
4. No mammal with impaired use in two or more legs can move well enough for release to the wild.
5. Raptors and mammals which are human imprinted are not behaviorally equipped for life in the wild, and they may pose a threat to humans.
6. Compound fractures more than 24-48 hours old are general irreparable and necessitate amputation - i.e. will make the animal non-releasable.
7. Raptors and waterfowl require both legs to hunt/swim, so amputees cannot be released. Most waterfowl can manage with one foot amputated, as long as they can weight-bear on that leg. Many small songbirds can be released if they have only one leg.
8. No animal should be released if it has high likelihood of shedding/ transmitting a disease to the wild population (e.g. raccoons continue to shed distemper and parvo viruses for a period after recovery).

These are just some example of things to consider --and they are the more obvious ones. Some of the criteria we must all use when making the decision to provide treatment versus euthanasia are these:

1. Will the animal be able to maintain a life in the wild which is normal for others of the species?
    a. Does it have adequate vision, hearing and physical ability? (e.g. can it hunt/find food, can it evade predators, etc.)
    b. Does it have the strength to perform the activities needed by that species? (e.g. roam large territories, fly to certain heights, migrate, dive certain depths, dig burrows, etc)
    c. Does it have adequate functions of its limbs to perform necessary activities? (e.g. hold food in its paws or talons, climb trees and jump from limb to limb, fly between tree branches, etc.)
    d. Are its mouth parts adequately functional? (e.g. does the rodent have opposing incisors intact so that one won't overgrow, does the pelagic bird have a beak which can still spear fish: does the hard-billed songbird have a beak which can crack seed shells, etc.)
    e. Is the animal behaviorally normal? (e.g. can it socialize with others of its species, can it reproduce, etc.)
2. Can you provide an adequate habitat in which to release the animal once it has recovered? Sometimes animals, which are not 100% functional in some ways, can survive in certain habitats (e.g. a non-migratory songbird released in an area with many bird feeders; a waterfowl released in a pond, which is kept open year-round.

3. If the animal is to be kept in captivity during a long recover period or permanently, can you provide housing and nutrition, and fulfill its other needs for an adequate quality of life?
    a. Will your cages prevent feather, foot or keel damage?
    b. Will your cages provide room for adequate exercise?
    c. Will your cages provide shelter and options for a variety of locations (high, low, shade, sun, various perch sizes.)?
    d. Can you provide the necessary nutrition in terms of quantity, and quality (adequate calories, protein, vitamins, minerals).
    e, Can you provide proper conspecific socialization and other forms of stimuli?
    f.. Will the animal serve a useful purpose (e.g. surrogate parent, breeding animal or educational animal)-- wild animals weren't "designed" for life in a cage.

As I stated before, I can't provide a "cookbook method" of when to treat an animal or when to provide euthanasia, but I hope I've been able to offer some things to consider when a doubtful case arises. Euthanasia is an act which will always involve our emotions, no matter how many times we perform it, but we must remember to consider the patient, a wild animal, first, and deal with our emotions second if we are to truly provide a service to wildlife.

Erica Miller, DVM is on staff at Tri-State Bird Rescue & Research, DE. She is also a member of the Board of Directors of NWRA

Why Must We Euthanize Birds?

By Lynne Frink
Newark, DE

At Tri-State Bird Rescue & Research Inc. we have been taking care of injured wild animals every day of the year for 15 years. For most of us it is our life’s vocation. What gives a human being the right to decide whether another living creature should live or die? I have no answer to that question. Those of us who have dedicated our lives to wildlife rehabilitation have a deep love of wild animals and a deep commitment to their well-being.

It is important for the non-rehabilitator to understand that the minute a wild animal is picked up by a human being, we know that it was, in nature’s eyes, a dead animal. Wild animals live in constant threat of being eaten by another wild animal; wild animals must escape predators in order to stay alive. A wild animal, which is picked up by man, is an animal so sick or injured that it could not escape its enemy.

This is the type of animal a wildlife rehabilitator deals with - not the poodle with a skin rash or a kitten with an eye infection. Animals delivered to rehabilitators are dying animals with severe traumatic injuries, toxic reactions or infectious diseases.

When we first started as rehabilitators we did not know how sick the animals were that came through our door. After all, they did not moan or cry out: some of them looked normal.

We soon learned that <u>all</u> wild animals (except the newborn) mask symptoms. After all, if you were one of a heard of wild deer and a pack of wolves chases the herd, which animal is the pack going to single out? The deer that limps, or droops its head. Animals don’t show pain and try to hide injuries. An owl that looks fairly alert and stoically silent one minute can be dead the next.

So we learned that the animals that come to us were usually very sick. But, we

tried to save them all. Often we would have 200 or more very sick animals. They needed hand feedings or tubing's, cage cleaning, mediations, 2 or 3 or more times a day. Not having the experience to know which would get better and which would die, we worked 12, 14, 18-hour days trying to keep the animals alive. As the years passed we learned a lot of lessons.

1. We learned that human beings can get so tired and so sick trying to save every suffering creature that they can completely lose their ability to help at all. I doubt that anyone can understand this unless he or she worked day and night, month after month trying to save dying creatures.
2. Through years of painful learning experiences, we slowly gained enough experience to look at a bird and know what its chance for recuperation are. We learned that an owl with a heavy parasite burden and an open, comminuted fracture would never fly again. And we learned that he would never be able to stand up straight or perch and that he would grow miserable and depressed and dirty sitting in a small cage for the rest of his life. We learned that when a goose or a gull did not respond to treatment for heavy metal poisoning that it would be neurologically impaired and perhaps brain-damaged, and would never be able o take two steps together again in its life.

So what were we to do? We continued to receive injured wild birds, from tiny chickadees to eagles, all the time. Our money was limited. The hours of the day were limited. We could dedicate our lives to keep crippled animals alive in cages. We could work morn to night hand feeding them and exercising their legs so that they were able to defecate. We could work dawn to dusk to make their captive, confined lives a little less painful.

We knew that we were very good rehabilitators - in some areas of expertise we were the best in the world. We could make the choice to select the birds which had a chance for survival and freedom and pour all of our efforts into those wild creatures.

After 15 years of caring for wild birds, we felt we had a pretty good feeling for which birds would recover - and we decided we would do all in our power to help them.

And as for the birds that were so badly mutilated, injured or diseased that they can never fly or even walk in the wild again? We could euthanize these birds. We could release these wild creatures from their tortured bodies so that their spirits, at least, could fly free again.

We have dedicated our lives to relieving suffering in wild animals and returning them back to the wild. We don't like to euthanize birds. We have never euthanized a bird without our heart breaking a little.

But the lessons that have taught us which birds wouldn't recuperate have also taught us which bird would. And watching that bird lift from my hand and fly free again is the greatest gift I know.

Working with the Public

Taking Phone Calls

The Medical Services staff keeps records on the status of all wildlife at the facility. Although it is discouraged, occasionally Hotline or Rescue volunteers or even the public may call to check on the condition of an animal. Always be diplomatic but truthful. New volunteers should refer these calls to the Program Coordinators until you have completed your training and gained experience.

Calls may also arrive with questions about possible medical conditions of animals still in the wild, such as wildlife die-offs or sightings of unusual species or odd wildlife behaviors. Again, new volunteers should refer all calls to the Program Coordinators until you have completed your training and gained experience.

Working the Window

The Medical Services volunteers are responsible for checking in the animals that arrive through the window. During the Orphan Care season, volunteers in the Orphan Care area may help with this process.

Dealing with the public requires skills beyond normal assessment and triage. It requires diplomacy and the ability to successfully interact with people.

Sometimes animals will arrive in a less-than-ideal condition as a direct result of poor transport or poor temporary care. Do not berate or lecture. This is an opportunity for education. Take a few minutes to calmly and kindly talk with the person so he or she will know what to do should the situation arise again.

Liberty Wildlife accepts all native species of birds, mammals, reptiles, and amphibians. We do not accept non-native avian species such as pigeons, English sparrows, or European starlings. This does not imply a “value” to these species, it is just not what we do, just as we don’t do dogs and cats. Please handle these inquiries with patience and professionalism. A list of organizations and individuals that take non-native species is usually available at the window.

Hand everyone a brochure that comes to the drop-off window. It gives people additional information on Liberty Wildlife and provides the opportunity for them to become members. Newsletters are often available for distribution, too.

Liberty Wildlife no longer accepts Non-Native birds. While informing the public of this new procedure, please be certain to handle it professionally and politely.

Avian Protocol

The majority of calls on the Liberty Wildlife Wildlife Hotline are calls about birds. Therefore, most of the wildlife arriving at the facility are birds.

Birds have evolved many physical adaptations that make flight possible. Hollow bones reduce weight. Feathers cover skin providing insulation and aiding in aerodynamics. Organs may be reduced in size or number, again, aiding in weight reduction. Helpful additions to the respiratory system include air sacs and pneumatic bones. These are specialized features and must always be considered in treatment.

Liberty Wildlife's avian protocol is detailed throughout this training program. You will be provided with step-by-step instructions on care, treatment, and the continued well care of our avian patients.

Although some procedures may be familiar to you, please wait until you have completed training *and have been signed-off to* proceed before attempting medical treatments or assessments. Remember the three basics of avian care: *(WDQ) warm, dark, and quiet*—these help more than you think!

Guide to Identification of Hatchling and Nestling Songbirds

Marty Johnson
Wildlife Rescue, Inc., Palo Alto, CA 94303
1995

Pink to Red Mouth Birds

Species	Mouth Color	Gape Flanges	Beak Contour	Down	Legs / Feet	Approx Weight in grams Hatchling	Nestling	Adult (F)	Feeding Call	Feathers	Special Features
House Sparrow	pink	medium, yellos,	short, cone-shaped	done	short, chunky	2-13	14-20	27	melodic single	smooth, gray-	
Rufous Sided Towhee	pink	pale yellow	conical and pointed	dard gray	long legs, big feet	3-18	20-29	39		dark back, white spots on wings & tail	
California Towhee	pink to red	pale yellow not prominent	conical and pointed	long, brown-gray on head, back and wings	long legs, big feet	4-20	25-39	52	high-pitched re-peated like crickets chg to single peep	brown	
Brown-Headed Cowbird	deep pink	white to cream not prominent	heavy, to a pt narrower than a towhee's	long, snow-whjte	long legs, big feet, blk tipped nails	3-20	25-30	39	continuous high-pitched vibrating sound	breast yellowish when coming in	bald face, parasitic, often found in nests of towhees
Northern Oriole	deep pink	pale yellow	long, pointed narrow	long, white-it gray on back, wings, 2 rows on head	long, slate-gray legs	2.5-18	20-25	33	high, staccato, repeated notes, similar to blackbird	yellow breast, gray back, white wing bars	insect eater
Lesser Goldfinch	red	pale yellow	similar to finch	grayish	short, pink, stubby	1-6	7-8	10		green to rust back, yellow abdomen	red dot at corner of gape flanges
Red-Winged Blackbird	red	yellow, not prominent	long, pointed	scant, white on back, lower wings, and thighs	long legs	3-15	20-30	42			bald face, similar to cowbirds
Brewer's Blackbird	red	white, not prominent	long, pointed	blackish-gray, fairly plentiful	long legs, white toenails	3-15	20-30	42	raucous, repeated call, sounds like a rusty hinge	black	
Scrub Jay	red	white, not prominent	long & wide	none	long legs, grabby feet white toenails	6-30	35-70	87	hatchling - short re-peated peeping, later a single squawk	furry gray head, blue wings and tail	ruddy skin
House Finch	red	white to yellowish	short, conical	white, long and plentiful - 4 rows on head	short, stocky	1.5-8	10-15	54	none when newly hatched, then high-pitched peeping	stripey, gray/ white chest	
Crow	red	white	very long, large heavy	sparse, gray-brown on head, underpartst	long, heavy	18-70	70-328	438		black	ruddy skin

PINK TO RED MOUTH SONGBIRDS INCLUDE: Blackbirds, Cowbirds, Crows, Finches, Goldfinches, Grosbeaks, Jays, Orioles, Sparrows, Tanagers, Towhees, and Waxwings

Guide to Identification of Hatchling and Nestling Songbirds

Marty Johnson
Wildlife Rescue, Inc., Palo Alto, CA 94303
1995

Yellow to Orange Mouth Birds

Species	Mouth Color	Gape Flanges	Beak Contour	Down	Legs / Feet	Approx Weight in grams Hatchling	Nestling	Adult (F)	Feeding Call	Feathers	Special Features
Starling	bright yellow	bright yellow, very prominent, lower larger than upper	very wide	grayish-white, long and plentiful on head, back and wings	long legs	5.5-30	40-60	80	hatchling-single squeaky note	gray-black	
Mockingbird	yellow	yellow	wide	dark, gray, plentiful	long legs	5-18	20-32	43	hatchling-single, clear, piping note, then throaty bark	gray and white striped wing and tail	gray indes, cresent markings on roof of mouth
Robin	yellow to yellow-orange	pale yellow	wide	sparse, cream on head, back and legs	long legs	5-35	40-60	77	hatchling - staccato trill	rust-tipped speckly chest	skin often yellowish
Black Phoebe	bright yellow-orange	bright yellow	wide, flat tapering to a point	gray & sparse	long, thin legs	2-5	7-15	18	peep-peep	brown-tipped black feathers	insect eater
Pacific Slope Flycatcher	bright yellow-orange	yellow	flat, wide, pointy tip, 'arrowhead' look	white on head, back, and wings in "star" cluster	long, think, delicate, dark blue-gray, white toenails	2-6	7-8	11	insistent crow-like squawk, frog-like when older	buff-abdomen, buff and white striped wings	insect eater
Cliff Swallow	orange-yellow	flesh	very wide, flat pointy beak	light gray head and back	short legs, small, chubby feet	2-13	13-15	22	barking type chirp	nestling-light tan on back by tail, otherwise adult	insect eater, cavity nest
Violet-Green Swallow	orange-yellow	cream	very wide, flat pointy beakt	cream on head, shoulders and back	short legs	1.5-8	8-10	14		white eyebrows	insect eater, cavity nest
California Thrasher	orange-yellow	cream	curves down as nestling grows	dark gray on head, back, wings, thighs plentiful	long let	6-35	40-60	84		medium gray	
Chestnut-Backed Chickadee	orange-yellow	very yellow prominent	flat, wide	gray on head and back	long, pale bluish-purple	1-4	6-8	10	squeaky cheep	buff abdomen, black head, buff-white circles on side of head	insect eater
Bewick's Wren	orange	yellow	flat, wide, pointy	long, gray on head only	long, delicate	1-4	6-8	10			
Bushtit	deep orange-yellow	yellow	short	none	long, delicate	1-3	3.5-4	5	3 syllable "locater" call "mohawk" look	gray, first feathers on crown of head	feamles have blue eyes, cavity nesters
Wrentt???	deep orange	yellow	poiny	none		1.5-6	7-11	14		gray-brown	yellow inides

YELLOW TO ORANGE MOUTH SONGBIRDS INCLUDE: Bushtits, Chickadees, Creepers, Dippers, Flycatchers, Mockingbirds, Robins, Shrikes, Starlings, Swallows, Thrasters, Thrushes, Titmice, and Vircos

Mammal Protocol

Although Liberty Wildlife receives mostly birds, mammals do arrive at our facility.

Only veterinarians, senior Medical Services volunteers, or others specifically authorized will assess and treat mammals and provide for their daily care and food. These animals are not to be touched, handled, or even transferred from their original container.

Liberty Wildlife has specific procedures in place for the treatment of mammals. In the future, workshops will be designed that provide training in this area.

Cottontails and jackrabbits
Usually bunnies and squirrels are taken directly to small mammal rehabilitators that work out of their homes. These individuals are trained in the specialized care of these animals. It is important to take precautions around injured cottontails and jackrabbits as they can carry tularemia, a deadly disease that can be passed to people.

Squirrels, rats, mice, and gophers
These rodents have large teeth and are quick to bite. Although rodents tested in Arizona have not been rabid, some have been found to carry the hanta virus and other diseases which can be just as deadly.

Large mammals
Larger mammals, such as foxes, coyotes, raccoons, javalina, ringtail cats, and porcupines occasionally are brought in with injuries. Again, only senior Medical Services staff or veterinarians that are vaccinated against rabies and have been trained in large mammal handling and restraint are authorized to work with these animals.

Bats
Although bats are mammals, they have their own protocol. Do not handle bats in any way. Whenever a bat arrives, immediately refer to the bat protocol for additional information you may need from the public.

Bat Protocol

Do not handle bats in **ANY** way. *This applies to the daily Medical Services staff as well as Daily Care volunteers.*

Why is this so important? Bats can be rabid. When a bat arrives at Liberty Wildlife, it is usually because it is sick or injured, therefore it is definitely a possibility that it is infected with the rabies virus.

Rabies is a significant public health concern. In cases where the proper post-exposure protocol treatment was not given, or in cases where it was given too late or incorrectly, rabies is always fatal.

A person or pet can have "exposure" to the rabies virus from a bite or even from contact with an animal's saliva from a live or dead animal.

The good news is that if post-exposure care is given correctly and on time, rabies is treatable in humans. This is why such care must be taken to track down any possible contact with rabies.

Checking in a bat

When the public brings in a bat, leave it in the container in which it arrived. Put a "Please Check" tag on the container and add the tag that says "Do not touch. Possible rabies." Do not open the container to add food or water. If the public needs their container or carrier, take their name and number and state that we will get it to them as soon as possible. If a Rescue and Transport volunteer has brought in the animal, they may take a temporary carrier until theirs is cleaned and returned to them.

Only authorized Medical Services staff are allowed to assess, treat, or have ANY contact with a bat—this includes bats that are dead as well as those that are alive

Inorder to be authorized to work with bats during any medical or daily care procedure, including feeding, an individual must have a current rabies vaccination, proper training, and prior approval from the Medical Services Program Coordinators.

Working with the public

A special form has been designed to obtain additional information from the public when a bat is brought in. The questions on this form are used to

track human or pet contact with a bat in the event that it is found to have rabies. Please make certain that every blank on the form is filled in before the public leaves the premises. A copy of the Bat Intake form is included in this section.

It is important to handle this initial interaction with the public with extreme care. Be sure that any inquiries you make are presented in a non-threatening manner.

People may change their answers to questions for the most surprising reasons.

- They might be embarrassed that they touched the animal.
- They might be afraid of contact with state officials.
- They might resent the time, energy, or expense required for them to obtain the necessary post-exposure treatment.
- They might have heard horror stories about medical care.

Children may have an entirely different set of concerns.

- They might be afraid they would be "in trouble"
- They might be afraid of receiving a "shot".

Be pleasant, diplomatic, and professional. If someone has had "exposure" do not berate or frighten them. After you receive the information required, give the person the phone number for the Arizona Department of Health. Explain that the Arizona Department of Health may contact them to discuss any precautions they may need to take.

Definition of exposure

Rabies is most commonly spread through contact with saliva from an animal infected with the virus. Exposure or possible transmission of the rabies virus to a human can take place in several ways. The most common type of exposure occurs from an animal bite. Exposure can also occur as the result of an animal scratch or contamination of mucus membranes or un-intact (open) skin by saliva or nervous tissue from a rabid animal. Exposure can occur from dead animals, too. Rabies affects all warm-blooded animal species, including people. It is 100% fatal in untreated humans.

Again, if a person has been bitten or if it is determined that there may have been "exposure" of any kind, the animal must be tested for the protection of the public.

In cases of "exposure"

If a person has been bitten or if it is determined that there may have been "exposure" of any kind, we will advise the Arizona Dept. of Health so that they can make arrangements for quick testing of the animal. Remember, in cases where the proper post-exposure protocol treatment was not given or in cases where it was given too late or incorrectly, rabies is always fatal. The animal must be tested in order to save lives.

Testing

The rabies test is done on the brain tissue of the animal. If the animal is alive and needs to be tested, it must be euthanized. Unfortunately, this is the only option and it is the law.

Only authorized Medical Services staff will complete the preparations for testing. Again, if the bat is alive it must be euthanized. The body must be carefully wrapped and triple-bagged. Bats must be carefully labeled and put in the *medical* refrigerator immediately as their brains decompose quickly. The bat can be either frozen or refrigerated. Although the State can conduct rabies testing locally, additional testing procedures that identify the specific strain of rabies are sometimes completed out-of-state.

Arizona's Department of Health Bureau of Laboratory Services provides a Rabies Testing Form that must be completed and attached to the specimen. A sample of the correct procedure for completing the form is in this section and a copy is in the file with other blank lab forms. After completing the form, the top part is placed in the outer bag holding the bat.

If there has been "exposure" the animal must be transported to the Arizona Department of Health lab immediately. If this is a routine check, transport it on the same day if possible. At the very latest, it must be delivered within 48 hours.

The testing lab is located in downtown Phoenix on the corner of 17th Avenue and Monroe. Get the directions from Liberty if you are to go down and drop off a specimen. Staff from the testing lab will phone or fax Liberty Wildlife with the results. The lab is open from 8:00 a.m. to 5:00 p.m. and closes promptly on time, in fact, sometimes a little early.

In cases of "no exposure"

If it is determined that there has been "no exposure" the bat will then be assessed and treated according to its condition. If the animal is successfully rehabilitated, it will be released.

If a bat dies or if it is euthanized, it will be submitted for rabies testing as a routine procedure—even in "no exposure" cases.

Remember, the rabies virus is a serious public health concern. Bats are the most common carrier of rabies in Arizona. **Do NOT handle bats in ANY way.**

Liberty Wildlife • Bat Check-in

• Important! Do not touch bats (live or dead) in any way •

Fill in form completely. Please answer every question.

Information on transport person or public

Name _____

Address _____

City/State/ Zip _____

Home phone _____ Work phone _____

Bat information

Species if known _____ Date found _____

Describe where bat was found _____

City _____ Major cross streets _____

Exact address if known _____

Contact name at location _____ Number _____

Was this location a home, school, park, etc.? _____

Describe the site at this location where the bat was found _____

_____

Contact

How did you obtain this bat? _____

_____

Describe your contact with the bat. _____

_____

_____

_____

Did you receive this bat from someone else? (If so, list name and provide phone number.)

_____

List the name and number of anyone else who might have had contact with the bat.

_____

To be completed by Liberty Wildlife

Date In _____ Received by _____

Log Number _____ Assessed by _____

Reptile Protocol

Reptiles are cold-blooded animals with a wide variety of specific nutritional and environmental needs.

Reptiles can carry salmonella. It is important to wash your hands thoroughly after each handling.

Prior to assessing a reptile, identify it if it is safely possible to do so at the time.

Snakes

Do not handle snakes. Unfortunately, today there are so many exotic reptile pet owners and collectors of snakes that you might one day be confronted with a non-native snake that could be deadly. There are also many species of native snakes that are dangerous as well.

Identification of snakes is difficult at times. The demand for "designer snakes" in the pet industry has resulted in animals that have unusual color patterns or markings. Leave the assessment of incoming snakes to the authorized Medical Services staff and veterinarians.

Snakes' skin can easily transfer toxins into the animal. Do not expose them to external products such as Sevin dust, DeSolvIt, or soaps. Rattlesnakes and Coral snakes have their own protocol and will be discussed separately.

Turtles

Turtles are usually thought of as aquatic animals, but this is not always the case! Box turtles require an environment similar to that of a tortoise. Again, species identification is sometimes difficult, but it is critical to providing the correct set-up for your patient.

Tortoises

Tortoises can be very sensitive to their nutritional needs when young. It is critical to provide them with the necessary amount of light and the correct type of food.

Lizards

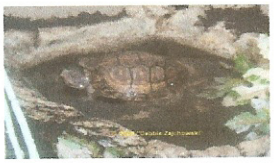
Lizards have a very thin skin that can easily transfer toxins into the animal. Do not expose them external products such as Sevin dust, DeSolvIt, or soaps.

Gila Monsters

Gila Monsters will be discussed under the protocol for venomous reptiles.

Identifying Common Turtles & Tortoise in the United States

by JoAnn Dalcin

Comman Name	Range	Shell or Markings	Length	Additional Information
Turtles This group consists of land and water turtles. The most common and easily recognized land turtle is the Box turtle. Captive Box turtle diets consist of worms, some fruits, and canned moist dog food. These turtles do not swim well, but do need a container with about 1" of water in their containment area.				
Eastern Box Turtle	Maine to Georgia, Atlantic Ocean to Alabama	Dark brown or block with irregular yellow or orange lines 	4-8 "	
Three Toe Box Turtle	Georgia to Texas	Light brown w/dark lines 		
Ornate Box Turtle	Norther: Nebraska to South Dakatoa & Illinois Southern: Western Texas to Southern Arizona	Dark with yellow lines 	4"	
Gulf Coast Box Turtle	Coast of Georgia & Florida		7-8"	
Florida Box Turtle	NE Florida to SE Georgia	Dark Brown or black with radiating yellow streaks 	5-6"	

Chinese Box Turtle		Dark brown or black top of head is olive, sides are yellow or orange 	About 7"	
Malaysian Box Turtle	Thailand, Malaysia, Vietnam	Moderately domed dark brown or black, yellow lines on the face, under shell is yellow 	About 8"	Most aquatic. Will eat fruit, canned moist dog food and some smelts (fish)
Tortoise Have Elephantine feet. Any tortoise found her could be an escape from someone's house as they can live here. In t he wild they eat grasses. As a pet feed them greens (kale, endive, red or green leaf lettuce), some fruits (sparingly), and mixed vegetables. All tortoises need a good vitamin supplement.				
Desert Tortoise	SE California, Western Arizona, Southern Nevada, & SE Utah	Brown shell 	11"	A protected species in Arizona, California & Nevada
Texas Tortoise	Texas to Mexico	Light brown shell 	6-7"	
Gopher Tortoise	Gulf Coast of Florida	Flattened or elongated light brown shell 	9-10"	

Water Turtles

Are identified by their smooth shells and sebbed feet. The most common seen in the pet trade are the sliders, painted and the yellow bellies. Turtles in this grouip can also be recognized by the red, yellow, or orange horizontal stripes on their face, neck or limbs and a crescent or spot beyind the eyes. These turtles are found over much of the U.S., Mexico, Central America to the NW corner of South America. They are herbivorous and omnivorous. Males are usually smaller than the females. They average from 3 inches (Muhlenberg) to 2 feet long (Batagus). Most species inhabit fresh water, but spend many hours backing on logs. Another group of water turtles are the mud and musk turtles. Their shells are more domed and they average in length from 4-7 inches long. They enjoy diets of insects, fish, mollusks and some vegetation.

Mud Turtle	Over most of the U.S. but generally the SE U.S.	Yellows to brownish or a cmbination, some have yellow lines on their faces 	3-5"	
Musk Turtle	Maine to Wisconsin and as far South as Florida	Brown or black 	About 5"	a.k.a. stinking jim or stinkpot. This turtle loves water.

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Venomous Reptiles and Snakebite:

A perspective for Wildlife Rehabilitation

By James W. Grier
Fargo, ND

Introduction

There are four situations in which a wildlife rehabilitator might encounter venomous reptiles or have to deal with an actual or potential snakebite. (1) An injured or diseased individual of a venomous species of reptile could be brought in for treatment and care as in other types of wildlife cases. (2) A Wildlife rehabilitator, in the course of being outdoors to recover, release, or otherwise work with another rehabilitation case could accidentally encounter a venomous reptile. (3) A wild animal suffering a snakebite could be brought back in for treatment. (4) Although not involving a legitimate "wild" animal case, it is possible that someone might bring captive venomous reptile to a wildlife rehabilitator for help.

This article will give a brief background on venomous reptiles, snakebite, and discuss ways of dealing with the possible encounters that wildlife rehabiliators could experience.

General Background on Venomous Reptiles

Venomous reptiles fall into two categories: venomous lizards and venomous snakes. There are only two truly venomous lizards, the Gila monster (Heloderma suspectum) and the Mexican beaded lizard (H. borridum) in the family Helodermaidae. They are found in the deserts of Mexico and southwestern U.S. In addition, the Komodo dragon of Indonesia, while not actually venomous, is venomous-like in that its mouth contains a complex of harmful bacteria that can create serious infections through a bite. All of these lizards are unlikely to

be encountered by a “wildlife rehabilitator”, or, in the event that they might be, the persons who would most likely be involved would probably already be at least somewhat familiar and able to recognize and deal with these animals. The remainder of this article will focus on the more widespread category of venomous snakes.

There are an estimated 8,000 persons bitten by venomous snakes annually in the United States alone. However, fewer than twenty people die each year in the U.S. Although the possibility of dying form a snakebite seems frightening, the chance of it happening is quite low, even if one is actually bitten. The chances of surviving, or avoiding in the first place, a snakebite are even better if one is informed.

There are three main type of venomous snakes: the front-fixed fanged elapid snakes (family Elapidae); the front-folding fanged vipers (family Viperidae); and rear-fanged snakes (family Colubridae, the common and generally harmless snakes). The viper’s fangs are longer than the others and fold back against the roof of the mouth when not in use. The elapids have much shorter fangs but the venom tends to be much more potent and toxic. Aside from the boomslang of Africa and a small number of tropical species, the rear-fanged snakes are insignificant and not considered dangerous to humans, although some, such as the hognose snakes, can give a painful and toxic bite similar to a bee sting.

The venom varies among different species (and sometimes even among different populations or in individuals within a given species) of venomous snakes; it is a complex mixture of substances in all cases. The variability in the venom of different snakes leads to a wide variety of symptoms that are difficult to generalize. There are two basic categories of effects and symptoms: local, which include such things as pain, swelling, and bleeding at the site of the bite and in surrounding tissues, and systemic, which include problems with respiration, the heart, nervous system and senses, internal bleeding, and hemorrhaging at distant sites around the body such as in the victim’s mouth. All types of venomous snakes can produce both categories of effects and symptoms. And there are varying degrees of seriousness depending on species of the snake and a host of other factors. However, as a rough generalization, viper bites tend to be more local and painful, produce swelling, and be less life threatening whereas bites tend to produce more systemic effects, little or no swelling and pain at the site of the bite, and be more life-threatening.

Except for the coral snakes and a few insignificant rear-fanged species of the southern states, all of the venomous snakes of concern in the United States are vipers. These include a number of species and subspecies of rattlesnakes plus copperheads and cottonmouths. One should refer to a reptile field guide to determine which, if any, venomous snakes might be encountered in any particular area.

Snakes use their venom primarily for subduing prey and as a digestive aid. It is used only secondarily for defense, such as against humans. As such, they bite differently in defense than they do when eating. In some cases, perhaps twenty percent of the time, they do not even inject venom when biting defensively. In another thirty or so percent of the time, they inject only a small, insignificant amount of poison. The instances of little or no envenomation are known as “dry bites”. Significant doses of venom are delivered in roughly half of all defensive bites. How serious it is to one’s health depends on a number of factors (such as where the bite is and the person’s age and health).

The 2-3-4 of Snakebite

Avoiding or Minimizing the Chances of Being Bitten

The best way to avid problems is not to get bitten in the first place! There are two basic rules:

1. When in areas with venomous snakes, always be alert and cautious. It helps to know what might be around, by checking with local or regional reptile guidebooks, then be careful when in the field, such as when hunting, fishing and camping, gardening, or otherwise being outdoors.
2. Don't deliberately handle or otherwise meddle with venomous snakes, including attempts to kill the snake. Handling of snakes should be left only to experts with training and previous experience. It is best to just look at, and even admire the snake but keep your distance. It is usually a rare opportunity that many people fear but many others actually hope for. (Rattlesnakes, for example, are not found in most parts of the world-some people travel to the U.S. just to get a chance to see them!)

Venomous snakes can be fast and unpredictable. Never assume that they will not try to strike but always assume that they might including at a surprising moment when you least expect it. The only safe way to deal with a venomous snake is to know where the head is and don't give the fangs a chance to touch you. For everyone except experienced snake handlers, that means staying back away from and not touching or messing with it, even with a stick or other object. And unless it is a near human habitation, don't kill or attempt to move it. Just enjoy the sight then you go your way and let it go its way.

What <u>Should</u> Be Done in Case of Snakebite

The three most important things to do in case of a bite does occur are:

1. Remain as calm as possible. Bites are usually not as serious as people fear. Even if they are serious, getting excited only complicates the situation. What is needed is concern and prompt attention, not fear and panic.
2. Get to a physician/hospital as quickly and safely as possible. If a telephone is convenient, call in advance to alert them that you are coming. There is little else that one can or should do in the way of first aid (see below) and many of the things that untrained people try to do only make matters much more serious -- often creating greater problems than the bite itself! The main emphasis for first aid should be on safely getting the victim to medical treatment rather than "doing something" in the field. The bitten person should be kept calm as possible and move (or be moved) to medical help deliberately with a minimum of activity. One should make haste slowly to the closest medical facility. The best first aid kit for snakebite is a set of car keys!
3. Remember the following name: Arizona Poison Information Center. Many medical and poison control centers in locations where venomous snakes exist have information and experience on what to do for snakebite. However, one of the biggest problems with snakebite is that it really is not a problem -- that is, it is so rare that most medical personnel never encounter it, have little training

or understanding concerning it. and consequently, do not know what to do when it occurs. Thus, it may be important for you to know who to have them contact for advice! The Arizona Poison Center, located at Tucson, Arizona, is a national referral center providing advice for physicians and hospitals. The phone number (24 hr.) is 602/626-6016. It is easily obtained by calling the Arizona information operator.
When the medical facility is called in advance or upon entering, inquire whether they have much previous experience with the snakebite and ask them to contact Arizona Poison Information Center.

What Should Not Be Done in Case of Snakebite
In spite of being recommended in the past, several actions may only create worse problems and they are no longer advised by most experts. In particular, the following four things should NOT be done:

1. Do NOT give alcohol to the victim. Alcohol is frequently involved in situations where people get bitten in the first place. Alcohol and venomous snakes mix even less well than drinking and driving.
2. Do NOT cool the bitten area.
3. Do NOT use a tourniquet. Tourniquets have been a leading cause of medical problems in dealing with snakebite. It is better to do nothing than use a tourniquet. There is good evidence that in case of elapid bites, a broad, elastic wrapping, such as with a broad medical wrap or a spread-out nylon sock, wrapped around the entire limb including covering the bitten area, may help until one can get proper medical treatment. But broad wraps have not been well studied for viper bites; viper bites usually lead to swelling (unlike most elapid bites) which can create dangerous pressure under any form of constriction; and most persons will never see an elapid bite. If in doubt, don't. And in any case, broad wraps are much different than tourniquets. Don't use tourniquets!
4. Do NOT cut into the bitten area. The old incision and suction method is no longer generally recommended for most cases of snakebite, although there is still some difference of opinion on the matter. Unless it is done by someone with formal training and proper equipment, and is initiated immediately (within a maximum of five minutes of the bite), it is ineffective and can be much worse than the bite itself. Suction over the bite may help if a proper device (such as the Sawyer Extractor --see references at the end) is available and it is started immediately. The mouth should not be used and most "snakebite kits" available at sport shops, etc. are worthless. Since proper devices are rarely at hand quickly enough when needed, suction also is usually not worth considering.

Venomous Snakes and Wildlife Rehabilitation

Now to return to the circumstances in which wildlife rehabilitators might encounter venomous snakes, as indicated at the start of this article. The different

situations and recommended responses are very different from each other.

A venomous snake at the door

It is extremely unlikely that a venomous snake will be brought to a rehabilitator for treatment and care. Most cases where injured or diseased venomous snakes might be found in the wild would result in the snake being left alone or killed by whomever found (or injured) it in the first place, Secondly such cases are not likely to respond to rehabilitation regardless of one's good intentions. Nonetheless, I suppose that there is a slim chance that such a case, or an animal that was being kept in captivity by someone could show up on a rehabilitator's doorstep. If you are faced with such a situation, my recommendation is to leave it alone and contact someone for help and advice. The snake, if not already in a secure, hard walled container, should be placed into a container such as a plastic box or garbage can. If it is in a bag, place the bag in the container. Be aware that snakes can easily bite through bags! The snake (or bag) should be moved only with long tongs, a hook, stick, rake or similar item -- *not by hand, even with gloves*, or otherwise allowed near any part of one's body. Only someone who is already trained and experienced in working with venomous snakes should work with them. If you are such a person, then you already know what you are doing and this information is superfluous. If you are not such a person, don't mess with the animal! Proper training requires more than can be obtained from reading: it requires previous work with nonvenomous species, working with someone else who is experienced, and practice with live animals.

To know what venomous snakes might occur locally, I recommend referring to a good field guide, available in most book stores, or contact your local or state natural resources agency. If in doubt about whether a particular snake is venomous or harmless, do not take any chances, leave it alone.

Who does one turn to for help in case of a venomous or questionable snake at hand? Most law enforcement agencies, veterinarians, universities, etc. lack the necessary expertise unless, by chance, there happens to be an individual with the interest and experience on board. Your best bet is to contact (call information for phone numbers) Black Hills Reptile Gardens in Rapid City, SD, or a major zoo and ask for the herpetological department. They might be able to help you directly or else refer you to one of the few snake veterinarians around the country who are qualified to help in such matters.

Exposure to venomous snakes while in the field

If you happen to accidentally encounter a venomous snake while engaged with other rehabilitation activities, simply follow the "2-3-4"s described earlier in this article. Be alert to the possible presence of venomous snakes if in an area where they exist and don't mess with them. Leave them alone. Give the snakes a wide berth; go on about your business; and it will go on about its business.

Wildlife brought in as a victim or possible victim of snakebite
Small animals such as rodents, rabbits, small birds, etc. are not likely to survive a snakebite. Such a case brought in for wildlife rehabilitation probably represents someone interfering with a snake's lunch! Incidentally, most species of vipers quickly bite their prey and let it go. They wait for it to die then track it down by olfaction to recover and eat its.) Snake bites on small animals, while common, result in quick death, and the animal is usually consumed in relatively short period of time so that they are unlikely to be found in the wild by a person.

Larger animals, such as domestic species or wildlife like deer, however, may occasionally be found suffering from snakebite. They symptoms are not always clear and the fang marks are unlikely to be seen or even found upon close inspection. There may be bleeding from a limb, the face region, or perhaps another part of the body surface. The most likely symptoms will be swelling and tenderness from pain. If on the nose, face, or throat, there may be difficulty with breathing.

Treatment might require antivenom, if worth the expense and trouble. This will require obtaining antivenom (most hospitals in regions with venomous snakes carry it, as do some veterinarians), and getting advice on how to administer it. Antivenom treatment is expensive, complicated (involving intravenous techniques), and must be started soon (a few hours maximum) after the bite to be effective.

Alternatively, and often just as effectively, treatment may consist of providing quiet and rest; with time for recuperation (usually only a few days) by letting the animal's body itself handle the venom. During the first few hours, constant vigilance of the victim is required with standby preparations in case of respiratory problems or necessary fluid replacement.

Conclusions

Snakebite is not a common problem (except for normal prey species) and the vast majority of wildlife rehabilitators are unlikely to ever encounter anything involving venomous snakes or snakebite. The few circumstances under which such encounters might occur are varied and require very different responses, as discussed in the article.

The most important advice for persons who are not already trained and experienced in working with venomous reptiles is don't! In other words don't handle, get near, or attempt to deal with them. Instead make sure they snake is left alone, if in the wild, or, if at the you door, in a secure hard-walled container or otherwise not posing a threat to anyone and seek help such as from the herpetologists at a zoo. If in doubt as to whether a snake is venomous or not, regard it as a possibly venomous and leave it alone.

References

The primary reference for snakebite and dealing with it is:
F. E. Russell. 1983. *Snake Venom Poisoning*. Great Neck, NY; Scholium Int, Inc
(This is the most definitive current book on the subject covering both North American and, to a limited extent, exotic species. It discusses medical aspects in depth.)

Equipment

The "snakebite kit" considered to be most effective for reducing venom in a bite from a viper is a syringe pump suction device, the Sawyer Extractor. Instructions that come with the kit explicitly and emphatically recommend NO cutting around the bite. Also, the kit is NOT a substitute for proper medical treatment; it is only an aid to possibly reduce the amount of venom that may be present. The kit is available for about $15 from Sawyer Extractor Kit, Saffeta Inc., P.O Box 7036, Long Beach, CA 90807. Anyone routinely working with or around vipers might want to keep one of these kits close at hand. *

James Grier has been a professor in the Department of Zoology at North Dakota State University since 1973. He first became interested in snakes in 1946 (at the age of 3) and started working with venomous snakes in 1962. He maintains a collection of around sixty-five snakes of which about half are venomous, at the university.

Venomous Reptile Protocol

Snakes

Do not handle snakes. Unfortunately, today there are so many pet owners and collectors of snakes, that you might one day be confronted with a non-native snake that could be deadly. There are also many species of native snakes that are dangerous as well.

Rattlesnakes

Identification of snakes is difficult at times. Did you know that rattlesnakes can lose their rattle? Leave the assessment of incoming snakes to the authorized Medical Services staff.

Rattlesnakes can dispense their venom even after they have died. Many people have been seriously injured and even died from contact with a dead snake.

Coral snakes

"Red on yellow, kills a fellow."
"Red on black, friend of Jack."
That's that rhyme for remembering how to identify a venomous western coral snake—just remember to keep ***far*** **away** while you figure it out!

The venom of coral snakes is highly dangerous. These animals will be treated, fed, and cared for only by authorized Medical Services staff and veterinarians.

Gila Monsters

Although it is rarely fatal to humans, the bite of a Gila monster is tenacious and extremely painful. The Gila monster is one of three known venomous lizards in the world today.

Do not handle Gila monsters. They may seem slow moving, but that is **NOT** the case! Only authorized veterinarians and Medical Services staff will conduct assessments, treatments, daily care, and feeding.

Liberty Wildlife Medical Services

Medical Services Training Program

• Section Two •

Paperwork and Charting Handling and Restraint

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267
Wildlife Hotline (480) 998-5550

Paperwork and Charting

Medical Services is probably the most paperwork-intensive volunteer area at Liberty Wildlife! But this communication flow is absolutely necessary to ensure the proper care for wildlife and to maintain the proper treatment and disposition information for the facility's permits and reports.

Paperwork records:

- When an animal arrives
- When an animal is assessed
- When an animal receives a treatment or exam
- When an animal receives a medication
- When an animal is fed
- When an animal is moved inside or out
- When an animal is moved from one outside enclosure to another
- When an animal is released, placed, euthanized, or dies

You will be responsible for recording information and following up with all paperwork correctly.

Completing the Admission form

A two-part check-in form must be completed for every animal arriving at Liberty Wildlife.

When an animal is dropped off, the easiest thing to do is to have the public complete the check-in form. Hand them a blank form on the small clipboard and ask that they complete the blanks up to the solid line. *Verify that the correct species is listed on the form*.

If an animal is brought in by a rescue volunteer, the rescue volunteer should complete the check-in form. If the rescue volunteer has forgotten how to log-in the animal, offer to show them the procedure. Rescue and Transport volunteers often take a small stack of blank forms with them so that they can have the public fill out the form at the time of the rescue.

If an animal does not have a check-in form, it is the responsibility of the Medical Services volunteer to complete the form at the time the animal is being assessed. Use any information that is available. For example, a form might say "Came from clinic without paperwork," "Left in cage by Rescue volunteer last night," or "Left out front before the facility was open."
A sample of a completed check-in form can be found in this section.

The Log Book

After a check-in form has been completed, it must be recorded into the current year's log book and assigned a number. Log numbers begin with the year and are followed by the next sequential number in the log book. For example, the first animal of 1998 was assigned 98-0001. When you record the check-in form in the log book, record on the next available space the date, species, name and full address of person that brought in the animal, and a brief description of the animal's injury.

A sample of a page from the log book is included in this section.

The log number that is assigned is recorded on the check-in form in the small box in the upper right hand corner. This number must also be recorded on the medical chart, the food log, and on any other document requiring identification such as a medication schedule. Again it is the responsibility of the Medical Services volunteers to make certain each animal has a log number by the time it is assessed.

Starting the Medical Chart

Each arriving animal must have a medical chart completed upon assessment. The medical chart consists of three separate sections.

The first section contains the identification information on the animal, such as the species, date in, and the log number. The second section contains the condition of the animal upon check-in, any initial treatment administered, and a section for additional notes. The third section is the ongoing care log where treatments and condition reports are recorded.

Large bird, all raptors, mammals, or unusual animals are given 8 ½ X 11 preprinted charts. Passerines and other small birds are given small blank cards for charts. These small cards can be easily attached to bins and small cages.

When an animal is a new arrival, the chart should be attached to the front of the cage so that the senior medical staff is aware of its arrival.

If an animal with a large chart is stable, the chart is placed in a medical file folder. The right side of the folder is for the chart itself. The left side of the folder is for supporting documents which include lab requests forms, lab results, x-rays, well care forms, and completed medication cards.

The medical folders are filed in the Intensive Care area. Small charts always stay with the animal when it is in Intensive Care.

It is important to make regular notations on the medical charts. These remarks will include progress of condition, treatments given, medications started or stopped, outside treatments such as X-rays, visits to specialists, or even behavior notations. Be sure to use language that communicates plainly and clearly. Write clearly at all times.

When animals are stable enough to be moved out of intensive care their movements must be recorded on the medical chart. Each chart should clearly indicate the specific cage where an animal has been moved.

Education animals have medical charts, too. They are kept in the three drawer file cabinet in the bird room in the bottom file drawer. Items that should be recorded are any medical concerns or treatments, beak coping, talon trimming, jessing, behavior changes, cage movement, or any other information that might prove valuable to have on file.

Samples of large and small medical charts are included in this section for you to review.

Medication and Treatment Schedules

Animals often receive medications or regular treatments. In order to keep track of these procedures, a schedule is posted on the animal's enclosure.

Medication and treatment schedules are written on bright green index cards. The color is easy to identify, reducing the possibility of missing a scheduled treatment. Check boxes on the card indicate the number of days (showing dates) and the frequency. Also listed on the card are the species, log number, medication or treatment, dosage, method of administration, and any other pertinent information.

When a course of medication ends with the remark "Re-evaluate" discuss the animal's current condition with the Medical Services Program Coordinators to determine if the treatment should continue or be modified. If the course of medication is completed the card is removed from the animal's cage. For birds with larger charts, hole-punch the card and place in the chart in the fastener on the left hand side. For birds with smaller charts, staple the card to the back of the chart, putting the staple in the far corner. A sample is included in this section.

The Food Chart

When any animal is given food it must be recorded on a food log. This includes food that has been force-fed or hand-fed. Food intake should always be recorded on the food log, not on the medical chart. Each food log must have the species, date in, and the log number of the animal. Food logs are kept for large birds and mammals, or for animals on special feeding schedules such as doves needing to be tube fed.

A sample of a food log is included in this section.

Final Dispositions

We must record the final disposition of each animal that has come into Liberty Wildlife. This is usually the last notation in the medical chart.

An animal can have one of the following six different dispositions.

- Released - If an animal is returned to the wild, the location of the release site must be recorded as well as the release date and the person(s) releasing the animal.
- Transferred - If an animal has been transferred to another facility the name of that facility, its location, and the date of transfer are listed.
- Expired (DOA) - If an animal arrives that has already died, it is still logged in and recorded as DOA or dead on arrival.
- Expired (Died in 24) - If an animal arrives and dies within 24 hours of being checked-in, it is recorded as Died in 24.
- Expired (Died) - If an animal arrives and dies after 24 hours in the facility, it is recorded as Died.
- Expired (PTS) - If an animal is euthanized, it is recorded as PTS or put to sleep.

Animals that have expired should have the specimen location identified on the final disposition form. There are three options:

- DISF (dead in specimen freezer)
- DES (destroyed)
- DIFF (dead in food freezer).

When animals are placed in the specimen or food freezers a Final Disposition form should be included with the body. Pads of these forms are available which record the species, log number, date, and final disposition of each animal. When you put an animal in the specimen freezer, always log the specimen on the form located on the freezer door.
A sample of a Final Disposition record is in this section.

Electrocutions:

We have a contract with the Utilities Companies (APS and SRP) to take data on electrocuted birds. This data will hopefully prevent future electrocutions and provide data on how these birds are being electrocuted.

These specimens are handled by the Research and Conservation Team. Our job is to make sure these specimens end up in the proper place with the proper paperwork.

When they come to the window, the Utility Company representative will have the animal bagged and a copy of their paperwork. Ask them if they need a copy of the paperwork; if so, please make a copy for them. Take the paperwork and the bagged animal and put it in another garbage bag with the paperwork stapled to the original bag. Finally, place the specimen into the Utility Refrigerator and contact the Research & Conservation team to advise them that the Utility Company has dropped off a specimen.

LIBERTY WILDLIFE • FINAL DISPOSITION RECORD

Record Number 02-0001 Species GHO

Date of Final Disposition 9/13/02 Comments

☐ Released By Phone

Location

☐ Transferred To Location

☒ Expired DOA ___ Died in 24 ___ Died ___ PTS ✓

Specimen location DISP ✓ DES ___ DIFF ___

Pigeon N/N

259g Red 78

Sulfatrim .5cc PO BID

9/16 ☐ ☐

9/17 ☐ ☐

9/18 ☐ ☐

9/19 ☐ ☐

9/20 ☐ ☐

9/21 ☐ ☐

9/21 ☐ ☐

FEEDING LOG

SPECIES GHO

LIBERTY NUMBER 02-0001

DATE IN 9/12/02

SPECIAL INSTRUCTIONS

DATE LOGGED	FOOD REMAINING FROM DAY BEFORE	TOTAL OF FOOD GIVEN FOR THE NEW DAY
9/12/02	0	250g Chuteachick
9/13/02	0	250g Chuteachick

SAMPLE

Medical Log

Species Kestrel (Female)

Log Number 02-1111 Date In 9-4-02

Condition/Initial Treatment Down - dehydrated. Compound FX (R) radius/ulna. No other significant findings. Eyes/Ears/Mouth clear. Cleaned wound Wrapped wing w/nitrofurazone/Telfa/vet wrap Started on Sulfatrim 1cc PO BID 7 days. Administered 6 cc Ringers LRS. AMS

Additional Notes 669.

Date Comments

9/9/02: Swelling present. Removed wrap. Cleaned area. Reapplied nitrofurazone/Telfa/vet wrap. Monitor for swelling. AMS

Pigeon
259g.

SAMPLE CHART II N/N
Red 78

9-16-02- Compound FX (R) carpo-metacarpus Eyes/Ears/Mouth clear. No other significant findings. Cleaned area & wrapped wing w/ nitrofurasone telfa/vet wrap. Started on Baytril .5cc PO BID 7 days
AMS

M. Dove
50g

SAMPLE CHART 02-1111
Yellow 7

9/16/02. BAR. NSF. Eyes/Ears/Mouth clear. Needs to grow
JTH

Liberty Wildlife Rehabilitation Foundation

02-3380

Drop off date: 9/17 Date obtained: 9/17

Your name (print clearly): DON ROGERS

Email address: DROGERS@COX.NET

Address: 4939 E. AIRE LIBRE

City: SCOTTSDALE State: AZ Zip: 85254

Daytime/Cell phone: 602-788-5200 Evening phone: _____

What was the situation (cat attack) hit by car, found on ground, etc.): _____

What has been done for this animal (food, water, medication, etc.): NOTHING

Major cross streets where animal was found: TATUM & BELL

How did you hear about Liberty? DEBBIE WILSON Have you been here before? YES

Would you like to make a monetary donation today to help wildlife? YES For what amount? 1,000

Would you be interested in becoming a volunteer? NO

*********Liberty Only*********

Species: HOUSE FINCH **Sex:** _____

Age (hatchling, nestling, fledgling, juvenile, baby, (adult)): _____

Rescue/Transport volunteer name: T. STEVENS Phone: 602-317-9920

Final Disposition (circle one) DOA Died in 24 Died PTS PTS in 24 (DISF DES DIFF) Date: _____

Transferred to: _____ Phone: _____ Date: _____

Released by: _____ Phone: _____ Date: _____

Liberty No.	Date In	Species	Origin Person/Place	Comments	Final Disposition
02 3375	9/16/02	M. Dove M F Age___	Jim Kaiser 6001 E. Western Rd Carefree 85377	Hit window	DIED, DOA, PTS——DIF, DES, FED Date ___ TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___
02 3376	9/16/02	Western Grebe M F Age___	1574 E. 26th Ln. #21 Apache Junction 85219		DIED, DOA, PTS——DIF, DES, FED Date 09.17.2002 TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___
02 3377	9/17/02	M. Dove M F Age___	Lori Gottman 12347 E. Shangri La Scottsdale, AZ 85259	Hit Window	DIED, DOA, PTS——DIF, DES, FED Date ___ TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___
02 3378	9/17/02	M. Dove M F Age___	Joseph Scherzer 10900 N. Scottsdale Scottsdale, AZ 85254	FOG	DIED, DOA, PTS——DIF, DES, FED Date ___ TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___
02 3379	9/17/02	WHITE WINGED DOVE M F Age___	JOANNE SWANK 8168 E. ANGEL SPIRIT SCOTTSDALE, AZ 85255	FOG	DIED, DOA, PTS——DIF, DES, FED Date ___ TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___
02 3380	9/17/02	House Finch? M F Age___	Don Rogers 4939 E. Aire Libre Scottsdale AZ 85254	Cat attack	DIED, DOA, PTS——DIF, DES, FED Date ___ TRANSFERRED TO: ___ RELEASED BY: ___ Band No. ___ Location ___

Liberty Wildlife Rehabilitation Foundation

Drop off date: _____ Date obtained: _____

Your name (print clearly): _____

Email address: _____

Address: _____

City: _____ State: _____ Zip: _____

Daytime/Cell phone: _____ Evening phone: _____

What was the situation (cat attack, hit by car, found on ground, etc.): _____

What has been done for this animal (food, water, medication, etc.): _____

Major cross streets where animal was found: _____

How did you hear about Liberty? _____ Have you been here before? _____

Would you like to make a monetary donation today to help wildlife? _____ For what amount? _____

Would you be interested in becoming a volunteer? _____

*********Liberty Only*********

Species: _____ **Sex**: _____

Age (hatchling, nestling, fledgling, juvenile, baby, adult): _____

Rescue/Transport volunteer name: _____ Phone: _____

Final Disposition (circle one) DOA Died in 24 Died PTS PTS in 24 (DISF DES DIFF) Date: _____

Transferred to: _____ Phone: _____ Date: _____

Released by: _____ Phone: _____ Date: _____

Liberty No.	Date In	Species	Origin Person/Place	Comments	Final Disposition
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______
		______ M F Age___			DIED, DOA, PTS——DIF, DES, FED Date ______ TRANSFERRED TO: ______ RELEASED BY: ______ Band No. ______ Location ______

Paperwork Quick Reference

Animals are tracked through each step of the rehabilitative process at Liberty Wildlife. Proper completion of necessary paperwork is crucial. The list below outlines the paperwork process.

When an animal arrives:

Complete check-in form	On all animals
Record in log book	Native wildlife only (See list on log book cover)
Prepare food chart	Raptors,waterfowl,mammals, birds being tube fed, or animals requiring food monitoring
Prepare medical chart	Raptors, waterfowl, mammals use preprinted medical charts, Songbirds and other small birds use chart cards.

Complete as needed:

Medication schedules	Prepared when medications are being administered on bright green cards.
Treatment schedules	Prepared when regular treatments are needed such as soaks, bandage changes, physical therapy, etc., bright green cards.

When animals are moved:

Record on medical chart	Record exact location

Final dispositions:

Complete Final Disp. slip	All native wildlife
Record on check-in form	On all animals
Record on medical chart	On all animals
Record in log book	All native wildlife

Handling and Restraint

Handling wildlife is not second nature! It is a skill, just like any other, that needs to be acquired. Both training and experience are required to help you develop the skills necessary for proper handling and restraint.

It is important to understand that secure restraint does not mean being heavy-handed. Keep in mind that these are living creatures. You can secure the animal and still be gentle. Think of a dog that is trained to use a "soft mouth" when retrieving. Gentle, gentle, gentle!

This section will cover the basic information you need to begin safe and informed interaction with wildlife.

We will discuss restraint equipment and the importance of using it correctly. Personal safety, including safety equipment and attire, are reviewed. The four types of handling are presented, along with the training procedure for each type. And, handling and restraint techniques for medical procedures are detailed, including notes on specific species.

Safety Review

Your personal safety is a crucial component of effective handling and restraint.

Take all necessary precautions to ensure your safety and the safety of others around you. Make sure you are completely comfortable with the material on safety that was presented in the section on Safety. Carefully review the material in this section on equipment and precautions.

Do not attempt any type of handling or restraint unless you have completed the necessary training on the procedure. Work with an experienced volunteer until such time as you are authorized to complete a procedure on your own.

Before attempting any type of handling or restraint be certain you are completely comfortable with the procedure and with the animal being restrained. Never attempt any type of restraint or handling unless you are personally comfortable with the circumstances.

Gloves

Use appropriately sized gloves for the bird and for you. Consider the size of the animal. Consider the distance the leg or head can reach. Consider the strength of the animal. And, of course, consider the species.
Always wear two gloves. In order to be prepared to react to any situation, you must be protected. Continue to wear both gloves throughout the procedure.
When dealing with possible infectious situations, do not reuse gloves without having them cleaned. Avoid contamination from animal to animal.

Rubber or latex gloves

Use rubber or latex gloves to protect yourself from dirt and disease. These gloves should be worn when preparing food or feeding, when handling small non-raptor infectious bird for procedures, or when the situation indicates this type of protection is appropriate. These gloves are available in latex and are sized (small, medium, and large) and are available in vinyl for people with latex allergies.

Small leather gloves

Small leather gloves are used for restraining small raptors such as kestrels, screech owls, burrowing owls, sharp-shinned hawks, and small waterfowl such as green herons. They will provide a small degree of protection for the hand, but do not provide coverage beyond the wrist.

Large leather gloves

Large leather gloves are used for restraining medium raptors such as great horned owls, red-tailed hawks, Harris' hawks, and large waterfowl such as egrets, black-crowned night herons, and great blue herons.

Eagle gloves

Eagle gloves are large leather gloves that are Kevlar-lined, providing better protection when working with very large or aggressive species such as eagles or ferruginous hawks.

Goggles

Goggles provide protection for your eyes and must be used when working with herons, especially great blue herons. They also should be worn in the outdoor enclosures. When you are wearing goggles, keep them on. One person should be fully protected to react to any situation and that person should be the handler. If you wear glasses normally, goggles can be worn right over the top of them.

Restraint Equipment

- **Towels**

Towels are often used as a substrate during procedures to provide a non-slick surface on which to work. They are also used to aid in restraint.

A towel can be wrapped around a bird's body to keep the wings from flapping. This is particularly useful in large birds with powerful wings or large wingspans. Towels can also be used to drape over the head of the animal. This aids in restraint by providing a dark environment for the animal, helping to calm it. A large towel can be used to initially secure an animal by holding it open as a visual barrier between you and the animal. When its vision is blocked you can safety drop the towel over the animal's head and body.

- **Cotton Tubes or "Socks"**

Socks are long tubes of cloth that can be placed over an animal. They cover the animal's head and body, including the wings which greatly restrict movement. This is useful when obtaining weights. Socks can also be used to aid in restraint during foot procedures.

- **Hoods**

Hoods are used to cover the head of the animal, which can help calm it. Hoods are commonly dark cotton drawstring bags, which cover the head and secure around the neck. It is important not to pull the drawstring too tight as you can restrict breathing. You should be able to put a finger easily between the bag and the neck of the animal. Custom hoods can be made of tooled leather and shaped to the animal's head. These hoods allow for easier breathing; however, they must be hand-tooled and fitted to each animal. Leather hoods are available for the eagles.

- **Booties**

Booties are small drawstring bags that cover the foot and talons of a bird. They work by reducing the animal's ability to open its foot. Depending on the "fit" of the booties, an animal can still grab to some degree so caution must still be used. Be sure to secure the booties with the drawstring, but do not pull the string too tight.

- **Anesthesia**

Anesthesia can be used for restraint. Medical procedures with restraint times greater than five minutes or those requiring full access to the animal during

restraint (limiting the handler) may be candidates for anesthesia. As with any medication, there are risks involved with administering anesthesia. These risks must be carefully evaluated. The condition of the animal must be thoroughly assessed to determine if the drug can be tolerated. Anesthesia is commonly available in an injectable form or as an inhaled gas and is administered under the direction veterinarians by experienced medical staff.

- **Get creative, but be reasonable**

Do what you must to provide secure restraint, but use common sense. Always remember, first, do not harm! Continue to carefully monitor the animal during any type of restraint.

Types of Handling

There are four types of handling that you will experience as a Medical Services volunteer. They are used for:

Medical procedures
Capture
Movement and care
Education wildlife

Each requires a different type of training. In this section we will first review the techniques for the last three handling types, followed by an in-depth discussion and workshop and the handling techniques for medical procedures.

Capture

Capture is the process used by Rescue and Transport volunteers to initially obtain an animal in the field. The goal of the capture process is to quickly and safely secure the animal for transport to Liberty Wildlife. Assessment is not done at this time, just capture, containment, and transport.

Training on capture techniques is provided through the Rescue and Transport group. As a Medical Services volunteer, you may be called upon to assist in a rescue. You may also need to use these skills should an animal escape its from its enclosure.

Classes on Rescue and Transport are taught at Liberty Wildlife. After attending the class, add your name to the Rescue and Transport list and respond to as many rescues as you can. It is the actual experience in the field that will increase your skill level. You must complete the Rescue and Transport class to be signed-off on your Medical Services training.

Movement and Care

You have already learned that wildlife don't understand that you are there to help. Every contact with a wild animal is perceived as a threat and it is up to us to make this perceived threat as quick and as low-stress as possible.

Animals will need to be moved. This is an unavoidable part of providing care. When an enclosure in Intensive Care needs to be cleaned, the animal must be removed. When animals in the Intensive Care area have completed their medical treatment, they are moved outside to larger cages or flight

enclosures. The Daily Care volunteers are well versed in these processes and have systems in place to make these necessary contacts effective yet brief, accomplishing the transport safely and with minimum stress to the animal.

The Orphan Care group also must move and provide care for the animals. These small birds must be handled when they are fed, when their enclosures are cleaned, and when they are transferred to outside aviaries.

When healthy animals, large or small, are ready for release, they must be moved into a carrier so they can be transported to the release site.

Keep these points in mind when handling an animal for movement or care:

Protect yourself
Protect the animal, adjusting to its injury
Be aware of your surroundings
Minimize contact. Have your next action planned
Anticipate what the animal will do
Avoid escapes
Expect the unexpected
Think quick!
Lead with your hands, not with your face

The techniques used in Daily Care and Orphan Care are important tools for every Medical Services volunteer to learn. To schedule a training session, contact the Daily Care and Orphan Care coordinators. If you are already actively volunteering in an area, you may have already received this important training, and may not need to repeat it. It is best to complete some Daily Care and Orphan Care training to better your skills for the Medical Services program.

Education Handling

Liberty Wildlife has birds on the premises that are used in educational programs. These birds were once injured and are not able to be released back into the wild. Because of this, educational animals have their own challenges. Most have an injury or other problem that may require ongoing medical attention.

For example, an amputation site can leave feather shafts exposed unnaturally, a potential hazard when blood feathers are coming in. Imprinted animals can exhibit unusual behaviors that can cause feather

plucking or aggression. As some of the animals have been with us for years, conditions can arise that are due to old age that are seldom seen in the wild where survival of the fittest is the norm.

It is important to become familiar with the educational wildlife at the facility before you will need to treat them. Study each individual. In the medical reference materials you will find *Audubon's Encyclopedia of Birds*. Look up the species and read everything you can find. It is important to understand each bird's feeding habits, nesting or migrating patterns, behavior, and normal sizes and weights. Then study the medical files that are kept on each animal.

We have generated a checklist of the educational wildlife to help you learn. This is a self-guided study program. Feel free to ask questions or ask for additional help as you review each case.

Volunteers in the Education Department have been trained to work with these animals in order to accompany them to educational programs in the schools or community. In turn, these animals have been trained or manned for use in education programs. These animals are assigned levels which correspond to their particular training level and the degree of experience needed by the Education handler.

Since it is important that these educational ambassadors are handled by methods they expect, the Medical Services staff must work closely with the education team or experienced staff so not to traumatize an education animal. This will retain the trust that has been established and nurtured between the birds and their handlers.

Painstaking work and patience has gone into the training (manning) of these birds. In the classes on handling you will learn the proper methods for interacting with manned birds and, equally as important, discuss understanding and respect for the animalís point of view.

In additional to normal educational handling, the educational animals need *medical* handling when they receive regular medical checks. This is accomplished by bringing the bird into an unusual location before it is "grabbed" so it will not be wary of rough handling its normal day-to-day procedures.

Handling and Restraint for Medical Procedures

This last type of handling is the type you will use most often.

Correct handling and secure restraint are the keys to quick, yet thorough, examinations, treatments, and other medical procedures.

Responsibilities of the handler

- **Secure animal**

This is your first priority. If the animal is not secure, proper medical treatment is difficult, sometimes impossible. Treating an unsecured animal is dangerous to the handler, to the person treating the animal, to others in the room, and to the animal itself.

- **YOU are the last chance**

In rear-end automobile collisions, traffic tickets are traditionally issued to the person in the back car. It is assumed that he or she had the last real chance to control the situation. The same concept applies here. You, as the handler, have the last real chance to control the situation. Don't allow a person or an animal to become injured. Take your responsibility seriously!

- **Communicate**

Vocalize! If you are losing your grip, say so. If you are uncomfortable with a restrain situation, speak up. If you are feeling light-headed or faint, let someone know immediately. It is important to maintain good communication during all procedures. Good communication is crucial for a quick and successful treatment.

- **Be Informed**

Of course, it is important to know the species you are working with prior to reaching in a cage or box. It will make quite a difference if you are reaching for a dove versus a hawk! It is equally as important to research the condition of your animal carefully before you reach for it. If an animal has a broken leg, you would handle it differently than if it has a broken shoulder.

- **Observe carefully**

Watch the animal and your co-workers carefully during all procedures. It is tempting to become involved in the medical process. Don't! Your attention must be 100% focused on the task at hand. This doesn't mean you are just watching the animal. Watch others, too. Make sure they are not in jeopardy.

- **Be aware**

Make sure you are comfortable while restraining, but don't let down your guard. An animal can sense relaxation in your grip and take advantage of it.

- **Secure, don't squeeze, choke, or smother**

An animal that is securely restrained can still breathe easily and circulate blood through its system. You can kill an animal by holding it incorrectly.

- **Offer and accept help**

If you see someone doing a treatment, offer your assistance to hold or help. If someone offers their help to *you*, accept it! Many situations can be done easier and with less stress when you have help.

Avian Restraint Techniques

Obtaining the Animal

When you must handle a bird, know what you are reaching for. Get a good understanding of the animal's condition if it is available. If you cannot predict the condition, as is the case when conducting an assessment, restrict the animal's movement as much as possible so as to limit the risk of further injury.

When you are getting an animal out of a cage or a box, first locate the position of the animal. Quickly, but gently, reach for the animal with the appropriate precautions and actions for the species. *Only after you have control of the animal should you remove it from its enclosure.*

It is crucial to restrain a bird's wings immediately upon moving an animal from a cage or box. Continue to hold wings in as you move the animal to another cage or a treatment area. Loose wings can be a danger to both the bird and to others. Flapping can further aggravate an injury or cause unnecessary trauma to muscles. Birds that are very young can break blood feathers or cause other damage to growing feathers. Also, wings can hit people causing injury to the head, face, or other areas--. Wings on large, strong birds can knock a person hard enough to stun them.

Keep hands, fingers, and other body parts clear of talons and beaks, too. A bird that might normally just use its feet for defense may resort to its beak when it discovers it is restrained. Always be prepared.

- **Raptors and Other Large Birds**

These birds are usually controlled by keeping one hand on their legs and feet, and the other on their head, beak, or shoulders.

When you hold a bird by its legs, always keep a finger between the legs. This provides additional cushion for the bird and more security for you as the handler. Hold in the middle of the leg just above the hocks for the most stability. Hold the legs in one hand with your index (pointer) finger between the legs. Wrap your thumb around one leg and the remainder of your hand around the other. Close your hand and keep it closed. Your hand should not be squeezing the legs of the animal, but rather should be securely closed on itself. If you have your hand positioned correctly, the animal cannot slip its feet out of your grip. You should be able to cover the feet with your gloved hand.

You can now place the other on the back of the bird to provide additional support. If the beak of the bird is long and pointed, hold it directly. If you have a hawk or other raptor, hold the head by circling one hand around the back of the neck. Never hold a bird or put pressure across the front of the neck. If you must secure the wings, drop your hand a little lower on the back so that you are holding in the shoulders. The subtle differences in these methods will become clear to you as you practice

- **Small Birds**

Small birds are escape artists! They can take advantage of any lapse of technique or attention and wiggle out of your grasp.

Hold a small bird in your hand so that your hand is across its back with its head sticking out between your first and second fingers. It is very important to position your hand correctly so that you do not impair breathing. With your hand you can hold the animal's feet, again keeping a finger between the legs.

If the bird is attempting to bite, you may have to shift your hand so that your thumb is against one side of its head to prevent it from twisting and biting.

Types of Medical Holds

Foot Procedures

When holding for foot procedures, particular care is needed to secure the animal. This is particularly important with raptors, as an unsecured animal could easily close its talons on a nearby hand.

Prepare the table for a procedure by placing towels on the surface. Next, place the bird on its back on the table. The bird can be hooded or you can cover the bird's head to help calm it, but be sure to allow enough space and movement for normal breathing. While wearing long gloves, place the bird so that its head is closest to you and its wings are between your forearms. If the bird is large or strong, you will need to wrap its body in a towel to help secure the wings.

Place one foot in each hand. This allows you to handle the feet separately. You will need to hold the foot that is being treated high on the leg to provide access for the caregiver. If you can, fully extend the leg, as the animal seems to have less strength in this position.

When one foot is being worked with, place a well-gloved finger across the pad of the other and encompass it completely with your hand. This leg can then be folded safely away from the treatment area. Remember, monitor the situation constantly and voice any concerns you have. Communication is critical during foot procedures.

Wing Procedures
When holding a bird for a wing procedure, it is important to provide easy access for the caregiver. The animal should be held in an upright position with the wing that is being treated facing the caregiver. It can be hooded to help keep it calm during the procedure.

Take precautions to make sure the bird does not flap its injured limb as this could exacerbate the injury.

Head Procedures
When holding a bird for an examination or treatment of the head, you will need to secure the body and feet with one hand and the head with the other. The easiest way to hold the head is to encircle the animal's neck from the back. Do not squeeze but rather lift lightly on the head to seat it in your hand. Applying this light pressure will keep the animal in the correct position. Take precautions and communicate clearly to avoid being bitten.

Body Procedures
It is difficult to hold a bird for an exam of the body. You have to secure the feet, head, and wings, and yet provide access.

The simplest way to hold for a body exam is to constantly readjust your hold as the caregiver moves from area to area. Again, this requires good communication. As with feet or wing procedures, hooding the animal can help to keep it calm.

If It Happens …
Despite everyone's precautions, there have been times when people have been "footed" by raptors. These powerful birds use their feet for catching prey and have the ability to "hang on" with an amazing tenacity.

Should you be "footed", the first thing to do is to remain calm. Do not try to pull out your hand, as this may cause further damage.

Remember, the bird is defending itself and trying to get away. If it has the option of escape, that is the choice it will make. The childhood agreement we all learned, "You let me go, I'll let you go," applies here! Communicate your action to others and allow them time to clear the area. Then, turn the bird away from you and toss it gently away from you. It will think that it is "flying" away and will usually release its grip in the process. It is a much easier task to recapture a bird than to forcibly remove one from a body part.

Raptors often leave puncture wounds which might seem small but can be very deep. Contact your personal physician or local human medical center immediately for instructions and treatment.

Specific Species

This section provides additional information on specific species.

- **Kestrels**

Kestrels are small falcons. They are high-strung and very vocal. In spite of their small size, kestrels can be dangerous. Their sharp, needle-like talons seem to have developed a second sense as to the whereabouts of your cuticle – a very painful lesson to learn. Also, they bite readily, causing the handler to be constantly aware of two ends at once! To remove a kestrel from its cage, enter from the small door with gloved hands. A small net or towel can be helpful. Kestrels can be escape artists, so stay alert!

- **Sharp-shinned Hawks**

Sharp-shinned hawks are accipiters – quick, darty fliers that earn each meal by capturing other birds. This ability makes them hard to capture and quick to dart out of even the smallest of openings.

- **Cooper's Hawks**

A slightly larger twin of the sharp-shinned hawk, the Cooper's hawk is also an accipiter. It's quick, darty flight give it the ability to escape through even the smallest opening.

- **Screech Owls**

Like most owls, screech owls seem to be slow moving. They will have sharp talons however and will use them to defend themselves.

- **Barn Owls**

These beautiful light-colored owls not only have sharp talons and beaks, they also have a loud, ear-piercing scream which can hurt your ears! The embodiment of "born to be wild", these animals seem wild and aggressive from day one. They have a tendency to fly right at you if they have no other option of escape.

- **Great Horned Owls**

This "tiger of the skies" is one of the strongest birds of prey, second only to the eagle group. Its long sharp talons can exert a pressure of about 80 PSI. Despite this strength, the great horned owl tends to be a calmer bird and will often appear to stoically tolerate handling. Do not let down your guard though; they did not get their nickname without good reason!

- **Red-tailed Hawks**

Red-tailed hawks can be very aggressive at times. They are a large hawk and have the ability to react quickly. Their talons are extremely sharp and long. It can also bite with its sharp beak. These hawks will often jump at the door of their cage when you approach. When moving a red-tailed hawk from its cage, it is important to move quickly and assertively, before it can react.

- **Harris' Hawks**

Similar in size to the red-tailed hawk, the Harris' hawk has one big difference to note when handling. The Harris' hawk has a much longer reach with its legs, not only forward, but also from side-to-side. The talons on this bird are extremely long and sharp and it can react quickly and will often jump at the door of the enclosure.

- **Ferruginous Hawk**

The ferruginous hawk is the most aggressive of the buteo group. A quick look at its short talons and toes can be very misleading to a handler. These birds require an experience handler for any movement or procedure.

- **Eagles**

Do not attempt to move, treat, assess, or in any way approach an eagle without the specific direction of senior Medical Services staff. Eagles are extremely strong and dangerous. The golden eagle can exert between 200 to 300 pounds of pressure in just one foot and can ratchet their foot closed, holding that pressure constant. Bald eagles are extremely aggressive and will not hesitate to take advantage of any lapse in technique or protocol.

- **Green Herons**

Although small, the green heron can still be a danger to eyes for someone unprotected or unaware of their ability to extend their neck.

- **Black-crowned Night Herons**

These birds are extremely aggressive and can extend their assumed reach by about 10 inches! Take special care when handling these animals. Wear protective eye wear in addition to the appropriate gloves.

- **Great Blue Herons**

If you have ever watched great blue herons fishing, you know first-hand the precision with which they can strike with their beak. They do strike for

the face and eyes so it is crucial to wear protective eye wear and constantly maintain a secure hold on their beak. The legs on a great blue heron must also be restrained as they hang down quite far and can produce nasty scratches on the handler or others in the area.

- **Geese**

Although they are waterfowl, geese act very differently than ducks. Geese are also aggressive and very strong. One good hit from their wings can cause a person to see stars. It is important to make sure you have secured their wings during *any* type of handling.

- **Dickie Birds**

Small passerines and doves tend to stress easily. Although they are not usually a danger physically to the handler, extreme caution must be taken to protect these delicate creatures. Do not hold too tightly and monitor their reactions closely.

- **Mammals**

Do not attempt any contact with mammals without the approvals and precautions that are defined in the mammal protocol. Do not handle bats under any circumstances. See the bat and mammal protocols in Section One for further information.

- **Reptiles**

Do not attempt any contact with reptiles without the approvals and precautions that are defined in the reptile protocol. See the reptile and venomous reptile protocols in Section One for further information.

Handling Checklist

Remember, Observe!
Your keen powers of observation can be your most important tool during restraint. As you hold, constantly monitor the animal's condition, its position, and the location of others in the area.

- **Monitor the animal**

Is the animal too stressed?
Is the animal breathing too hard?
Is the animal gasping?
Is the animal's color pale?
Is it still completely restrained?
The animal should be upright and comfortable whenever possible.

- **Just as important, monitor your handling position.**

Where are your hands and arms?
Are you keeping clear of the airway?
Are you covering the nares or mouth?
Are you restricting the animal's breathing?
Are you leaning on or against the animal's body?
Are you squeezing or holding too tight?
Are you impairing circulation?
Your handling should be gentle, yet secure.

- **Are others in jeopardy?**

Where are others in the area?
Are others reaching across the work area?
Are others leaning too near the animal?
Are others hands or other body parts in danger?
Communicate any concerns you have immediately.

- **Constantly re-evaluate!**

You will move, the animal will move, and others will move. Safe and secure handling and restraint means that you must constantly re-evaluate the situation and your technique.

Liberty Wildlife Medical Services

Medical Services Training Program

• Section Three •

Skeletal System and Feathers

Liberty Wildlife, P.O. Box 14345, Scottsdale, AZ 85267
Wildlife Hotline (480-998-5550)

Introduction to the Avian Skeletal System And Avian Feathers

Probably the most envied adaptation of birds is flight. This gift is owed to one of the simplest laws in aerodynamics – you have to be light enough to get off the ground! Many unique features of birds work together to make this possible. In this section, you will be introduced to two important components of avian structure: the avian skeletal system and the avian outer covering of feathers.

This part of your training will begin with an overview of vocabulary terms that are used in the Medical Services program. Next, the avian skeletal system, a critical foundation for future sections of this program will be discussed in detail. X-rays, common tools that are used to help identify irregularities in the skeletal system, will be viewed. This section also provides an overview of feathers, their structure and types. And, we'll end with an activity to diagram some of the parts and structures that you have learned.

Let's begin!

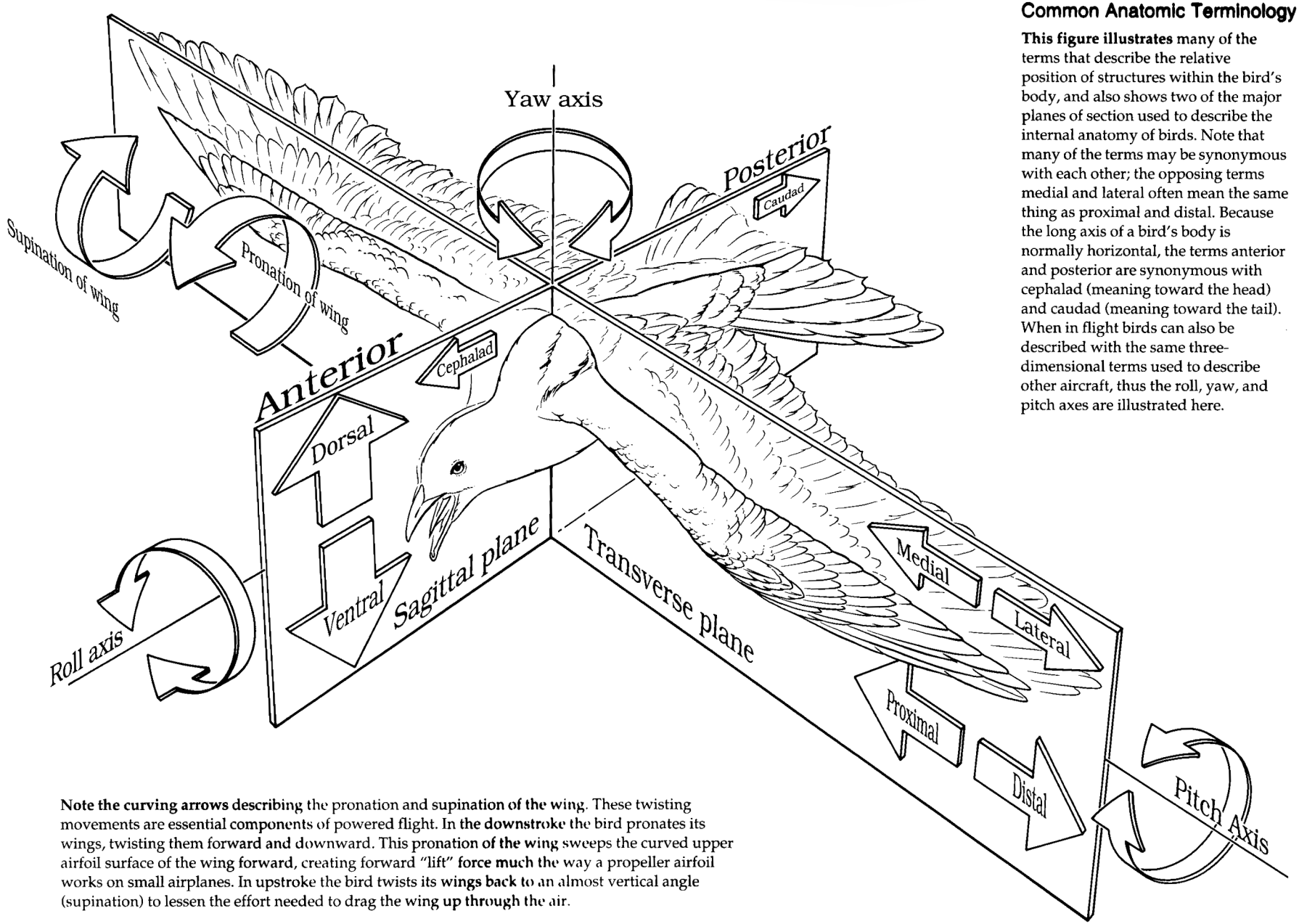
Vocabulary

The following terms will help you to describe avian anatomy by function or position. Many of these words have an opposing term that is listed in brackets.

Abdominal	Pertaining to the region between the thorax and pelvis
Air sacs	Air-filled sacs that are part of the respiratory system
Anterior [Posterior]	Directed toward the head
Apterium	Area bare of contour feathers
Axillary	Pertaining to the armpit or axilla
Brachial	Upper arm, area supported by the humerus
Buccal	Cheeks, the lateral walls of the oral cavity
Carpal	The wrist or wrist area
Caudal [Cephalic]	Toward the tail
Celiac	Pertaining to the abdomen or stomach
Cephalic [Caudal]	Toward the head
Cervical	Pertaining to the structures of the neck
Costal	Ribs or rib cage
Cranial	Pertaining to the head
Digital	Referring to fingers
Distal [Proximal]	Away from the point of attachment
Dorsal [Ventral]	The top side or back
Inferior [Superior]	Ventral or bottom
Lateral [Medial]	Farther away from the midline
Leading [Trailing]	Front (anterior) edge of the wing as the bird flies
Medial [Lateral]	Pertaining to or situated toward the midline
Occipital	Area where the spinal column meets the skull
Orbital	Pertaining to the eye sockets
Patagium	Tissue that connects shoulder area to the wrist
Pectoral	Ventral check area, between the sternum and shoulder
Pelvis	Caudal portion of the trunk or torso
Pneumatic	Pertaining to air or respiration
Posterior [Anterior]	Directed toward the tail
Proximal [Distal]	Nearest to the point of attachment
Sacral	Region between crests of the pelvis, fused synsacrum
Synsacrum	Fused section of pelvic and caudal vertebrae
Sternal	Pertaining to the sternum
Superior [Inferior]	Dorsal or top
Tarsal	Area of the lower leg containing the tarsometatarsus
Thorax	The part of the body between the neck and abdomen
Trailing [Leading]	Back (posterior) edge of the wing as the bird flies
Ventral [Dorsal]	Bottom, toward the abdominal side
Vertebral	Referring to the spinal column

Common Anatomic Terminology

This figure illustrates many of the terms that describe the relative position of structures within the bird's body, and also shows two of the major planes of section used to describe the internal anatomy of birds. Note that many of the terms may be synonymous with each other; the opposing terms medial and lateral often mean the same thing as proximal and distal. Because the long axis of a bird's body is normally horizontal, the terms anterior and posterior are synonymous with cephalad (meaning toward the head) and caudad (meaning toward the tail). When in flight birds can also be described with the same three-dimensional terms used to describe other aircraft, thus the roll, yaw, and pitch axes are illustrated here.



Note the curving arrows describing the pronation and **supination of the wing**. These twisting movements are essential **components** of powered flight. In **the downstroke** the bird pronates its wings, twisting them **forward and** downward. This **pronation of the wing** sweeps the curved upper airfoil surface of the wing **forward**, creating forward "lift" **force much** the way a propeller airfoil works on small airplanes. In **upstroke** the bird twists its **wings back** to an almost vertical angle (supination) to lessen the effort needed to drag the wing **up through** the air.

The Avian Skeletal System

The avian skeletal system is a rigid framework containing bones that are often fused or reduced in number from the mammalian skeletal system. This rigidity is necessary as a foundation for the attachment of the limbs and large flight muscles. The make-up and location of the skeletal structure centralizes the avian body mass that supports flight.

The avian skeletal system is divided here into four recognizable sections: the thoracic limbs (wings), the pelvic limbs (legs), the head, and the torso (thorax, pelvis, and tail).

The Thoracic Limbs

The thoracic limbs are the wings of a bird. They attach to the body at the shoulder and contain the humerus, elbow, radius, ulna, wrist, and the manus (carpus and metacarpus).

- **Shoulder**

The shoulder is the joint or point of articulation between the wing and the body. At this joint the proximal end of the humerus articulates with the glenoid fossa, a cavity formed by the scapula and coracoid.

- **Humerus**

The humerus is the bone of the wing located between the shoulder and the elbow. As in many other avian bones, the humerus is hollow, specialized for strength and lightness. The proper movement, including rotation, of the humerus is necessary for correct flight.

Although the humerus is a bone, it is also part of the respiratory system in birds as it is connected to the air sacs. When this pneumatized bone has open or compound fractures there is a danger to waterfowl (or other birds in water) as liquid entering the bone through the fracture site could actually cause the animal to drown.

- **Elbow**

The elbow is the joint or point of articulation between the distal end of the humerus and the radius and ulna.

- **Radius and Ulna**

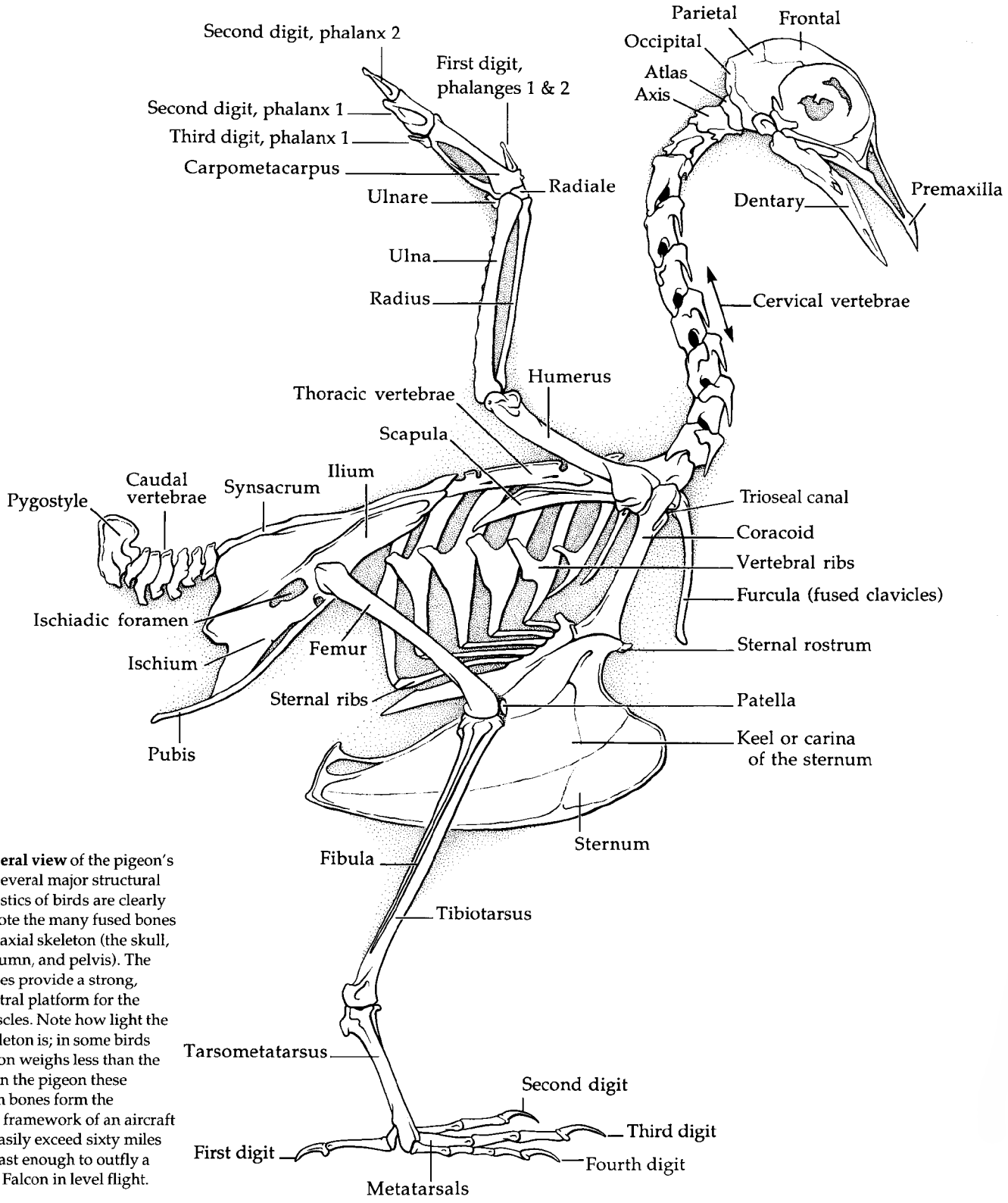
The radius and ulna are the bones of the wing located between the elbow and the wrist. As in many other avian bones, the radius and ulna are hollow, specialized for strength and lightness. The proper movement, including rotation, of these two bones are critical for correct flight.

The ulna is the larger of the two bones. The secondary wing feathers attach directly to the ulna. The radius is the smaller bone and is located closest to the patagium.

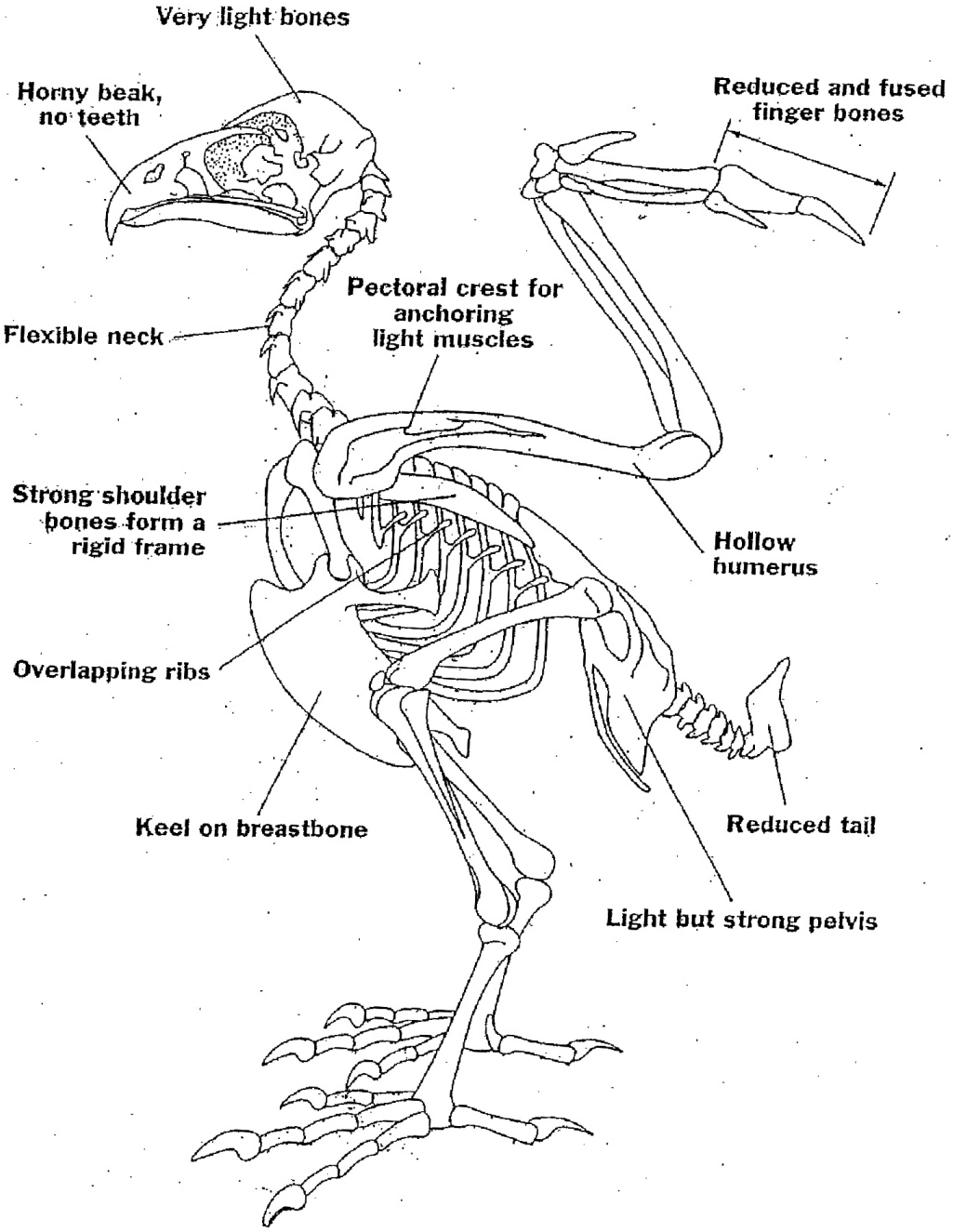
- **Wrist joint**

The wrist joint is the point of articulation between the distal ends of the radius and ulna and the carpometacarpals.

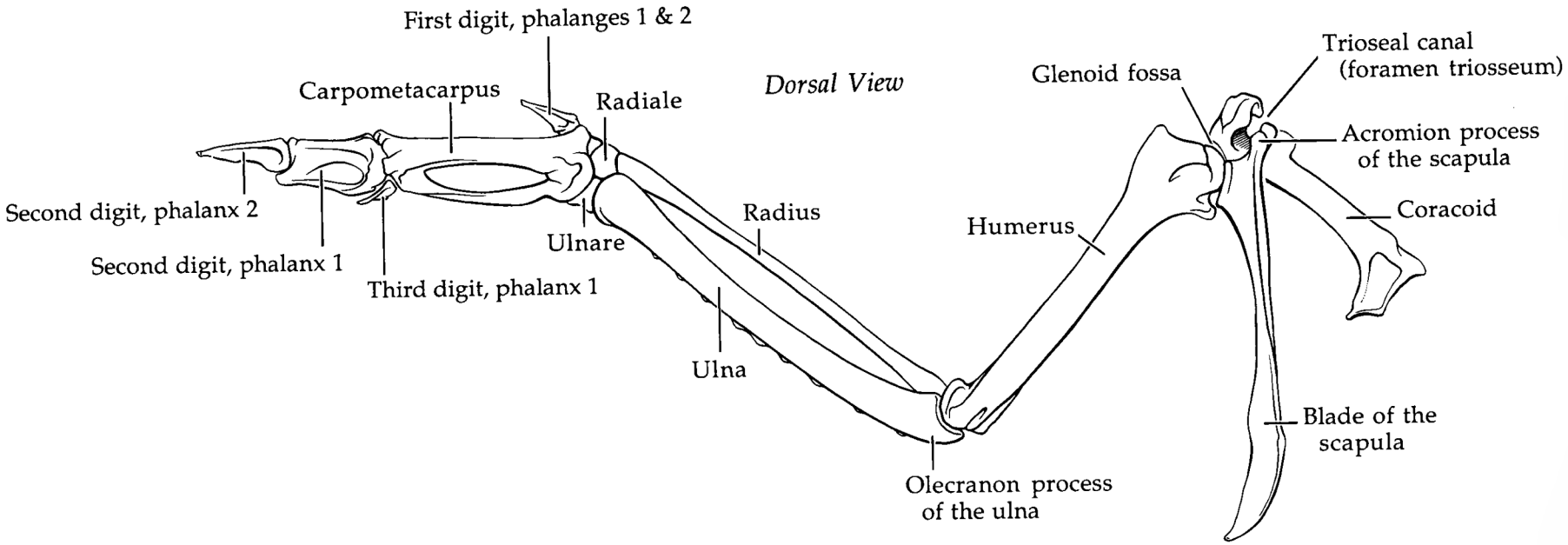
Lateral View of the Skeleton
Rock Dove (*Columba livia*)



In this lateral view of the pigeon's skeleton several major structural characteristics of birds are clearly visible. Note the many fused bones along the axial skeleton (the skull, spinal column, and pelvis). The fused bones provide a strong, stable central platform for the flight muscles. Note how light the bird's skeleton is; in some birds the skeleton weighs less than the feathers. In the pigeon these paper-thin bones form the structural framework of an aircraft that can easily exceed sixty miles an hour, fast enough to outfly a Peregrine Falcon in level flight.


Very light bones
Horny beak, no teeth
Reduced and fused finger bones
Pectoral crest for anchoring light muscles
Flexible neck
Strong shoulder bones form a rigid frame
Hollow humerus
Overlapping ribs
Keel on breastbone
Reduced tail
Light but strong pelvis

Superior View of the Left Wing Skeleton
Rock Dove (*Columba livia*)



The wing plan seen from above is remarkably simple, yet it is structured for maximum efficiency and light mass. The flight muscles of the breast attach to the short, powerful humerus, which bears the main stresses during both the upstroke and the downstroke. The radius and the heavier ulna support the mid-wing area. As in the human forearm, the two bones are designed to allow some twisting (pronation and supination) of the wing during flight. Note the row of tiny dimples along the trailing edge of the ulna; these bony knobs show where the secondaries are fixed to the wing along the ulna. Farther out on the wing the primaries attach to the carpometacarpus and the phalanges of the second and third digits.

Carpus, metacarpus

The manus (hand) bones of a bird are the bones at the distal end of the wing. This area contains both separate and fused bones, including the phalanges or digits.

The carpus consists of the radial carpal bone and the ulnar carpal bone. The radial carpal bone is cranial and the ulnar carpal is caudal.

The minor and major metacarpals fuse, both distally and proximally, to form an opening called the intermetacarpal space. These bones support the alular digit or thumb (digit one). The remaining two digits are the proximal and distal bones of the second phalanx (digital two) and the small phalanax minor digit (digit three). Most of these bones are extensively fused and modified to support flight.

The Pelvic Limbs

The pelvic limbs are the legs of a bird. They attach at the hip and contain the femur, knee, tibiatarsus, fibula, ankle, tarsometatarsus, and the digits or toes.

- **Hip**

  The head of the femur articulates with the ilium of the pelvis at a cup-shaped structure on the ilium called the acetabulum. This point is usually located within the trunk of the body.

- **Femur**

  The long proximal bone of the leg is the femur

- **Knee**

  The knee is the point of articulation between the femur and the tibia.

- **Tibiatarsus/fibula**

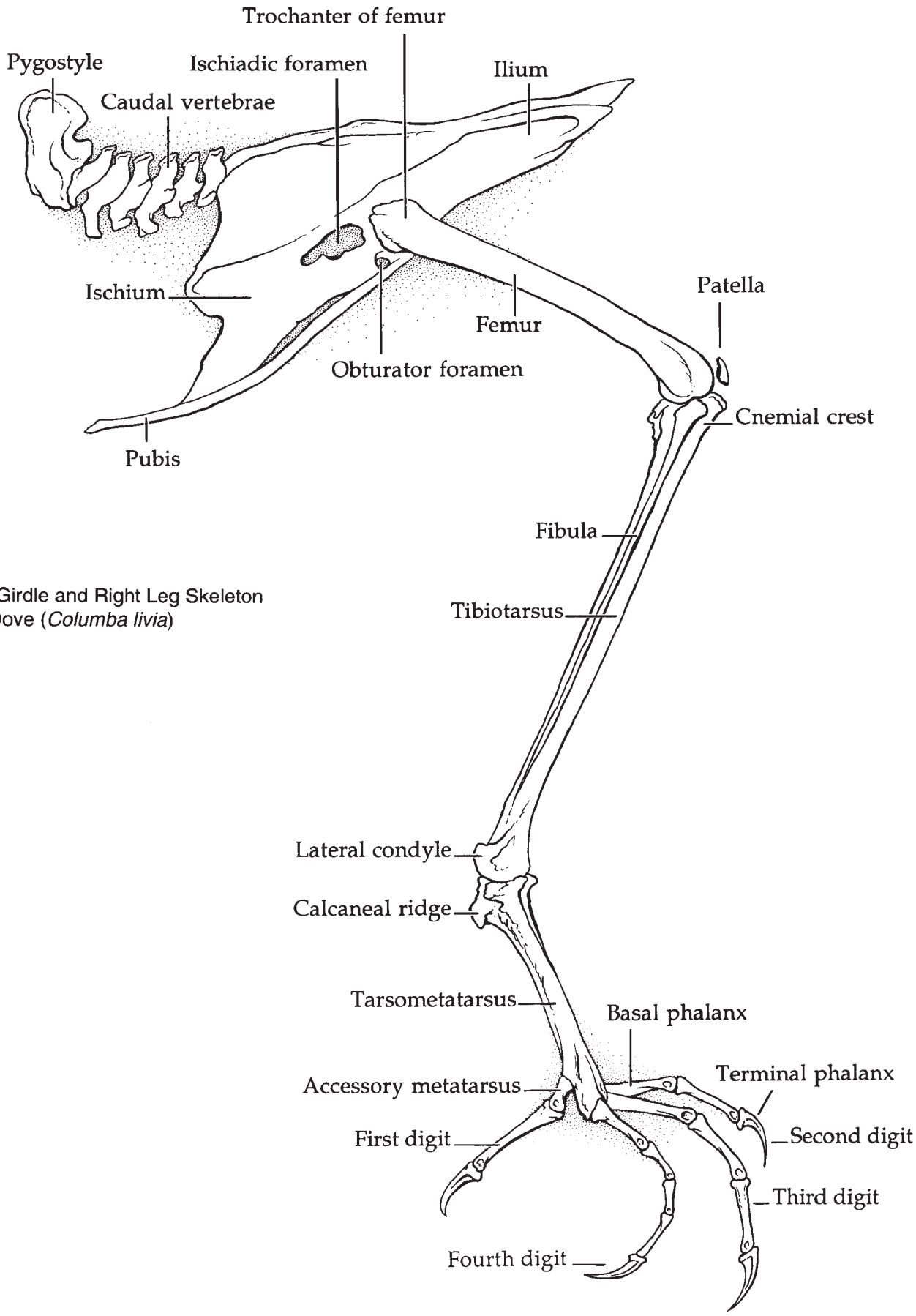
  The tibiatarsus is the long bone that is distal to the femur. It is a fused bone containing the tibia and upper bones of the foot. The fibula is a small bone that runs parallel to the tibiatarsus on the lateral side of the leg.

- **Ankle**

  The ankle is the point of articulation between the tibiatarsus and the tarsometatarsus.

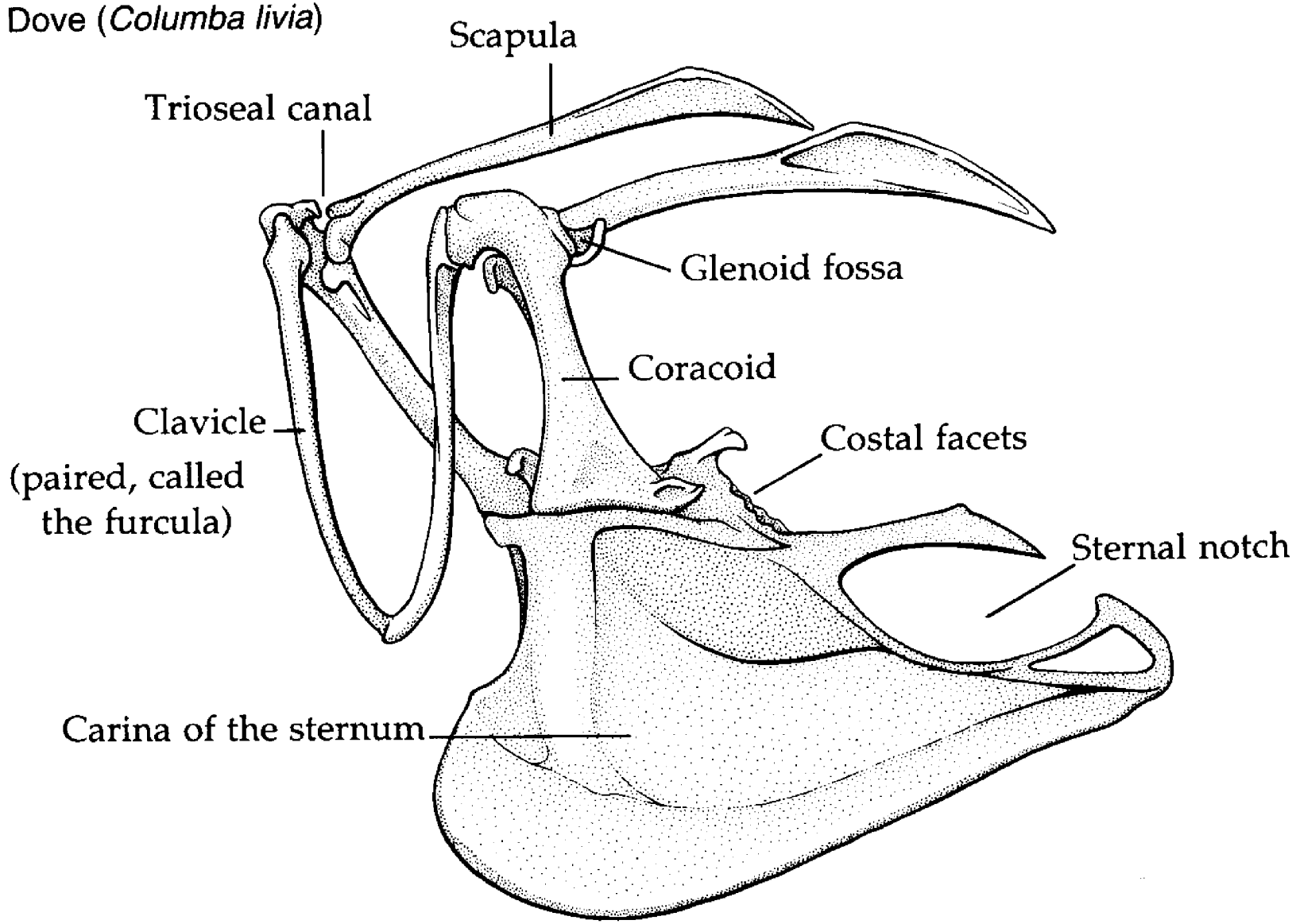
- **Tarsometatarsus**

  Distal to the tibiatarsus, the lower bones of the foot are fused and stretched to form the tarsometatarsus.



Pelvic Girdle and Right Leg Skeleton
Rock Dove (*Columba livia*)

Pectoral Girdle
Rock Dove (*Columba livia*)



Digits

The digits, metatarsals, are the toes of the foot. The digits fall into specific arrangements known as toe configuration which vary according to species. The first digit of the foot, the hallux, is similar to the human big toe. On toes with raptorial arrangement, the hallux is the back toe. With the hallux as the first toe, the other digits are numbered with the inner toe as number two, the center forward toe as number three, and the outer toe as number four.

The Head

In the avian skull most of the bones are fused. Others allow for flexibility with the upper and lower mandibles. Huge spaces are available for the eyes. Facial bones are reduced to a network of struts that support the beak. Additional bones are located in the tongue.

The Torso or Trunk

The torso of the bird's body contains all structures exclusive of the head and limbs.

- **Vertebral Column and Rib Cage**

The vertebrae are the bones of the spine and are grouped by location in the spine:

- The neck or cervical area has from 13 to 25 vertebrae, depending on the species – as compared with the seven vertebrae found in people
- The thorax or thoracic area has five vertebrae which are fused.
- The lumbar or abdominal vertebrae (three) are fused with the pelvic or sacral vertebrae (four) and six of the anterior caudal or tail vertebrae to form a fused spinal column of 13 vertebrae called the *synsacrum*.
- The remaining six free caudal vertebrae form the tail and end with the *pygostyle*, a fusion of final caudal vertebrae which form a flat blade of bone that supports the muscle and connective tissue of the tail.

- **Thorax and Sternum**

The thorax contains the sternum and the ribs. The sternum is the breastbone. On most avian species the sternum has a bony keel, a special adaptation found on

flying birds.

There are seven ribs on either side of the vertebral column, two of which are tiny and do not attach to the sternum. The remaining five are composed of two pieces which helps to strengthen the rib cage for flight.

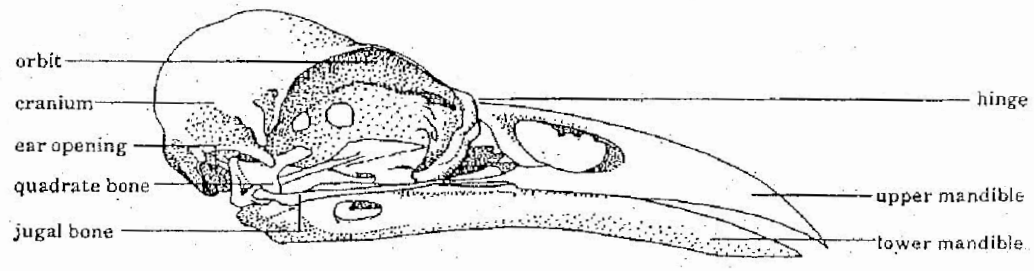
Pectoral Girdle

The pectoral girdle contains the sternum, the coracoids, the scapulas, and the clavicles. The sternum is the breastbone. The coracoid links the sternum with the shoulder area. The scapula extends posteriorly from the superior end of the coracoid and provides for attachment of the shoulder muscles. The two fused clavicles descent from the superior end of the coracoid and provides for attachment of the breast muscle.

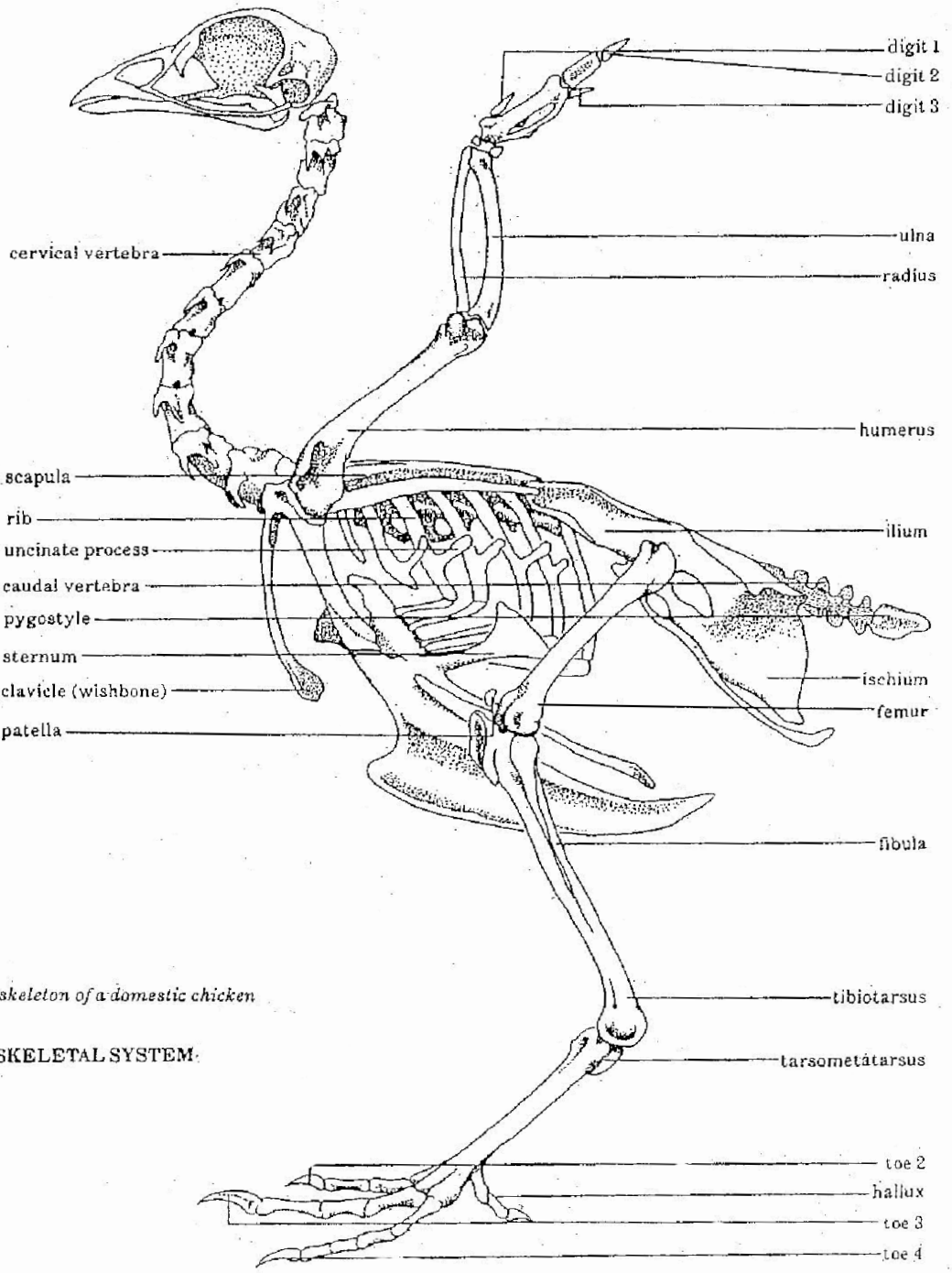
A very important structure, the *trioseal canal*, is formed by three bones: the clavicle, the coracoid, and the scapula. The trioseal canal enables the bird to lift its wing using the muscles of the breast. This keeps its body mass centralized, an important adaptation for flight.

- **Pelvic Girdle**

The pelvic girdle contains three principal bones called the ilium, the ischium, and the pubis. The fused spinal column, the synsacrum, joins with these extensively fused bones to form one unit of bone that makes a strong foundation for attachments of the legs. The pelvis also protects the contents of the abdomen.



skull of a crow



skeleton of a domestic chicken

SKELETAL SYSTEM

Avian Skeletal System

Humerus X-Ray Study

This self-study program uses x-rays in the packet labeled "X-Ray study – Humerus #1 thru #19." Using an X-ray viewer, study each x-ray as you read the information listed below.

#1 On this first x-ray, learn the location of the humerus in relation to the head and tail of the animal. Where is your humerus?

#2 Positioning is often the key to success for your observations! It's hard to distinguish bones when they are "on top" of each other.

#3 It can be difficult to examine the humerus when the wings are folded. However, it would take a big x-ray to show extended wings on this Bald Eagle baby! Can you see something in the x-ray that might cause this bird problems?
(Hint: Remember bald eagles like to eat fish!)

#4 Can you find the humerus on this Barn Owl?

#5 How about on this Swainson's Hawk?

#6 Can you find the humerus on this Harris' Hawk?

#7 Note the long humerus on this Great Blue Heron.

#8 Can you find the small humerus on this Cardinal?

#9 Same birds, two positions. The left half shows a front view. The right half shows a side (lateral) view with the wings pulled back. Can you locate the remains of this bird's last meal?

#10 Red-tailed Hawk, lateral view with both wings pulled back. Can you locate both humerus bones?

#11 Sometimes X-rays are ver light or very dark, making them difficult to read.

#12 Can you find the humerus fracture on this Flicker? Note the location of the fracture. This would be identified as a mid-shaft fracture as the break is located about halfway along the length of the bone.

#13 Can you find the humerus fracture on this Flicker? It is probably the result of being shot. Can you see the shot in the X-Ray? This fracture has a poor prognosis because the break is close to the joint and the bone is broken into many pieces or *comminuted*.

#14 Can you find the multiple fractures of the humerus on this Kestrel?

#15 Can you find the multiple fractures on this Great Horned Owl?

#16 What do you think caused these fractures on this Cooper's Hawk?

#17 How would you describe the type and location of this fracture?

#18 This humerus has been pinned to help stabilize the fracture until it heals.

#19 Yeah! A good view of an intact humerus.

#20 When you have finished this exercise, return the x-rays to the envelope, leaving them in numerical order for the next person.

Feathers

Feathers are another unique adaptation of birds. They are made of keratin. Feathers shield the skin from damage, protect the bird from extremes in temperature, and aid in flight.

The Parts of a Feather

- **Shaft**
  The shaft is the supporting structure in a feather. It runs lengthwise through the feather.

- **Vane**
  A broad flexible vane extends from either side of the shaft.

- **Barbs**
  The vane contains barbs which extend from the shaft. The barbs contain other small structures which hook together and help the feather maintain its shape.

- **Quill**
  The quill is the exposed end of the shaft which is not covered.

- **Sheath**
  The feather emerges from a feather follicle in a sheath which provides protection.

- **Molt**
  The process of replacing worn feathers is called a molt. Most feathers are molted a few at a time so that the bird can still fly, but sometimes feathers are molted all at once leaving them flightless for a short period of time.

- **Plumage**
  The feather covering worn between molts is called the plumage. A bird's plumage can vary by age and season.

Types of Feathers

There are many types of feathers on a bird. They can vary by location and species. They vary in number, too. A Trumpeter Swan may have over 25,000 feathers and yet a Hummingbird may have less than 1,000.

- **Contour feathers**
  Vaned feathers of the body and wings.

- **Remiges**
  Flight feathers of the wing. They include primaries, secondaries, and tertiaries.

Primary feathers are the large flight feathers located on the distal end of the wing. These are the largest feathers. Most birds have ten primary feathers (songbirds have nine) which are attached at the carpus and metacarpus. The first primary feather is located at the wrist. The primaries continue laterally in number. For example, the number ten primary is usually the first feather found on the distal end of the wing.

Secondary feathers are the flight feathers proximal to the primaries. They attach at the ulna. The first feather at the distal end of the ulna is the first secondary.

Tertiaries are the three or four feathers proximal to the secondaries which lie between the wing and the body.

- **Other body and wing feathers**
  Scapulars are the small contour feathers that cover the scapula.

The *alular quills* are the feathers (usually three) that extend from the alular or first digit.

The *wing coverts* cover the wings and the axillar region.

The *crurals* are the feather coverings on the legs.

Crest feathers extend from the crown of the head.

- **Rectrices**
  The rectrices are the large, vaned flight feathers of the tail.

- Semiplumes
  Lie under the surface of feathers providing insulation and aerodynamic contouring.

- **Down**

  Adult down provides a layer of insulation under other feathers. Natal down, which covers hatchlings, provides insulation. Natal down is often pushed out by other plumage and can appear as tufts at the tips of new feathers.

- **Powder down**

  Special feathers with barbs that shed at the tips. This shed feather is powder-fine and provides waterproofing.

- **Bristles**

  Bristles are contour feathers without vanes. Not all birds have bristles. They are usually found on the head near eyes, nares, and around the mouth.

- **Filoplumes**

  Long hair-like feathers that are throughout the plumage. They help determine the location of feathers and provide a sense of touch in the plumage.

Medical Services Practice Worksheet

Section Three • Avian Skeletal System and Feathers

Vocabulary March

Write the number of the term next to the appropriate description.

1.	Buccal	___	Pertaining to the structures of the neck
2.	Cephalic	___	Pertaining to the eye sockets
3.	Orbital	___	The wrist or wrist area
4.	Synsacrum	___	Pertaining to the armpit
5.	Pneumatic	___	Area bare of contour feathers or axilla
6.	Brachial	___	Pertaining to the head
7.	Abdominal	___	Area where the spinal column meets the skull
8.	Vertebral	___	Directed toward the head
9.	Costal	___	Referring to fingers
10.	Lateral	___	The top side or back
11.	Air sacs	___	Ventral or bottom
12.	Tarsal	___	Pertaining to or situated toward the midline
13.	Patagium	___	Farther away from the midline
14.	Leading	___	Upper arm, area supported by the humerus
15.	Superior	___	Ventral chest area, between the sternum and shoulder
16.	Sternal	___	Tissue that connects shoulder area to the wrist
17.	Apterium	___	Toward the head
18.	Inferior	___	Pertaining to the abdomen or stomach
19.	Celiac	___	Ribs or rib cage
20.	Pelvis	___	Caudal portion of the trunk or torso
21.	Medial	___	Front (anterior) edge of the wing as the bird flies
22.	Occipital	___	Cheeks, the lateral walls of the oral cavity
23.	Anterior	___	Air-filled areas that are part of the respiratory system
24.	Caudal	___	Away from the point of attachment
25.	Pectoral	___	Toward the tail
26.	Cranial	___	Nearest to the point of attachment
27.	Trailing	___	Pertaining to the sternum
28.	Posterior	___	Directed toward the tail
29.	Distal	___	Pertaining to the region between the thorax and pelvis
30.	Sacral	___	Referring to the spinal column
31.	Dorsal	___	Pertaining to air or respiration
32.	Proximal	___	Fused section of pelvic and caudal vertebrae
33.	Digital	___	Region between crests of the pelvis
34.	Cervical	___	The part of the body between the neck and abdomen
35.	Thorax	___	Area of the lower leg containing the tarsometatarsus
36.	Axilliary	___	Bottom, toward the abdominal side
37.	Ventral	___	Back (posterior) edge of the wing as the bird flies
38.	Carpal	___	Dorsal or top

39. Avian structure has several adaptations that support flight. Name three.
    1.
    2.
    3.

40. Name four bones found in the thoracic limb.
    1.
    2.
    3.
    4.

41. Name a pneumatized bone.
    1.

42. List the three largest bones of the pelvic limb.
    1.
    2.
    3.

43. What is the synsacrum?

44. Name the four bones of the pectoral girdle.
    1.
    2.
    3.
    4.

45. What is the importance of the trioseal canal?

46. What are the three principal bones in the pelvic girdle?
    1.
    2.
    3.

47. Name four parts of a feather.
    1.
    2.
    3.
    4.

48. What is a molt?

49. Name five types of feathers and their location.
    1.
    2.
    3.
    4.
    5.

50. You have completed Section Three, Avian Skeletal System and Feathers. What was the most interesting part of this section to you?

Liberty Wildlife Medical Services

Medical Services Training Program

• Section Four •

Assessment

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Introduction to Assessment

Assessment is the process by which we determine an animal's condition and decide what action to take.

There are many factors to be considered in assessing an animal. How much handling can the animal tolerate? What is the priority of treatment? Should food and water be offered? All of these are important questions that must be answered to properly assess a new animal. There is much to learn! Let's begin.

Medical Abbreviations

New wildlife must be checked in upon and there are many abbreviations you will use in you observations.

Common medical abbreviations

BAR	Bright, alert, and responsive
CNS	Central nervous system
Df/Dx	Differential diagnosis
Dx	Diagnosis
DOA	Dead on arrival
FOG	Found on ground
Fx	Fracture
g	Gram
gm	Alternative for gram
HBC	Hit by car
H2O	Water
Hx	History
Lat	Lateral (x-ray position)
NPO	Nothing per os (nothing by mouth-no food or water)
NSF	No significant findings
PLR	Pupillary light response
PO	Per os (by mouth)
PRN	As needed
PTS	Put to sleep
Rads	Radiographs (x-rays)
Re√	Re-check
R/O	Rule out
Rx	Medications
Sx	Surgery
Tx	Treatment
V/D	Ventral/Dorsal (x-ray position)
w/ or c	with
w/o	without
WDQ	Warm, dark, and quiet

Common animal abbreviations

BCNH	Black crowned night heron
CB thrasher	Curve-billed thrasher
GBH	Great blue heron
GHO	Great horned owl
HH	Harris hawk
I dove	Inca dove
M dove	Mourning dove
RT	Red-tailed hawk
SS hawk	Sharp-shinned hawk
WW dove	White wing dove

Assessment Charting

Whenever you assess, treat, or move an animal you will be responsible for recording the information in its chart and completing any accompanying paperwork correctly.

The Medical Chart

Each animal must have a medical chart completed upon assessment. The medical chart records assessment information and treatment on the animal and follows the animal throughout its treatment.

The medical chart consists of three separate sections.

- The first section contains the record information on the animal, including the species, date in, and the log number.

- The second section contains the condition of the animal upon check-in, any initial treatment administered, and a section for additional notes or comments.

- The third section is the ongoing care log where additional treatments and ongoing condition reports are recorded.

Liberty Wildlife uses two types of medical charts. The large charts are 8 1/2 X 11 pages which are lined on the front and back. These are used for the large birds or unusual birds. Small blank cards are used as medical charts for dickie birds. Both type of medical charts should include all three sections.

Recording in the Medical Chart

When writing in medical charts use proper terminology. If you are not certain of a term, look it up or ask. If you can't identify a location, describe the area surrounding the location and include directional information.

When recording information on a medical chart it is important to note information that is *known*, not that which you assume. This is important in any type of observation. For example, if an animal is found on a road, record "found on road", not "hit by car". When an animal does not hold up its head, record "head hanging", not "broken neck". Clear, descriptive information is the best communication.

Record what you find, both normal and abnormal observations. For example, you might note "mouth clear, eyes bright, cloudy discharge from both nostrils, and color good".

It is important to make regular notations on the medical charts. These remarks will include progress of condition, treatments given, medications started or stopped, outside treatments such as X-rays or visits to specialists, and even behavior notations. Be sure to use language that communicates plainly and clearly. Write clearly or print at all times using only black or blue ink. Record the date and your initials on all notes.

Education animals have medical charts, too. Items that should be recorded are wellness checks, any medical concerns or treatments, beak coping, talon trimming, jessing, behavior changes, cage movement, or any other information that might prove valuable to have on file.

Medical Chart Location

When an animal with a large medical chart is actively being checked or receiving treatment, the chart will usually be attached to the front of its Intensive Care cage. When the animal is stable, the chart will be placed in a folder and filed with other *Intensive Care* charts.

Small animals have their medical chart (the small card) attached to the front of their cage until they leave Intensive Care.

Active medical charts are kept in a file cabinet in the Intensive Care area. When animals are moved out of Intensive Care you must indicate the specific cage where the animal has been moved and place the chart in the appropriate section in that cabinet. There are sections for *Close Monitoring Outside, Active Rehab Outside, Non-Releasable Outside, Ready For Release*, and *Final Disposition*.

Stress Management

Before you assess an animal, it is crucial to understand the effects of stress.

Stress alone can kill an animal. Wild animals do not want to be around people. If you approach animals in the wild, they will usually retreat to a safe distance. Being held by a human is very stressful for a wild animal. *They do not understand that you are trying to help*. Sometimes, even critical, life-saving measures may be too much for an animal to tolerate.

Quite often, only the bare minimum of treatment can be initially tolerated. You may not have time to complete a thorough assessment. It will be up to you to make sure that the animal's condition is carefully monitored and that care is taken to limit the animal's stress at all times.

It is often a very fine line that we walk during assessment. Keep any contact short, concise, and as low-stress as possible.

The following points will help avoid over-stressing wildlife.

- Keep animals warm, dark, and quiet
- Know when *not* to treat
- Keep bird's head and face covered when possible
- Do not peek in cages
- Do not handle an animal unless absolutely necessary
- Do not put an animal next to a predator that it can see
- Do not place an animal's bin where it can see people *above* it
- Limit the time needed for assessment

Think About It... 90,000 Pound Animals

by Jean Peters
Columbus, OH

Reprinted with permission from Of Fur and Feathers (January 1995), newsletter of the Ohio Wildlife Center Volunteers.

This morning I tripped over my cat. With a cranky ìyeow!î, he once again ran out from under the behemoth (me). He is used to this huge animal tromping around the house. As an ex-farm girl, the thought occurred to me that he must perceive me the way I would perceive a horse or cow when I am near them. I am always cautious around those very large animals. Even at their most friendly and calm, their mere body size can give me a nasty bump or broken bone by a misplaced foot or toss of their head.

I then computed how ìbigî people must be to my cat, just to get a perspective from human terms. Henry is very fat, around 15 pounds. Assuming a person is 150 pounds, then that is ten times bigger than my cat. An animal that is ten times bigger than a 150 pound human is a 1,500 pound animal! I suddenly had profound respect for all my cats. It must be a daily exercise of faith for them to lay sprawled on the floor with me stumbling around.

Then I thought about all those little animals at the OWC clinic. What would it be like to be a bird that weighs .25 lb., and that has never been touched by human hands before? A 150 pound human weighs six hundred times more that a .25 lb. bird. It would be as if we humans were being handled by something that weighs 90,000 pounds! What a fright!!

I thought how we humans are carnivores, complete with pointy teeth. What would I feel like being held by a 90,000 pound carnivore who was tossing me from paw to paw while I watched its open mouth as it howled (i.e., talked and laughed) with the 3-4 other 90,000 pound carnivores surrounding me? How would I feel if I was confined in a small cage where 90,000 carnivores could grab me at will? My adrenaline would be pumping, to say the least.

We humans are arrogant even in our kindness. We think that because we have good feelings and intentions our actions can have no negative impact. Well, I do not care how ìfriendlyî any 90,000 pound carnivore would be. I would be scared for my life around it, whatever it was doing. Its size alone could cause me to be squashed like a bug.

So, letís remember that we cannot ever neglect to look at our actions from the animalís perspective. Dr. Burton says we should be able to give a thorough physical exam in under a minute or two. We urge people to be quiet in the treatment area when an animal is being examined. We ask people to keep doors closed to the clinic wards. The animals are the reasons for these policies. ìUnder a minuteî could be a code of ethics that wild animals would really like when it comes to the ì90,000î pound human beings surrounding them.

Jean Peters is newsletter editor of the Ohio Wildlife Center volunteer newsletter and Secretary and newsletter editor of the Ohio Wildlife Rehabilitators Association.

Stress Management in Songbirds

By Bea Orendorff

Introduction

One of the top killers of songbirds in a captive rehabilitation situation is stress, including stress induced problems. Songbirds are prey species and as such are instinctively always on the lookout for danger, which causes them constant stress. If a prey animal such as a songbird is injured or sick, it must hide its injuries or increase the chance of becoming someoneís meal ñ predators would rather go after a debilitated animal than a healthy one because it is easier to capture.

Even nestling and fledgling songbirds can be adversely affected by stressful situations and instinctively hide discomfort as long as possible. By the time a songbird exhibits obvious signs of illness it is often too late for effective treatment. Rehabilitators must always be alert to any changes in behavior, however slight because it may mean the difference between life and death. This paper will suggest ways to reduce stress in young and adult songbirds by modifying their environment as well as the rehabilitators housing and husbandry protocols.

What is stress?

Websterís College Dictionary defines stress as 1. ìPhysical, mental, or emotional stress or tensionî and 2. ìa specific response by the body to a stimulus, as fear or pain, that disturbs or interferes with the normal physiological equilibriumî.

Physiological effects of stress on the body

Clinical signs of stress include muscle weakness and trembling, bilaterally symmetrical alopecia, atrophy of temporal muscles, enlarged abdomen, weight loss, increased susceptibility to bacterial infections, impaired antibody response, high blood pressure, anorexia, poor would healing, frequent urination and high consumption of water (Fowler, 1986).

From a medical point of view, there are two types of stress. Acute stress

(sudden but limited in duration and usually not fatal, unless the animal is severely compromised); and chronic stress which lasts for long periods of time. Rehabilitators are concerned and deal primarily with the latter.

Early on, a stressed animal tries to produce glucose for energy to cope with the stress. In its effort to do that, the body tries to break down other tissues such as proteins and fats. As a long-term result, the animal uses up its store of glucose and breaks down its muscle tissue. If the stress is kept to a fairly low level and the animal is eating well (taking in up to 150% of its normal food intake), it might be able to survive for a long period of time. However, the more the body works to respond to stress, the more difficult it is for it to direct its energy to healing. The body may simply not have the resources to make good quality protein, bone or collagen while it is responding to stress.

When a captive animal is under stress for long periods of time (days, weeks or even months) the body produces hormones called corticosteroids from the adrenal glands. These hormones change the balance of almost every chemical reaction in the body. Corticosteroids have a depressing effect on the immune system of the body, reducing the bodyís ability to respond to and fight infectious organisms such as viruses and bacteria. When the level of corticosteroids is high, the cells in the body which normally respond to infectious organisms either are not produced (mononuclear cells like lymphocytes) or are not able to completely fulfill their function (e.g. polymorphonuclear cells such as heterophils can grab bacteria but cannot break them down).

In cases where stress continues for a prolonged period, an animal reaches a point where it can no longer respond to the demands placed upon it; it simply canít catabolize (oxidize) any more of its muscle mass. Picture the following scenario: You have an animal which seems to be holding its own and looks fairly healthy. You pick up the bird to treat it, and it dies. This is a case of acute stress adding to chronic stress in a bird which was just barely dealing with the situation (Pokras, 1984).

Severe physiological and/or psychological stress can also have serious effects on the feathers. Two conditions frequently seen in rehabilitation facilities are:

1. Stress marks (a.k.a. stress lines or stress bars). Stress marks are caused by severe stress that occurs at a particular point in the growing feathersí development such as in nestlings or fledglings whose feathers were not fully developed at that time, or adults during molt. Stress marks look like opaque, then (usually less than 1/16î wide) lines that may extend across the width of theentire feather or just across part of it. They are most noticeable on tail and wing feathers but can occur on any feathers (Orendorff, 1997). These weak spots are not waterproof and are very susceptible to breaking (Erica Miller, 1998).

2. Sheaths that are not breaking away from wing and tail feathers of a nestling. Each feather is only partly free of its sheath and the rest of the feather (one half to two thirds) remains encased in its sheath. This occurs when a nestling has undergone severe stress (such as losing its parents, starvation, etc.) at the critical time when its feathers were supposed to erupt from their sheaths (Ordenforff, 1997).

Rehabilitators should keep in mind, however, that stress is not just a ìfour-letter wordî. Some degree of stress is necessary to stay alive. That same surge of adrenaline that the body releases when faced with acute stress caused by fear is responsible for the ìfight or flightî mechanism taking effect. This adaptation for survival insures that, when faced with danger, an animal will respond by either fleeing or fighting, depending on which is appropriate to its species.

Causes of stress

Psychological Stress. Inability to flee: fear any unknown or unfamiliar situation, sight or sound: humans: cats and dogs: other unfamiliar animals (such as farm animals for city birds): loss of habitat mate, offspring, nest: solitude (or signal birds): being housed with other birds (for solitary ones): rest-rank inability to make choices (perhaps one of the most stressful factors in captivity and one of the easiest to correct) are all examples of psychological stress.

Physiological Stress. Pain, hunger, temperature extremes, disease, injury, drugs or other chemical substances, restraint, molting, egg production.

Letís go back to the two dictionary definitions of stress: 1. ìPhysical: mental or emotional strain or tensionî and 2. ìa specific response by the body to a stimulus, such as fear or pain, that disturbs or interferes with the normal physiological equilibriumî. In addition to having lost the basic needs of any animal, a captive wild bird is also suffering from the ìphysical, mental and emotional strainî, and the ìfear and (often) painî described in the dictionary definitions of stress!

Psychological well-being is just as important as physical well-being an just as conducive to healing for captive birds, young and adult. Often, psychological stress cann cause physical stress and vice versa. In general, a bird will be stressed by anything physical, emotional or mental which deviates from the norm for its species. A health bird in the wild and under normal conditions is able to deal with some variants (depending upon their nature and severity) at any given time with few if any lasting ill effects. However, a bird in a rehabilitation facility is not living under normal conditions. Its entire world has been devastated, starting with the original cause of admission (nest loss, car collision, etc.) to the rehabilitatorís facility. Added to that is the close proximity

to humans (the one(s) who found the bird and the rehabilitator); and the unfamiliar surroundings such as the car in which it was transported, housing, sounds, and foods. The more variants we can eliminate or minimize, the less stressed the bird will feel and the more likely it is to heal.

Reducing stress in hatchlings and nestlings

Feeding and diets. Young songbirds need to consume a certain amount of food (in the form of a nutritionally balanced diet) per 24 hour period for good growth and development. To achieve this in captivity, they should be fed 12-14 hours daily (i.e. 7am to 9pm). This is even more critical in the smaller species, since they cannot miss several feedings a day for several days and remain healthy. If they survive, most of them seem never to catch up, remain weak and are slow to develop.

At Wild Bird Rescue, Inc. (WBR), if any feeding is missed, it is added to the end of the day rather than try to feed twice as much at the next feeding to make up. In the authorís experience, the most common cause of high death rates of uninjured young songbirds that are fed a nutritionally balanced diet, is that they are not fed enough (Orendorff 1997).

Housing. Nestlings feel secure and therefore less stressed in nests that are appropriate for their species. Open, cut-shaped nesters should be housed in open, cup-shaped substitute nests. Cavity or enclosed nests can be simulated by simply draping a dark, clean, ravel-free cloth over the artificial nest. It is absolutely essential that the artificial nest be neither too wide or too high, nor its bottom too smooth. An overly smooth substrate, such as a totally flat tissue, does not provide ìfootholdsî for the toes of the growing bird. Nests should be lined with several white unscented tissues. The tissues should be stacked together, and pushed down in the center of the nest with one finger. When the birds are place in the nest, the tissues will fold over them, giving them a sense of security, as it a parent were brooking them.

Hatchlings do not require the same degree of ìsnugnessî as a nestling. In the wild, hatchlings lay on the bottom of the nest and there is some space around them. This is normal and therefore does not stress them unduly. They are incapable of much movement other than raising their heads to feed and barely elevating their rumps to defecate.

Nestlings, on the other hand, must fit snugly in the nest thus providing support for each other. When the nest is too wide, the birds are unable to support themselves and each other (Beaver, 1986). They appear to be very uncomfortable as they flail around, the wings droop and their legs spread out on either side of their bodies. Because of this posture, young birds are often unable to raise their heads to feed. When these birds are switched to an

appropriate-sized nest, they quickly ìburrowî down, side by side. They arrange their wings on their backs, tuck their feet under themselves in a natural position and may rest their heads on the edge of the nest. Once comfortable, they close their eyes and fall asleep.

If the nest sides are too high, the nestlings are unable to raise their rumps over the edge to defecate. This appears to be frustrating to the nestlings who, instinctively, know they must defecate over the edge; they repeatedly try to reach the tip of the nest but are unable to do so and give up after several attempts. This wasted effort, besides adding stress to an already compromised nestling, consumes energy (calories) that would be best used for growth and recuperation (as in the case of starving or ill nestlings).

Sights and sounds. Studies have shown that birds possess color vision and are able to hear as soon as they hatch or even before! (OíConnor, 1984). Rehabilitators should strive to minimize human-related sounds such as human or pet animal voices, laughter, car sounds, music, etc., because the birds could become habituated to them with long exposure. Tapes that contain nature sounds but not music may be played, but care must be taken that they do not contain the sounds of songbird predators.

Reducing stress in fledglings

Feeding and diets. It is critical that diets are nutritionally balanced to help birds develop good feathers and weight similar to those of their wild counterparts. Studies show that among wild birds, dominance and survival are size-related (OíConnor, 1984).

Housing. Ideally, any bird old enough to perch should be housed in the same size enclosure as the adult of the species. Fledglings that are kept in enclosures too small for them to freely hop from perch to perch, vigorously flap their wings and attempt flight are stressed.

Fledglings are increasingly aware of their surroundings and instinctively react with caution to unfamiliar situations. However, with repeated exposure, birds may become habituated (therefore not stressed) to sights and sounds that should stress them (therefore make them cautious) when they are released into the wild. These include exposure to pet animals, cars and humans.

Sights and sounds. The same apply as in ìReducing stress in hatchlings and nestlingsî.

Reducing stress in adults (including parent-reared fledglings)

■ Birds admitted as fledglings or juveniles should be housed and managed as adults, since for all intents and purposes, their temperament and "mind-set" are those of adult birds. Birds admitted as older fledglings are usually quite wild because, having been with their parents for most of their formative days, they already ìknow they are wild birdsî. Even if they self-feed, they do not consume enough for good health. If they are young enough to need complete hand-feeding, they can be quite difficult to manage because, depending on the species, they may become highly stressed whenever they are handled to feed, may refuse to swallow, may spit out the food, or when placed into their container, may fling themselves around and injure themselves (Orendorff, 1997).

■ When transporting adult songbirds, unless medically contra-indicated, always provide them with a securely placed perch, completely cover their container, and protect them from all unnecessary human sounds and sights. Some species may be harder than others but, in my opinion, all wild birds are affected negatively by close proximity to people when they do not have the choice of flying away, as is the case with our patients. It is important to explain to the public that when transporting adult birds in a car they should not talk or play the radio.

■ When treating a songbird, all drugs and equipment should be assembled

ahead of time to reduce stress and handling time. Talking should cease while the bird is handled or, if it is necessary to talk, voice should be soft. Hand movements should be slow. The number of people present should be kept to an absolute minimum. While holding the bird, the rehabilitator should refrain from switching the patient from hand to hand, squeezing, or repositioning or moving his/her fingers because this is interpreted by the bird as being killed.

■ Birds should be encouraged to self-feed as soon as possible to minimize the stress of handling to tube-feed. Tube-feeding should only be considered if a bird has not self-fed at the end of admitting day or if it is emaciated. The number of hours rehabilitators can wait to see if a bird will self-feed depends on the species (large ones can go longer without food than small ones), whether the bird is fat, thin or emaciated, and the temperament of the species. If a bird is thirsty and is allowed to lose much weight, it is often very hard to get its weight back up by tube-feeding alone. Sometimes it seems to be a catch-22 situation: tube-feeding an easily stressed species might cause its death, but not tube-feeding if it refuses to self-feed for long may also contribute to its death.

■ If treatment is to be lengthy (longer than it takes to perform a single task such as one injection or tube-feeding) the bird's breathing should be monitored with averted eyes. The following will reduce stress:

1 If the bird starts mouth-breathing (a sign of stress) it should be placed back in its housing for 10-15 minutes.
2 The birdís head should be covered but the bird should be observed closely. If there are any changes iin its breathing the bird should be placed back in its housing for 10-15 minutes.

■ Whenever possible, all husbandry tasks, such as feeding, watering, cleaning and medicating, should be done once a day, at one time.

■ All indoor temporary confinement and recovery housing should have a drop cloth secured above the opening of the enclosure that can easily be pulled down to cover the opening. This should be done any time a rehabilitator plans to spend more than a few seconds in the room, such as when several patients are treated and fed. The drop-cloth eliminates visual contact with the person thus minimizing stress. Talking should, again, be done only when absolutely necessary and then only with subdued voices.

■ The floors of temporary confinement and recovery enclosures should be lined with several sheets of newspaper, covering the entire floor. To remove fecal matter and other waste from the floor the rehabilitator should simply pull out the top sheet each day or whenever necessary. This reduces human contact with the patients.

■ The above, as well as taking out and replacing water and food dishes, should be done with the drop cloth down so the bird cannot see the whole person.

■ With the exception of crows, grackles or other such naturally messy birds, it is unnecessary to clean the inside of temporary confinement and recovery enclosures more than once weekly for most species.

■ When it is necessary (such as to administer medications) to take a songbird out from the temporary confinement and recovery enclosure, the rehabilitator should avoid chasing the bird around, even if the enclosure is small enough that only hands are used to do so. A less stressed way to accomplish the task is to note where the bird is perched, then turn the lights off in the room, and gentle pick up the bird. Before the lights are turned back on, the birds head should be covered to eliminate visual contact. To return the bird to its enclosure, the procedure is reversed.

■ Outdoor enclosures should not be in close proximity of humans. If this is not possible, the side of the enclosure entering the area where people approach should be constructed of non-transparent material and talking with hearing range of the enclosure should be avoided.

■ When making housing choices for adult songbirds rehabilitators should keep in mind the type of habitat from where a particular bird came. Country birds are more susceptible to stress from human-related sights and sounds because these are not as much a part of their daily life and therefore are not habituated to them. People are an unknown entity. A Robin or starling that grew up in a nest located by a busy city road hardly pays attention to cars zooming by as it goes about its search for food. A country bird would not cope as well in the same situation.

■ Foods inappropriate to the species that are not recognized by the bird may cause it stress, both emotional (fear of the unknown) and physical (hunger).

<u>For all ages</u>

■ Rehabilitators must know the bird's natural history, to make appropriate choices for housing and feeding, to provide the typical habitat, and to house with other birds or by itself.

■ Having the appropriate substrate on which to stand may lower stress. Young plovers such a killdeer do well with a somewhat rough substrate such as Astroturf or Rubbermaid® shelf-liner. If their substrate is smooth, such as newspaper, they have difficulty standing and may develop splayed legs. As one

may imagine this is stressful emotionally and physically. Long-legged waders such as herons do well on Astroturf or carpet indoors, sand or pea gravel if outdoors.

■ Like other animals, birds feel most comfortable in familiar surroundings. These can be simulated in captivity by implementing as many of the following as possible:

1. All temporary confinement enclosure fronts can be positioned to face the outdoors, provided the view is a natural setting such as a wooded area, a garden or grassy meadow.
2. The ceiling of any indoor room can be painted to look like the sky. Include a few clouds.
3. Cabinet fronts or sides that face the confinement enclosures can be decorated with live-scale photographs of outdoor scenes, or trees and flowers can be painted on them. A coat of clear acrylic will prolong the life of such scenes. All painting, including the application of the acrylic coat should be done when no birds are housed in the room (to lower stress) and with good ventilation (for the rehabilitator's health).

■ Glass aquaria make excellent enclosures for recuperating songbirds. Stress for the inhabitant can be lowered by either of the following:

1. The Aquaria can all be placed on a shelf, side by side, with one short end facing the outdoors. The other three sides should be covered with nature photographs. To ease cleaning and prolong the life of the pictures, they can be positioned and taped on the outside of the glass and light green, white or light beige contact paper to allow plenty of light) can be used to cover the entire sides of the aquaria. All husbandry should be performed from the back.
2. If it is not possible to position the aquaria on shelves facing the outdoors, all sides should be covered with nature photographs or the bare side should have a drop cloth (made of nature-colored cloth) positioned above it that ccan be easily raised or lowered to block the inhabitant's view.

■ The floor of the indoor recovery room should be painted an earth color or green.

■ Temporary confinement enclosures that do not have see-through tops through which the "sky" can be seen as would be the case with aquaria with screen tops, can be painted with skies and small white clouds.

■ All colors in the indoor facility should be earth-related, such as shades of brown, grey and green. In some classes of animals, certain bright colors have been associated with aggression. While the author is not aware of any research that has demonstrated this to be true with birds, she believes that earth colors will not stress them.

■ Songbirds of any age in any stage of recuperation should not have visual or auditory contact with humans or human-related sights and sounds unless necessary. This includes care sounds, radios, laughter, coughing, TVs, etc.

■ Conditioning cages should provide songbirds with an area where they can hide when they feel threatened. Evergreen branches, nest boxes (for cavity nesters), or perches placed behind baffles and positioned as high in the cage as possible provide songbirds with such a place.

■ It is important that the rehabilitator be able to observe birds in a conditioning (for release) enclosure to ascertain their progress. However, staring at them (a sign of impending attack by a predator), even for a short time, causes them stress and their behavior is guarded or fearful rather than natural. Conditioning enclosures that have one solid side with one-half inch holes drilled at eye level allow the rehabilitator to observe the birds without their knowledge. Care must be taken not to make any sounds while observing the birds through the peep holes.

■ Songbirds should not be housed within plain sight of raptors, crows or mammalian predators.

■ Overly long day or night photoperiods (Gallerstein, 1984) can be detrimental because they upset the birds' biological clocks, thereby causing them physical as well as emotional stress (because they cannot respond appropriately).

■ Any prolonged procedure which may cause pain and/or excess stress should be performed under anesthesia. Anesthesia should only be performed if the bird is deemed healthy enough and if performed under veterinary supervision.

■ Birds may or may not show obvious signs of stress. In some species the signs may be very subtle such as flinching, blinking, barely shifting weight or very obvious such as fluffing up their feathers, or tucking their heads back under a wing.

■ Euthanasia should be considered for birds that are so debilitated that the rehabilitation process may be as stressful or dangerous as the initial problem.

■ The USF&WS decrees that ìany birds which are not suitable for release, including those that have sustained injuries requiring amputation of a wing at the elbow (humero-ulna joint) or above a leg or a foot, and/or are blind should be euthanized. Permittee should not sustain the life of any migratory bird that cannot after medical management feed itself, or has an impairment

that prevents it from perching upright, or cannot ambulate without inflicting additional injuries to itself. Permittee must contact the issuing office prior to euthanizing bald and golden eagles, endangered or threatened speciesî.

In the authorís opinion however, non-releasable songbirds that can perch, fly a little and, in general survive in captivity, should also be euthanized. While such birds may become habituated to humans and survive for long periods of time in captivity, the author believes this practice to be unethical.

In her opinion, there are two exceptions: 1. Non-releasable endangered species should be placed in a breeding program (if such exists and pertinent USF&WS permits can be obtained), and 2. hand-reared, tame individuals could be used as surrogate parents, again, if pertinent USF&WS permits can be obtained and suitable facilities can be built to house them.

■ When handling birds, all hand movements should be slow and deliberate and only when necessary. Always remember that songbirds are prey birds and therefore live on the edge.

■ Placement of temporary confinement enclosures should take into consideration the natural history of the species. Arborea birds should be housed in enclosures that are high above the floor and terrestrial ones on ground level.

■ As anthropomorphic as it sounds, rehabilitators should put themselves in the wild bird's place. If you were a wild animal, you would want as few human interactions as possible. You would not want potential predators eyeing you or coming near you, especially when you have no means of escape. You would want indications from humans in the room that they do not have their attention focused upon you. Every time you were handled, you want it to be swift and non traumatic. As a wild animal you would have had no previous experience or understanding of being petted by a human; a hand reach over your head would be extremely threatening. Finally, you would want your period of captivity to be as short as possible so that you could return to live free in the wild (Deering, 1993).

Conclusion

As rehabilitators, we must insure that our patients survive captivity because of our management procedures not in spite of them. By being sensitive to captive birdsí needs and with some thought and planning, rehabilitatorís can modify their husbandry techniques and the appearance of their facilities and enclosures to simulate the birdsí natural environments. Providing captive songbirds with species-appropriate food, shelter and comfort will decrease the birdsí psychological and physical stress which in turn, may increase the rates of recovery and release.

ìA wild creature who finds itself in a rehabilitation situation is like a traveler caught in a foreign country. Sounds, sights, food, microbes, language, healing ways, routines, pace, oneís means of support, and relationships ñ all are changed and foreignÖ a lot to adapt to at once. Our jobs as rehabilitators includes recognizing and minimizing these foreign stresses, and returning the visitor ot its own land as soon as possibleî (Stevens, 1991).

The author welcomes additional suggestions for managing stress in captive songbirds.

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Assessment Basics

Before You Begin

• Touch

You must be gentle. A laceration can be cleaned with the lightest of touch. Feathers can be carefully moved aside to examine tissue and bone. Opening a beak can be accomplished with an action that does not overextend the jaw. Ask yourself over and over again: "Am I interacting with this animal in the gentlest way I can?"

Always remember you can be in control of the animal and still be gentle.

• Handling

The handling of each bird should be kept to a minimum. When you are assessing a bird, take it out of its container for the assessment and *put it back while you are preparing for treatment*. Never hold a bird in your hand while opening or closing medications, packaging, jars, or other items. Do not walk around the room carrying the bird.

External Observations

You have many tools at your disposal to help you assess an animal--the most important of which is your ability to observe. *A good assessment begins before you touch an animal.*

First, look at the check-in form. It may provide much-needed clues. You might be able to determine how long an animal has been in its current condition or what may have caused the condition. You can also get other valuable information such as the species and where it was found. Early care notes on the animal while it was in transit also may be important. Verify the animal's species as guesses made by the public are not always correct.

Check the substrate of the animal's container or enclosure for fresh droppings or mutes, or for pellets. Droppings should be consistent with the species without blood, strong odor, or unusual coloration. If pellets are seen, they should be well-formed and normal in color.

Next, look at the animal as it rests in its enclosure. You will often notice if it is favoring a leg or foot. A drooping wing might indicate a problem with the wing, or it may be the result of trying to balance on an injured leg or foot.

When an animal is brought in by a Rescue and Transport volunteer ask about the animal's condition or its actions before and during capture. Was it on the ground? Did it fly at all? Was it near a road or beneath a power pole? The Rescue and Transport group may be able to give you valuable insight for your assessment.

As you begin to open the container, note the animal's behavior. A wild animal should show signs of agitation when approached. An animal that just stands, puffed and unmoving, is more than likely very ill.

The Head

• Positioning and movement

A basic point, but one worth mentioning, is that an animal's head should be correctly situated on its body. If an animal has a tilted or inverted head, it might be a sign of a neurological problem. The head should be still, or smooth and even, in its movement. Jerky, repetitive motion (tracking) can also be a sign of head or neurological trauma.

• Skull

The bird's head should be free of any abrasions. In most species the feathers should be smooth and laying flat. The top of the head can have injuries to the skin which leave the skull completely exposed. This area must be checked carefully as the skin may appear intact because of dried blood or feathers covering the area.

• Ears

The ears are located on the sides of the head, usually in a directional path back from the eyes. The ears should be clear and open, without obstruction or swelling. They should be free of mites, maggots, or other parasites.

• Eyes

The animal's eyes should be open. Pupils should be equal and reactive. (Some species, such as owls, can dilate their eyes separately in which case irregular pupils may be normal.) The eyes should be clear, without drainage, oozing, or weeping. The area surrounding the eyes should be normal for the species, without crustiness, swelling, or lesions.

• Beak and Cere

The beak of the birds should be checked, too. It should be intact and without cracks. Its shape should be correct for the species. Some species, such as curve-billed thrashers or raptors, can develop over-grown beaks. The nostrils should be clear and without drainage. The cere should be of normal size for the species, without swelling, crustiness, or lesions.

• Mouth

Carefully open the mouth. The mouth and throat should be clear and open, without blood or stringy saliva. The trachea usually should be visible and clear, and should indicate normal breathing without jerky or exaggerated movements. The mucous membranes should be moist, not tacky. The mouth color should be consistent with the species (commonly pink) and without unusual fading or discoloration. The mouth should not have a bad odor, although it may after a recent prey meal.

The Body

• Feathers

Feather condition is very important on a bird. The feathers should be clean and smooth without "stress" lines or fractures. Individual feathers should be unbroken and healthy in appearance, without debris or oil. Tail feathers should be clean and unbroken. Feathers should be free of mites or lice.

• Crop

Not all birds have crops, although they are found on many species. The crop is located on the ventral side of the body between the neck and the keel, although it can extend to the dorsal side of the neck, too. The crop may be full or empty, depending on the timing of the animal's last meal. It should always be soft, not hard or doughy. It should also be of normal shape, not over-extended. The crop should not have a bad or unusual smell.

• Keel/Coracoid/Clavicle

Check the keel for the proper thickness of muscle, a good indicator of proper weight. The keel may be more or less pronounced depending on the species and age, but the surrounding muscle should be full and rounded, away from the ribs and even on both sides. The keel bone itself should also be checked. It should be smooth on its edge, without protrusions or indentations. The cranial end of the keel supports the *coracoid* bones. Palpation of this area should indicate a solid structure without unusual movement. The *clavicle*, located on the cranial ventral position of the body and anterior to the keel, can sometimes be carefully palpated. It should be smooth and solid.

• Torso

Look beneath the body feathers at the skin. It should be smooth and uniformly colored without dry or flaky areas. It should be free of open wounds, bruising, or debris such as twigs or cactus needles. The body should be free of ticks or other parasites. The skin should be attached to the body and not lifted above it by air or fluid. The rib cage should feel solid without unusual movement.

• Back

The back should be straight, without distortions in the spine. Check carefully for abrasions or punctures. Back injuries can cause a variety of symptoms which may include inability to stand, difficulty in walking, inability to defecate, "shrimping" of the tail, or paralysis of the feet or legs.

• Vent

The vent and surrounding area should be clean, not caked with feces. The tissue should be free of any lesions or swelling.

Thoracic Limbs

• Wings

The bones of the wings should be smooth without interruption. The joints should be of normal size with the proper range of motion and degree of articulation. The wing should snap back into place after extension. The animal should fly if its age and development permit.

The skin covering the wing should be normal, without lesions or flaking, and smooth, without swelling or bruising. The wings should be free of ticks or other parasites.

The tissue located between the wrist and the shoulder is the patagium. The interior tissue in this area is extremely thin and vulnerable to tearing. It should be smooth and uninterrupted. The patagial tendon is located in the fibrous thickened anterior edge of this area. This tendon should have elasticity when palpated.

Pelvic Limbs

• Legs

The bones of the legs and feet should be smooth without interruption. The joints should be of normal size with the proper range of motion and degree of articulation. The skin covering the legs should be normal, without lesions or flaking, and smooth, without swelling or bruising. The legs should be free of ticks or other parasites and free of constricting items such as string, fishing line, wire, or bands. The legs should support weight and should function in a normal manner.

• Feet

Feet should open and close properly. The temperature of the feet should feel the same. The bottoms of feet should be healthy with good color and normal tissue. The skin surface should be free of lesions, unusual crustiness, or cactus needles.

The Two-Minute Exam

One important way to limit an animal's stress is to limit the time spent on assessment. the best way to do this is to start an imaginary time clock when you begin, and finish the exam within two minutes.

First, decide if you have the luxury of conducting a full exam. There will be times when an animal will be too stressed or too depressed to tolerate even a quick assessment. Make sure the environment (conversation or noise level) is appropriate for an assessment. If you can do so safely and effectively, conduct the assessment, keeping the entire process to under two minutes whenever possible.

Next, organize! Make the chart and a pen available for jotting down notes. Set-up the proper enclosure so that the animal can be moved to it immediately after assessment. If you are able to provide treatment, prepare the supplies you may need before handling the bird.

Prepare, assess, and then place the animal in its enclosure. Immediately record your notes on the medical chart, include the date and your initials.

The following areas should be checked as part of the two-minute exam:

Head

- Positioning
  - Correctly situated on its body, no tilt or inversion
  - Smooth and even movement, not jerky or repetitive
- Eyes
  - Open and clear
  - No crustiness, drainage, cloudiness, blood, lesions
  - Pupils are equal and reactive
  - Eye area not swollen, without lesions or crustiness
- Ears
  - Clear and open, without obstruction or swelling
  - No mites, maggots, or other parasites
  - No blood or lesions
- Beak
  - Intact and without cracks
  - Shape should be correct for the species, not over-grown
- Cere
  - Normal size and without lacerations
  - No lesions, swelling, or crustiness
  - Nostrils clear, without drainage

- Mouth
    - Mouth and throat open without or growths
    - Throat or trachea clear, without blood or stringy saliva
    - Good color, pink, no anemia or discoloration
    - Normal respiration, no bad odors

Body

- Feathers
    - Clean and smooth, healthy appearance
    - No stress lines or fractures
    - No mites or lice
    - No debris, tar or oil
- Crop
    - Should be soft, not doughy or hard
    - Normal size and distention
    - No holes or lesions
    - No unusual odors
    - Note status (full or empty)
- Keel
    - Proper thickness of muscle, full and rounded
    - Muscle even on both sides
    - Bone smooth, without protrusions or indentations
    - Coracoid bones solid, without unusual movement
    - Clavicles smooth and solid
- Torso
    - Skin smooth and uniform, without dry or flaky areas
    - Free of open wounds or bruising
    - No debris such as twigs or cactus needles
    - No ticks or other parasites
    - No unusual air or fluid pockets
    - Rib cage solid without unusual movement
    - Back straight, without spinal distortions
    - No “shrimping” of the tail.
- Vent
    - Clear, not caked with feces
    - No lesions or swelling

Thoracic Limbs

- Wings
    - Bones smooth without interruption or fractures
    - No lesions, swelling, or bruising
    - No mites, lice, ticks, or other parasites
    - Joints normal, proper range and articulation

No dislocations
Wing snaps back into place
Patagium elastic
Bird should fly, if development permits

Pelvic Limbs

- Legs

  Bones smooth without interruption or fracture
  Joints normal, proper range and articulation
  No dislocations
  No lesions, swelling, or bruising
  No mites, lice, ticks, or other parasites
  Legs should function in usual manner and support weight
  No constricting string, fishing line, wire, or bands

- Feet

  Should open and close properly, and support weight
  Good circulation, both feet at same temperature
  Bottoms of feet clear and without lesions or swelling
  No cactus needles

External

- Feces/Mutes

  Color should be in acceptable range, not bright green
  No blood, unusual odor, or undigested seed

Know when not to treat!

Sometimes the most important thing to know is what *not* to do.

For example, an animal may arrive in an emaciated (starving) condition. Giving that animal food could actually cause it to die.

When an animal is extremely compromised and depressed, its body systems may have shut down. Digestion is a body system that expends energy. When the body is forced to digest food, the animal must tap into its already limited energy resources to support digestion. This expending of precious energy could be enough to actually cause the animal's death.

In this circumstance, hydrating the animal may help to stabilize it. Later, when the animal is more stable, *slowly* introducing easily digestible nutrition may make the difference between life and death.

That was just one example. There are many more you will encounter. Take time to think each situation through before reacting. Remember, *first, do no harm*.

If the following life-threatening or other serious conditions exist, do not treat an animal for other injuries unless absolutely necessary:

- Over-heated
- Over-stressed
- Unconscious, down, extremely depressed
- Has difficulty breathing
- Internal bleeding
- If *you* haven't done it before

For example, an animal may have one or more of these symptoms and have a fracture of the wing, foot, or other limb. Do not treat the fracture until the bird is stable enough to handle the stress of treatment.

If any of these conditions exist, contact experienced medical staff immediately. Remember, *warm, dark, and quiet* are often the best treatment.

Liberty Wildlife
Medical Services

Medical Services
Training Program

• Section Five •

Medications and Dosages

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Intro to Medications and Dosages

Animals arrive at Liberty Wildlife for a variety of reasons. Some animals, due to their conditions, require medication to aid in their recovery. Medications are drugs that provide non-surgical treatment of disease, trauma, or other conditions.

Some medications directly address medical problems. Some may be *prophylactic* or preventative in nature.

In this section, you will be introduced to medications. The different types of medications will be presented, along with routes and methods of administration. This section will also define a new list of abbreviations and explain the proper way to write a medication schedule. Commonly-used medications will be reviewed. Two separate methods for calculating dosages will be presented followed by a lab activity that will recap the entire section.

Deciding What Medications to Use

Wild animals usually arrive at Liberty Wildlife without a detailed history of their condition. We do the best job we can to determine the nature of injuries and the possible cause. The condition of the animal being treated often gives us important clues and we use these clues to determine if medications might aid the recovery process.

Medications can be grouped into categories which help to explain their purpose.

- Anti-Infectives

  Anti-infectives are substances that counteract infection. These medications are selected based on their ability to combat a particular pathogen. This group of medications includes antibiotics, antifungals, and antiparasitics.

  - ♦ Antibiotics

    Antibiotics have the capacity to kill or inhibit the growth of bacteria.

    - ✓ When to suspect a bacterial infection

      Obvious infection (visual)
      Elevated white count
      Probable candidate for infection (exposed bone, severe tissue, severe trauma, active old injury, etc.)
      Weight loss or loss of appetite

    - ✓ Culturing the site

      Take a culture sample and submit it to a lab for a "culture and sensitivity." Cultures must be taken prior to giving an antibiotic to obtain an accurate result. These cultures can be taken from a wound, abscess, the mouth, the vent, a fecal sample, and other sites. Note: Cultures are not always taken. There are several broad-spectrum antibiotics that have proven to be effective in most cases. When in doubt, a specimen can be collected and then refrigerated for future use if needed.

    - ✓ Select an antibiotic

      A report is produced by the laboratory identifying drugs that are "sensitive" or will affect the identified pathogen. From this *sensitivity report*, an appropriate antibiotic can be chosen.

  - ♦ Antifungals

    Antifungals are agents that destroy or check the growth of fungi.

    - ✓ Fungal infections can be cultured
    - ✓ Some fungus infection have blood screening tests available ie: Aspergillosis

  - ♦ Anti-parasitics

    Anti-parasitics are agents that destroy parasites

    - ✓ When to suspect a parasitic infection

      Weight dropping or not gaining while eating
      Eggs observed in fecal floats
      Exposure suspected

-

- Anti-inflammatory
  These groups of medications counteract or suppress inflammation and the inflammatory response. There are steroidal and non-steroidal medications that are used.
    - ✓ Infectious agents
    - ✓ Trauma
    - ✓ Surgical procedures
    - ✓ Musculoskeletal disease

- Anesthesia
  (Given with veterinary supervision only)
  This group of medications is used to help in restraint of an animal, eliminate pain sensation during medical and surgical procedures, control seizures, and humane euthanasia.

Commonly Used Medications

The following is an overview of the common types of medications in use at Liberty Wildlife.

- Anti-infectives

This group of medications includes antibiotics, antifungals, and antiparasitics,. Anti-infectives are substances that counteract infection. A type of medication is selected based on its ability to combat a particular pathogen. Antibiotics have the capacity to kill or inhibit the growth of bacteria. Antifungals are agents that destroy or check the growth of fungi. Antiparasitics are agents that destroy parasites.

Some of the commonly used anti-infective agents are listed below:

Enrofloxacin (Baytril®)
Available in injectable and pill form. Injectable Baytril may also be given orally (PO) or subcutaneously (SQ). The oral method is preferable since injections of Baytril can cause severe muscle necrosis. Also, caution should be used in giving Baytril to very young animals.

Sulfamethoxazole and trimethoprim (Sulfatrim® Suspension)
Available in a suspension for oral medication. Effective for use in the smaller birds. Very broad spectrum antibiotic.

Cefadroxil (CefaDrops® or CefaTabs®)
Available in drops and pill form. Has been effectively used in smaller birds for respiratory infections.

Doxycycline (Vibramycin®)
Available as a suspension for oral medication. Very effective against chlamydiosis (psitticosisi).

Pipercillin
Available as a reconstituted injectable and given IM or IV, two or three times each day. Pipericillin has a very short shelf life when reconstituted. After reconstitution, it should be drawn up into one or one-half cc syringes and frozen until used. Useful in treating bumblefoot or other difficult infections that have been cultured and found to be sensitive.

Amikacin
Injectable. Should be used only when absolutely necessary. Birds should be thoroughly hydrated during the course of treatment to reduce the chances of kidney damage. Not for use in raptors or animals that exhibit renal dysfunction. Smaller birds require a special dilution.

Itraconazole (Sporonox®)
Human drug used in treatment of aspergillosis. Available in capsule form.

Fenbendazole (Panacur®)

Antiparasitic medication for treatment of nematodes, trematodes, and cestodes (worms). Paste or suspension.

Carnidazole (Spartrix®)
Tablet form. Commonly used to treat canker or trichomoniasis. Usually used as a single dose. Can be used as a preventative during season, as it has not shown signs of toxicity in birds.

Metronidazole (Flagyl®)
Liquid. Commonly used to treat canker or trichomoniasis. Comes in 125 mg and 250 mg strengths. (Must be diluted with propylene glycol for small birds.)

Ivermectin (Ivomecs®)
Liquid. Excellent for gapeworms or mites. Used to treat nematodes and arthropods. (Must be diluted with propylene glycol for small birds)

- Anti-inflammatory

This group of medications can interact or suppress inflammation. These medications are used to reduce the inflammatory response to infectious agents, trauma, surgical procedures, or a musculoskeletal disease. These can be steroidal or non-steroidal.

Dexamethasone
Injectable. Steroid. Used when animals are presented with head or back injury (spinal trauma) or central nervous disorders. Treatment is usually twice a day (BID) for at least three days, sometimes as long as five days but no longer.

Metacam
Injectable or oral suspension. Non-steroidal. Treatment of inflammation and pain associated with musculoskeletal disorders.

- Anesthetics (Given with veterinary supervision only)

This group of medications are used to help in restraint of an animal, eliminate pain sensation during medical and surgical procedures, control seizures, and humane euthanasia.

Isoflurane
Volatile gas. Administered by anesthesia machine. Used for the induction and maintenance of general anesthesia.

Ketamine (Ketaset®)
Injectable. For restraint or brief surgical procedures

Diazepam (Valium®)
Anti-anxiety and anti-convulsant agent. Used to treat seizures. Can be combined with ketamine for more complete general anesthesia in surgical procedures.

Euthanasia (Beuthanasia-D®)
Injectable. Deep anesthesia for rapid and humane euthanasia.

Medication Considerations

Dosage, Frequency, Duration, and Dose

After the medication has been established, the dosage, frequency, and duration must be determined. This information, along with the other specifications on the drug and the animal, will provide us with the dose, or amount to be administered at a given time.

Dosage

Dosage is the established amount of a drug that has proven to be effective as an agent. Dosages are often different for mammals, birds, or reptiles, or even for specific species (such as cranes or vultures), or groups (such as raptors or waterfowl). They may also vary by the form of the drug, such as a pill, injectable solution, oral suspension, and by the frequency in which it is given.

Dosages are often written in a format that specifies the amount of drug per unit of weight. For example, a dosage of 25 mg per pound would indicate that an animal should have 25 mg of the specified drug for each pound of weight. If the animal weighed 2 pounds, it would need 50 mg of the drug.

Dosages are available for most drugs and species. Lists of common dosages are printed pharmacological indexes or formularies. They can also be provided by the veterinarians.

Frequency

When you have determined the drug you are using and have the acceptable dosage for the animal being treated, you must determine the *frequency*. Frequency is the number of occurrences of a periodic process in a unit of time. For example, we need to know if we should give a drug once a day, twice a day, three times a day, or every other day.

Frequency is related to the dosage of the drug form being used for the animal being treated. You will find the frequency listed with the dosage in pharmacological indexes or formularies. Always note the frequency when looking up dosages.

Duration

Another important component of drug administration is the *duration*. The duration is the amount of time that the drug administration will continue.

Durations vary greatly. They can range from one-time administration to cover a period of months. The duration should be established in the beginning, but can be re-evaluated as time goes on.

Dose

The dose is the amount of a drug that is administered at one time. The dose is calculated for each animal based on the weight of the animal, the proper dosage for the animal, and the concentration of the drug.

Medication Calculations

The correct dose of a drug for a specific animal is calculated using three criteria:

The weight of the animal.
The dosage of the drug for the species being treated.
The concentration and form of the drug being used.

We have two methods of calculating a dose. One is a manual method using a simple calculation based on the three criteria listed above. The second is method uses this same information and reference chart called the *Formulator®*, which provides a predetermined factor as a "calculation helper".

When you are ready to calculate a dose, sit down with the information you need, *relax*, and begin. Take your time and do your calculations using both methods as a double-check system.

Simple Calculation Method

• Remember the relationships involved
    • Weight. The weight of the animal must be in the same form as the weight unit that is listed in the indicated dosage. For example, if the dosage indicates 5 mg/lb, you will use the animal's weight in pounds. If the dosage indicates 25 mg/kg, you will need the animal's weight in kilograms. If the dosage indicates 1 mg /gm, you will need to put the animal's weight into grams.
    • Dosage. The dosage is how much of the drug the animal needs per unit of weight. You will find this figure printed in the pharmaceutical index or formulary.
    • Concentration. The concentration is how much of the drug is contained in a unit (ml, unit, or tablet) of the drug you are using. You will find the information on the drug bottle or container.

• Not WDQ, WDC!
The WDQ we often see on charts refers to the standard stress-reducing treatment of warm, dark and quiet. WDC is what you need to figure a dose correctly, in two different ways. First, WDC means warm, dark, calculate! Relax and conduct your calculations so that you can think undisturbed. Secondly, WDC means weight, dosage, concentration. The correct order of the three figures you will need in your calculation.

• Calculation
    • **W**eigh the animal.
    • Locate the proper **d**osage for the medication and type of animal in the red pharmaceutical index or the formulary.
        • Note the weight, unit of the dosage, and make sure your animal's weight has been translated into the correct form.
    • Identify the **c**oncentration on the medication container.
    • Translate the animal's weight into the needed format.
        • If the dosage indicates mg/kg, your weight should be in kgs.
        • If the dosage is mg/ lb, your weight should be in pounds.
        • If the dosage is mg/g your weight should be in grams.
        • To translate pounds to grams multiply weight (lbs) by 454.
        • To translate pounds to kilograms divide weight (lbs) by 2.2
    • The order of the calculation is WDC or weight times dosage divided by concentration.

$$\frac{\text{Weight} \times \text{Dosage}}{\text{Concentration}}$$

    • Multiply the weight by the dosage
    • Divide the result by the concentration.
    • This will give you the *dose* which is the amount of the medication to dispense in a single application.

Example (Simple Calculation Method)

• We must give Baytril to a red-tailed hawk that weighs 2.75 pounds.

• The **d**osage for Baytril® in raptors is 5 to 10 mg/kg.
Taking a mid-range figure, we will work with 8 mg/kg.

• We must now put the **w**eight of our animal into kilograms (kg).
It weighted 2.75 pounds (lbs).
2.75 lbs divided by 2.2 lbs/kg equals 1.25 kg.
The animal weighs 1.25 kilograms.

• Next we identify the form of the drug we are using. Baytril® comes in an injectable form and in tablets. We are giving the injectable form which has a **c**oncentration 22.7 mg/ml.

• Now we gather our figures, WDC. (W times D divided by C).
Weight 1.25 kg
Dosage 8 mg/kg
Concentration 22.7 mg/ml

• Looks like this

$$\frac{1.25 \text{ kg} \times 8 \text{ mg/kg}}{22.7 \text{ mg/ml}}$$

• 1.25 X 8 = 10. 10 / 22.7 = .4

This means each dose should be .4 ml or **.4 ccs** of injectable Baytril®.

The Formulator®

The *Formulator®* is a laminated card which provides a "factor" to use when calculating a dose. The Formulator is located in the front pocket of the red pharmaceutical index. The most significant difference in this method of calculation is that the animal's weight *must* be in grams.

• Obtain the animal's **w**eight in grams. Grams, grams, grams! The Formulator® will only work if the weight is in grams.
    • To translate the weight into grams, take the pound weight and multiply by 454.

• Obtain the **d**osage from the red pharmaceutical index or formulary.

• Obtain the **c**oncentration from the bottle.

• The Formulator® is a chart with numbers down the left side and running across the top. The left side of the card lists drug dosages. The top of the card list drug concentrations.

• Locate the dosage on the column on the left side of the card.

• Locate the concentration in the figures at the top of the card.

• Find the intersection between the drug dosage and the concentration. *This is the factor, not the dose!*

• Multiply this factor by the gram weight of the animal to obtain the dose.

Example (Formulator®)

• We must give Baytril to a red-tailed hawk that weighs 2.75 pounds.

• The **d**osage for Baytril® in raptors is 5 to 10 mg/kg.
Taking a mid-range figure, we will work with 8 mg/kg.

• We must now put the **w**eight of our animal into grams.
It weighted 2.75 pounds (lbs).
2.75 lbs times 454 g/lb equals 1248.5 gm.
The animal weighs 1248.5 gm.

• Next we identify the form of the drug we are using. Baytril® comes in an injectable form and in tablets. We are giving the injectable form which has a **c**oncentration 22.7 mg/ml.

• Now we gather our figures, WDC, and take out the Formulator®.
Weight 1.25 kg
Dosage 8 mg/kg
Concentration 22.7 mg/ml

• Locate the dosage on the left side of the Formulator®.

• Locate the concentration on the top side of the Formulator®.

• Now identify the number at the intersection of the dosage and concentration numbers. This is your factor.
(The factor at the intersection of 8 mg/kg and 23 mg/ml is 0.00035.)

• Multiply the weight in grams by this factor. 1248.5 gms times 0.00035 equals 0.4. The dose would be **.4 ccs** of injectable Baytril®

Routes of Administration

There are several different methods for administering medications. They commonly given orally or by injection, or applied topically.

Per Os

Medications that are administered *per os* (by mouth) are given orally.

There are many advantages to oral administration. A precise dose can be given without causing the additional trauma associated with injection. Many drugs are available as oral suspensions which are easy to draw up and dispense. Some types of medications can be hidden in food to make administration easier. If an animal can eat on its own, it can self-medicate, a very low-stress method of administration as it will not have to be captured or handled.

There are some disadvantages to per os administration, too. Birds may have to be captured and fully restrained. This is stressful. Whenever a liquid is administered there is a danger the bird might aspirate. Also, not all drugs are absorbed orally. In fact, food often reduces drug absorption. Sick animals often consume less food, so they may not be receiving the correct dosage. The medication may not taste good and may be spit out or left untouched.

Parenteral

Medications that can be administered subcutaneously or intramuscularly are given *parenterally* or by injection.

There are many advantages to parenteral administration. An accurate dose and large volumes can be administered. Although the animal must be captured, restraint time is usually minimal. Adsorption from intramuscular injections is rapid. Parenteral administrations can be given subcutaneously help to alleviate muscle necrosis or other trauma at the injection site such as seen with Baytril®.

There are some disadvantages to parenteral administration, too. Full restraint is necessary. Injections can be painful and may cause substantial muscle necrosis. Birds have very thin skin, and fluid may leak out of the injection site, reducing the dose.

Topical Medications

Topical medications are those applied directly to a site. This group includes eye, ear or nose drops and ointments, aneseptic or wound ointments, creams, or powders, nose drops or ointments; and skin and foot ointments or creams.

There are advantages to topical administration. First of all, application directly on a site ensures administration. Also, the application directly on a site may have an added benefit such as keeping a surface moist or dry.

Of course, there are disadvantages to topical administration. Full restraint is often necessary. Feathers may become sticky from ointments or creams. Animal may rub off or lick the medication if the site is not protected.

Methods of Administration

Per OS (Oral)

- Procedure for administering liquid medications orally
  - Obtain a syringe with a removable needle.
  - Wipe the top of the medication vial with alcohol if it has a stopper.
  - Fill the syringe with the appropriate amount of medication.
  - Remove the needle, if one is there.
  - Properly restrain the animal, with help if needed.
  - Gently open the bird's beak and hold it open.
  - Note the location of the trachea.
  - Keeping your fingers away from the plunger, insert the syringe down one side of the bird's mouth well beyond the trachea.
  - Carefully and slowly, dispense the medication, allowing the bird to swallow the liquid.
  - Slowly remove the syringe.

- Procedure for administering pills orally
  - Prepare the correct dose for the animal being treated.
  - Properly restrain the animal, with help if needed.
  - Gently open the bird's beak and hold it open.
  - Note the location of the trachea.
  - Pick up the pill with a curved hemostat.
  - Insert the hemostat and the pill down one side of the bird's mouth well beyond the trachea.
  - Carefully release pressure on the hemostat letting the pill go.
  - If the animal is eating on its own you can hide pills in its food.
  - If a large animal is not eating on its own, a pill can be put into a small piece of food. This food can then be offered from a forceps (hand-fed) or put down the bird's throat (force-fed). Again, make sure it is placed well-past the trachea.
  - Small birds that are being fed worms from a forceps will often take a pill in the same manner.

Parenteral (by injection)

- Procedure for subcutaneous injection
  - Obtain the appropriate needle and syringe
  - Carefully note the amount of the dose
  - Wipe the top of the medication vial with alcohol.
  - Draw up the medication, drawing past the mark.
  - Clear any air bubbles from the syringe.
  - Select the appropriate amount of medication.
  - Properly restrain the animal.
  - Select your injection site. The large breast muscles are ideal.

Locate the keel (breast) bone. Feel the muscle mass on either side of the keel. This is the area to give an injection. If you wish, you can apply a small amount of alcohol to the area on either side of the keel (breast) bone, so you can see the skin. Alternating the site of the injection each time will reduce soreness for the bird. Some antibiotics cause more soreness at the site than others, however, repeated injections of any kind will cause discomfort.

- Insert the needle at an angle, almost parallel to and just under the skin.
- Administer the medication.
- A small bubble will appear on the skin which will be absorbed into the body.

- Procedure for intramuscular injection
  - Obtain the appropriate needle and syringe
  - Carefully note the amount of the dose
  - Wipe the top of the medication vial with alcohol.
  - Draw up the medication, drawing past the mark.
  - Clear any air bubbles from the syringe.
  - Select the appropriate amount of medication.
  - Properly restrain the animal.
  - Locate the injection site.
  - Insert the tip of the needle into the breast muscle on either side of keel.
  - Pull back lightly on the plunger of the syringe to check for blood.
    If any blood appears in the syringe, pull the needle out of the animal, and try another site.
  - Administer the medication
  - Some animals may require both an antibiotic and a steroid (i.e. Dexamethasone®). Inject the steroid, and give the antibiotic orally if possible.

Topical Medications

- Procedure for topical administration
  - Obtain the appropriate product
  - Properly restrain the animal.
  - Identify the appropriate amount of the product
  - Apply the medication
    When using drops, powders, or tube ointments, do not touch the animal with the tube or bottle. Hold it above the site and dispense. When using jar ointments, use a tongue depressor or swab to apply the product being careful to avoid feathers.

Abbreviations

There are several abbreviations that will be used when referring to medications and their administration.

EOD	Every other day
PRN	As needed
PO	Per os (by mouth)
SID	Once a day
BID	Twice a day
TID	Three times a day
QID	Four times a day
q24h	Every 24 hours
q72h	Every 72 hours
q7d	Every 7 days
g	Gram
gm	Alternative for gram
SQ	Subcutaneous
IM	Intramuscular
C&S	Culture and sensitivity

The Medication Schedule

A medication schedule must be completed on each animal receiving ongoing medicine. These schedule are written on bright green cards and posted on the animal's enclosure. Each schedule must contain complete information and the drug and its administration.

Preparing the schedule

A medication schedule must include:

- The species of the animal
- The log number
- The animal's weight
- The name, form, and sometimes concentration of the drug
- The dose
- The route of administration (delivery)
- The frequency
- Check-off boxes with dates indicating frequency and duration

Re-evaluation

Most drugs should be given at least eight hour intervals, if given on a BID schedule and drugs should normally be continued throughout their posted duration.

However, initial medication dosages may require changes resulting from the animal's response to the treatment. The *re-evaluation* may indicate a successful treatment, the need for further duration, or indicate the use of another drug.

If re-evaluation is indicated, write the word "re-evaluate" at the end of the check-off boxes and on the medical chart.

Record-keeping

Record all information relating to medications on the animal's chart. This includes doses, frequency, start date, and duration. Check-off boxes as drugs are administered.

Lab

Exercise One • Specimens

• Identify and create a chart for your animal.

• Obtain your animal's weight.

• Draw a condition. What would you suggest for this animal?

• Draw a drug. Calculate the dose for your animal. Write up a medication schedule for each drug.

• IM Injections
Taking the dosages used in Exercise One, administer the proper medication.
- • Identify your injection site
- • Select your equipment
- • Draw up the proper medication using sterile technique.
- • Inject.

• Oral medications (pills and liquids)
- • Select medication.
- • Administer.

• Applied to site
Draw a condition and select a medication
- • Administer

Liberty Wildlife Medical Services

Medical Services Training Program

• Section Six •

Fluid Therapy

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Avian Respiratory System

The manual in this section is from the:

Manual of Ornithology
Avian Structure and Function

By Noble S. Proctor and Patrick J. Lynch

The Respiratory System

The avian respiratory system is the most efficient in the animal kingdom, and in both its large and small details it is surprisingly unlike that of most other land vertebrates. In spite of their importance, lungs comprise just 2 percent of a birds' body volume (Welty and Baptista 1988). Unlike mammals, birds do not have a muscular diaphragm to power inspiration and expiration; they rely instead on the musculature of the intercostals muscles (Fedde 1975). When a bird *inhales*, air enters the lungs as a bird *exhales*. Almost every major part of a bird's body is in direct communication with its respiratory system of air sacs, a complex anatomic feature unique among modern vertebrates (Schmidt-Nielsen 1971, 1983). The anatomy and air pathways of the avian respiratory system are described by Powell and Schied (1989) and Scheid and Pliper (1989).

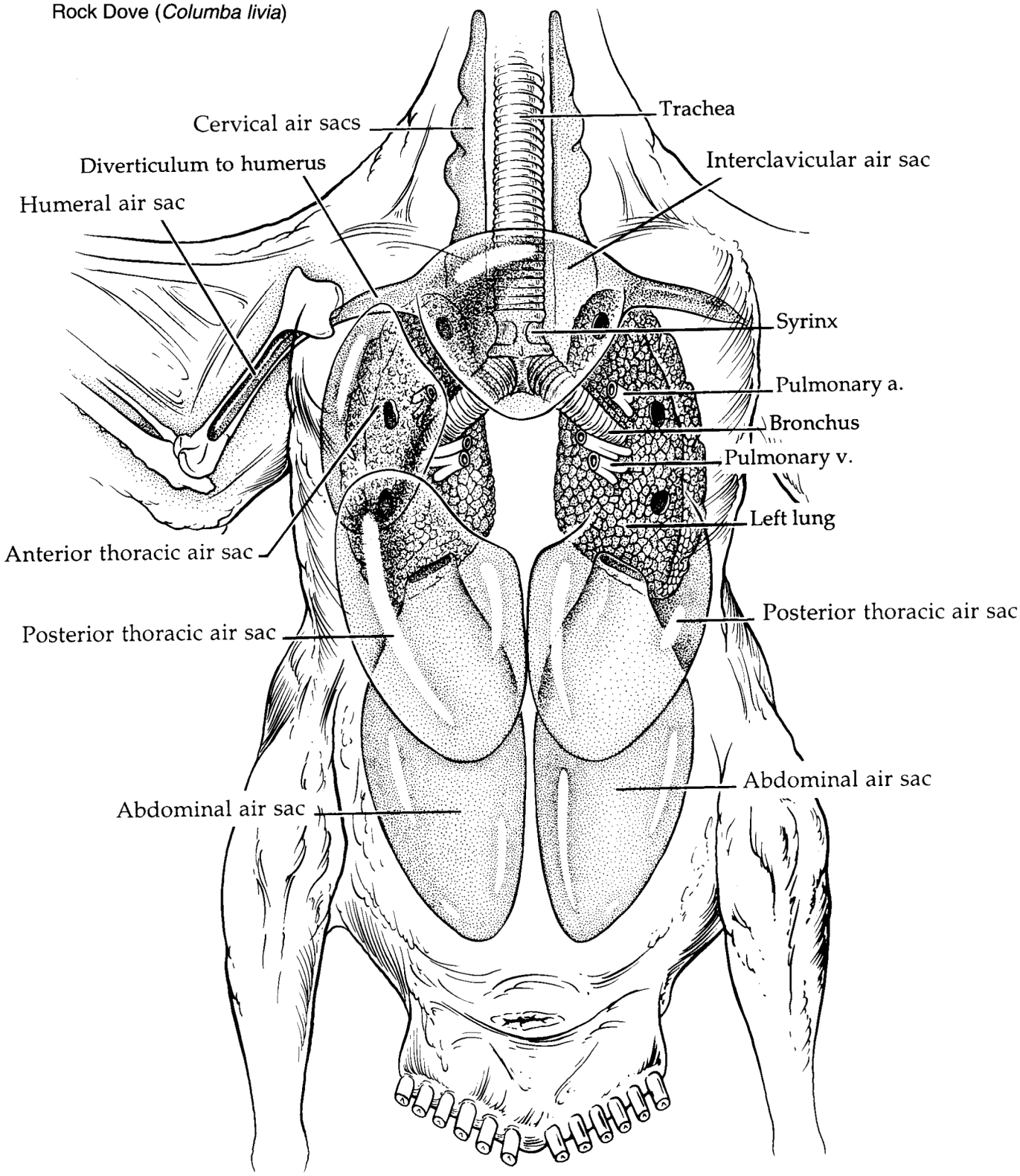
The primary function of the respiratory system is to supply oxygen to the body tissues and to carry away the carbon dioxide produced by metabolic activity. In birds this process of gas exchange is crucial, because the demand for oxygen produced by active flight is enormous. The flight muscles must receive a large and constant supply of oxygen to maintain flight, and such metabolic wastes as carbon dioxide must be removed quickly. In birds both heat and muscular energy are produced at the cellular level through the oxidation of foods stored primarily as fat within the body tissues. This cellular level of respiration, called internal respiration, actually produces metabolic heat and muscular energy. The gross structures of the respiratory system (pharynx, trachea, lungs, and air sacs) comprise the external respiratory system. The external respiratory system brings air into the body, exchanges oxygen from the air with carbon dioxide from the blood and expels waste-laden air from the body (Lasiewski 1972, Salt and Zeuthen 1960).

Reptiles and mammals move air through their lungs in a tidal-flow pattern in which the lungs are blind sacs and air moves in and out of the lungs through the same pathway. Birds, in contrast, have evolved a complex respiratory system of lungs and auxiliary air sacs that allow a continuous stream of air to pass through the lungs in an efficient one-way flow. At rest, both birds and small mammals of equal body size need about the same amount of oxygen to sustain body temperature and moderate activity. But small mammals cannot match birds in producing the huge extra energy demands needed to sustain flight for long periods. The relative efficiency of the avian respiratory system has been demonstrated by exposing sparrows and mice to a simulated altitude of about nineteen thousand feet. At this height mice become comatose, while sparrows are still able to fly and are apparently unaffected by the low levels of oxygen (Schmidt-Nielsen 1971).

Most flying birds are relatively small, weighing well under a pound. This is a great advantage in flight, but it imposes a difficult physiologic dilemma: small animals have a much higher ratio of body surface area to volume than do larger animals, so they radiate proportionately more heat and must expend relatively more effort to maintain homoiothermy. Most small flying birds face a double respiratory burden – to supply great quantities of oxygen to the flight muscles when in active flight and to feed the metabolic "furnace" that keeps their body temperature from falling dangerously low when they are inactive in colder environments.

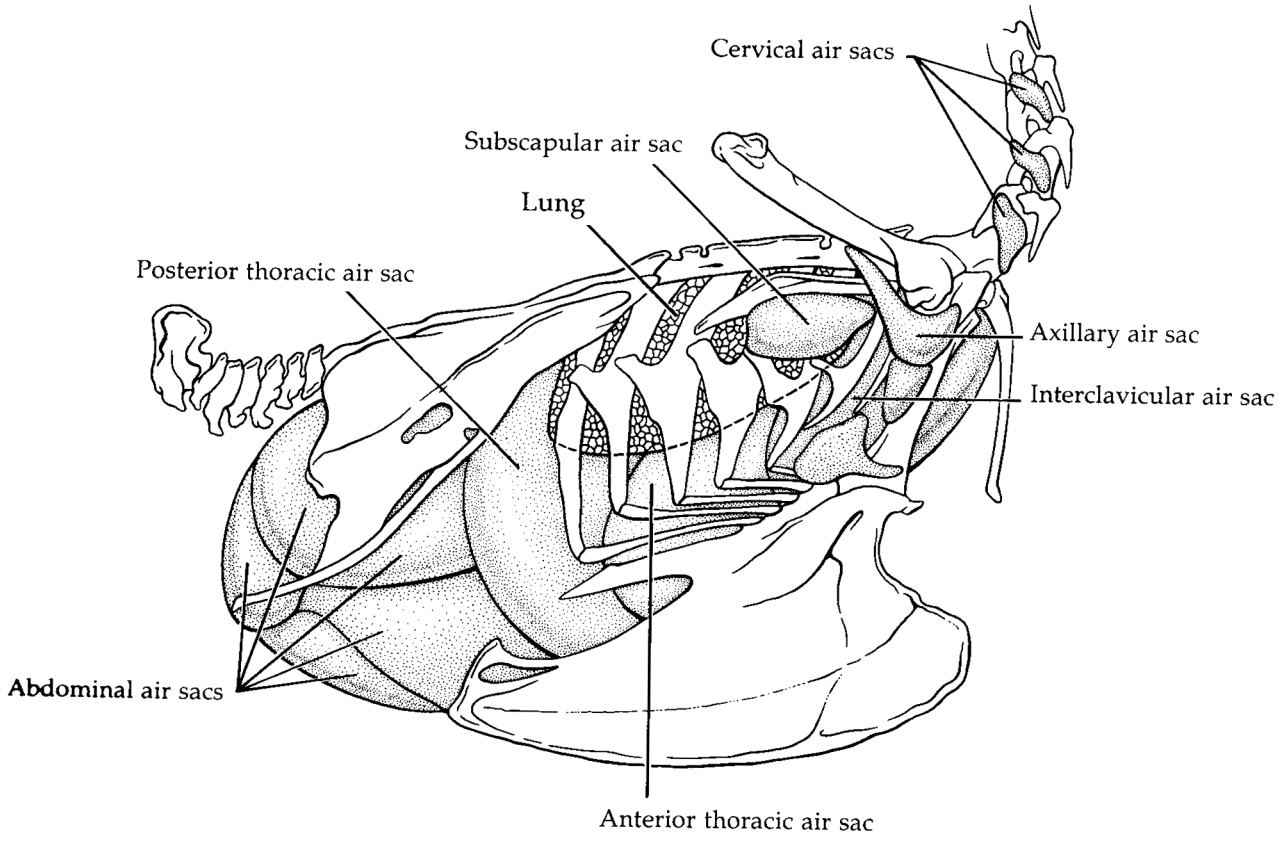
The avian respiratory system also cools the body. Birds lack sweat glands and are covered with an insulating blanket of feathers that effectively prevents them from radiating excess heat produced by muscular activity or from shedding heat absorbed from the environment. In hot environments the air sacs of the respiratory system are thought to aid birds in shedding excess heat as they breathe. Cooling apparently takes place as air passes over the walls of the air sacs and absorbs heat from the body, and this lowers the bird's internal temperature. A *few* of the more ardent advocates of homoiothermy in dinosaurs have theorized that the extensive system of pneumatized bones and body cavities found in birds probably evolved first in dinosaurs. Many theropods, including such well-known genera as *Deinonychus* and *Tyrannosaurus*, had extensively pneumatized skulls and the same type of rigid rib cage found in birds (Bakker 1986; Paul 1988). This suggests (but by no means proves) that some dinosaurs may have had a elaborate birdlike system of air sacs and pneumatized bones, but there is little direct fossil evidence for such a claim (Ostrom 1987).

Diagrammatic View of the Air Sac System
Rock Dove (*Columba livia*)



In most species of birds the air sacs occupy about 15 percent of the volume of the thorax and abdomen (Welty and Baptista 1988). In the lateral view of the air sac system depicted below, the air sacs have been inflated to show their positions in the body. Note the smaller air sacs surrounding the pectoral girdle and extending up both sides of the cervical spine. In most of the larger flying species, virtually every major bone is pneumatic to some degree, either perforated with connections to the air sacs or filled with hollow cavities. The remarkable complexity and extent of the air sac system strongly suggests that the sacs have a much greater function beyond external respiration. The air sacs are particularly well placed to aid the bird in shedding excess heat from its body as it breathes, and this thermoregulatory function explains why so much of the bird's body is penetrated with diverticulae from the air sac system. As air flows over the moist surfaces of the air sacs it causes evaporation. Evaporation absorbs heat and cools the tissues that are in contact with the walls of the air sacs.

Lateral View of the Air Sac System
Rock Dove (*Columba livia*)



Functional View of the Respiratory System

A diagrammatic view of the avian respiratory system opposite illustrates the path of a single breath of air as it flows through the air sacs and lung. Note that the exchange of carbon dioxide from the blood with oxygen from the air takes place only within the lung. The air sacs are poorly supplied with blood vessels and do not directly aid in gaseous exchange. The total respiratory cycle in birds actually takes two cycles in inhaling and exhaling to complete. The path of a break through the system can be summarized in four steps:

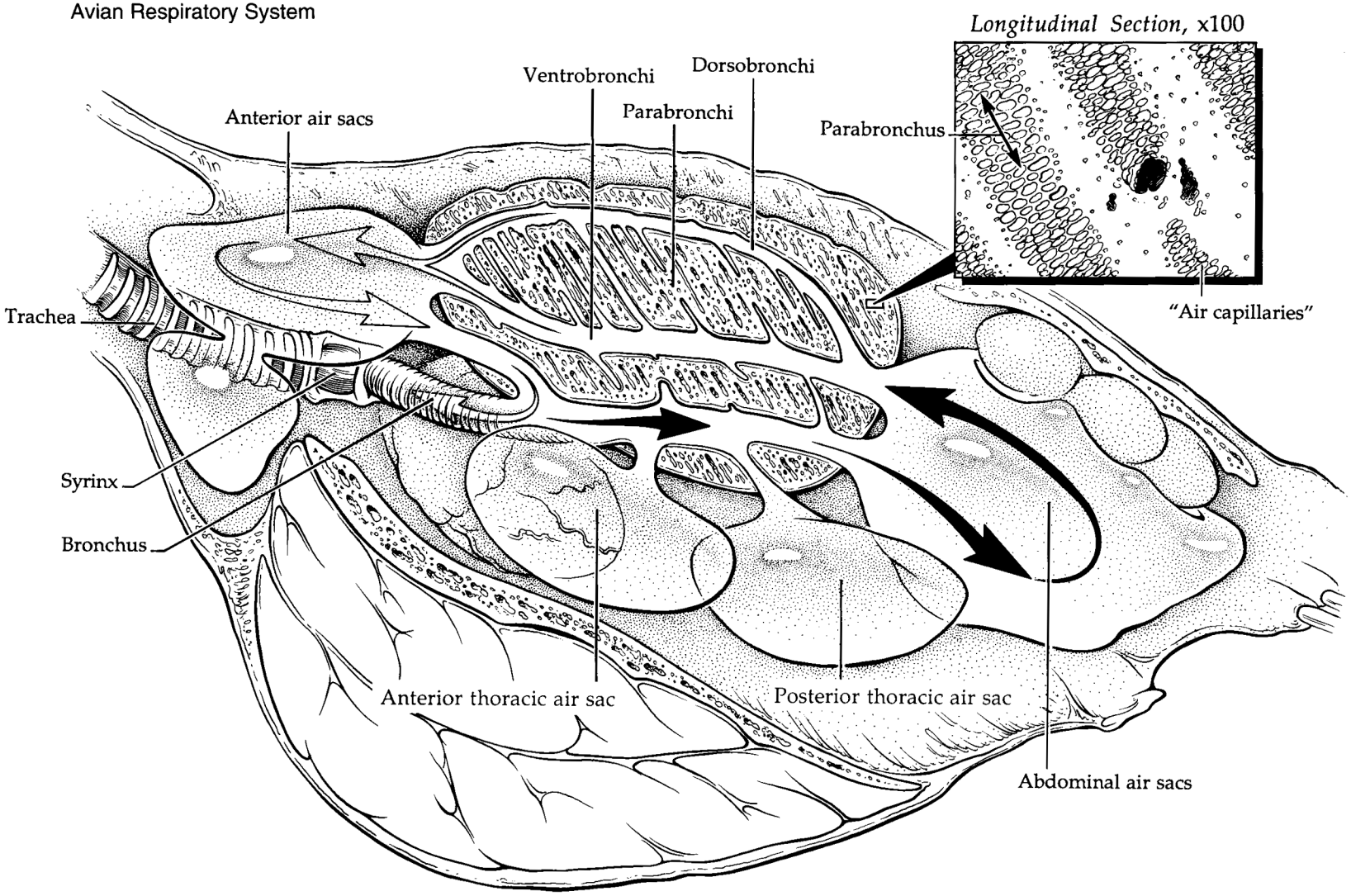
1. First inhalation (black arrows)
As a breath of air flows down the trachea, it passes through the syrinx and into the left or right bronchus. The bronchus brings the air to the lung. Once inside the lung the bronchial tube is called the mesobronchus, and it passes most of the air completely through the lung and into the posterior air sacs in the abdomen. The abdominal air sacs expand on inhalation as the abdomen expands, and this pulls the inhaled breath into the abdominal sacs.

2. First exhalation (black arrows)
As the bird exhales, the abdomen contracts, and this forces the air in the abdominal sacs into the lungs. Within the lungs, the air passes through a progressively finer sleve of tiny air passages, called the parabronchl. The smallest air passages within the lung are called the air capillaries that the exchange of oxygen for carbon dioxide takes place. The blood capillaries channel blood in through the lung tissue along with walls of the air capillaries, and this countercurrent flow of blood produces the maximum efficiency in gaseous exchange.

3. Second inhalation (white arrows)
As the bird inhales again the air in the lungs is driven out, and the stale air full of carbon dioxide now passes into the anterior air sacs, principally the interclavicular and anterior thoracic sacs.

4. Second exhalation (white arrows)
The anterior sacs contract, and this drives the air out into the trachea, where it passes up and out of the nostrils, completing the respiratory cycle.

Diagrammatic View of the
Avian Respiratory System



For the purposes of this diagram the air sacs are drawn much smaller than they appear in a live bird so that the major sacs will be easier to identify individually. In life the air sacs almost completely surround the abdominal viscera, and the sacs overlap each other extensively. If your dissection specimen was preserved in formalin, it may be difficult to appreciate the complexity and extent of the air sac system. If a fresh specimen is available, carefully open the abdominal wall and examine the air sacs that lie between the viscera and the wall. They will appear as thin, transparent sheets of tissue adhering to both the abdominal contents and the abdominal wall.

Introduction to Fluid Therapy

Fluid therapy is treatment that attempts to replace lost fluids in an animal. The type of fluid, amount needed, and route of administration vary with the animal's needs and condition.

In this section you will review the reasons for fluid therapy, become familiar with the equipment you will need, learn aseptic techniques for preparation, discuss the routes, methods, and administration of different types of fluids, and guidelines for determining quantities.

This section will end with a hands-on workshop which will provide the opportunity to put this material into practice.

Indications for Fluid Therapy

There are many conditions which may indicate the need for fluid therapy. The most common are dehydration, injury or trauma, blood loss, shock, starvation, vomiting or diarrhea, and toxicity. These conditions and causes do overlap in some ways.

Dehydration

Dehydration is the state that occurs when the body loses more fluid than it takes in. This negative fluid balance decreases the circulating blood volume and the amount of fluid in the tissues. There are several clinical signs of dehydration. You may find one or more in an animal you are examining.

- Mouth

Dehydration can be indicated during a normal assessment during the examination of a bird's mouth. When first opening the bird's mouth you may see "thready" mucus or ropes of saliva. This is a sign of dehydration. Touch the inside of the mouth. Tacky mucus membranes are another sign.

- Skin

Dehydration can be observed in the skin, too. Carefully look at the surface of the skin in one of the bird's apteriums. If the skin appears loose or unusually wrinkled, the animal is very likely dehydrated. Another way to identify dehydration is by "tenting" the skin. Simply pinch an area of the skin and note the manner in which it returns to normal. If an animal's skin does not readily return to its normal position, the animal is probably dehydrated.

- Evidence of a cause

There are several conditions which cause dehydration. Vomiting or diarrhea can quickly deplete the fluids in an animal's system. It is important to monitor these conditions carefully as fluids can be lost in large quantities and dehydration can occur quickly. Excessive bleeding or large open areas without skin are other indicators.

Injury or trauma

Injury or trauma can often be a cause of dehydration.

- Large areas of exposed tissue (degloving wounds) may have allowed fluids to escape through evaporation.
- Head injuries can result in an animal being unable to drink.
  - Heads can be inverted.
  - Impairing mental problems
- Too depressed (down) to drink.
- Blindness
- Hole in crop or other part of the digestive tract

Blood loss

Blood loss can result deplete fluids and needs to be replaced.

- Internal or external trauma
- Compound FXs
- Gunshot wounds
- Surgical procedures (some blood loss may be unavoidable)

Shock

Shock is the body's response to some type of insult. The body seeks to protect the heart and brain at all costs. Fluids help to raise the blood pressure and keeps the blood flowing. Signs of shock can be pale mucous membranes, non-responsiveness, low body temperature, or low blood pressure.

Starvation

In a starving animal, the digestive system is not fully functioning. Hydration aids in stabilization.

- Some animals get liquid from food
- Some are too weak to get to food or water
- When the body is stabilized they may begin to feed

Dehydration often masks itself as starvation. Depleted breast tissues "collapse" causing the bird's keel to feel pronounced. Fluid therapy can restore fluid to tissues and return "thickness" to muscle.

Vomiting or diarrhea

Vomiting or diarrhea can quickly cause dehydration. Replace fluids as needed.

Toxicity

When toxins are present in the system, fluid therapy is beneficial. It improves the function of the kidneys and liver by clearing the toxins from the bloodstream.

- Nephritic drugs (toxic to kidneys)
- Poisonings/toxic exposure

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Principles of Fluid Therapy

Sallie C. Welie, VMD

Introduction

Fluids play a vital role in the health and survival of all living creatures and are an important constituent of all cells. Fluid and cellular components in the circulatory system transport nutrients and oxygen to, and remove waste materials and carbon dioxide from organ systems throughout the body. Adequate circulatory pressure must be maintained so that each tissue received the perfusion that it needs to maintain normal function. When fluid imbalances occur due to starvation, disease or injury, life-threatening dehydration and shock may result.

Normal fluid loss through respiration, evaporation and elimination occurs at a daily rate of fifty milliliters (mls) per kilogram of body weight or approximately 5% of the animal's weight each day. Animals were decreased intake (due to injury or starvation) or increased loss (resulting from bleeding, vomiting, diarrhea, polyuria or infection) will experience some degree of dehydration. Additionally, oil contaminated animals may lose the ability to absorb fluids from their gastrointestinal tract because of petroleum induced enteritis. Oiled animals often experience increased fluid loss because of toxic injury to their kidneys. It is safe to assume that all oiled animals need some degree of fluid support and many will require intensive fluid therapy.

Signs of Dehydration

<5%	no clinical signs skin turgor return time – 1 sec
5-7%	tacky mucous membranes decreased urine output skin turgor return time – 2-5 sec
8-9%	weak pulse sunken eyes animal is cepressed, lethargic skin turgor return time – 2-5 sec
10-12%	general signs of chock no return of skin turgor

An estimation of the amount of dehydration can be made based on the physical characteristics described below. However, if the dehydration is less than 5%, it is usually not detectable, and if it is greater than 10-12%, it is usually fatal. Birds showing depression, weakness, skin tenting, and loss of roundness to the eye generally have fluid deficits between 5% and 10%. Mammals with 5-7% dehydration usually have tacky mucous membranes (feel the gums in the mouth), decreased urine output, and the skin will take two to five seconds to return to normal after it is pinched and lifted from the animal's back. A mammal's pulse will become weak and the animal will be depressed and lethargic as dehydration approaches 8-9%. It may enter shock and have no return of the lifted skin by the time it reaches 10-12% dehydration. Replacement fluids are calculated on an assumed 10% deficit.

Fluid therapy is used to correct existing deficits (replacement fluids), to provide for daily needs (maintenance fluids), and to provide for ongoing losses from bleeding, loss of kidney function, diarrhea, etc. Fluids may be administered orally (per os) or by injection (subcutaneous, intravenous or intraosseous injection). The route of administration is determined by the animal's condition, the volume of fluids to be given, and the training of the administrator. Multiple routes of administration can be used simultaneously. Intraperitoneal fluids are rarely administered to birds or mammals, but are often the best (and easiest) route to use with reptiles and amphibians.

Calculating Fluid Needs (after Redig)

1. Weigh the animal using a metric scale. Add 10% to this weight to compensate for probable dehydration. This gives the corrected body weight.
2. Compute maintenance and rehydration volumes; these are calculated separately, although they are given at the same time. Fluid therapy should be administered in three to four doses spread evenly through the working day.
3. To calculate maintenance fluids, find out 5% of the corrected body weight in grams. This corresponds to the total number of mls or con centimeters (cc) of fluid required by the animal in a twenty-four hour period. This volume is administered via three equal injections and/or by gavage for as long as maintenance support is needed (usually three or four days). Once the animal is eating and drinking readily, maintenance fluid support is usually discontinued.
4. To calculate replacement fluids, determine 10% of the corrected body weight in grams. This corresponds to the total number of mls which is equal to ccs needed to correct the fluid deficit. Replacement fluids are given over a three day period (50% on day 1, 25% each on days two and three) via three equal daily administrations.
5. For convenience, calculations can be entered into a table as shown in the example below. Note that all calculations rely on the equivalency factor that one cubic centimeter of water weighs one gram and that one milliliter equals one cubic centimeter.

EXAMPLE
A bird admitted weighing 50 grams (gm) is estimated to be 10% dehydrated. What are its fluid needs for the next four days?

a. Calculate corrected body weight: 50 x 10% = 5 gm, 50 + 5 = 55 g,
b. Maintenance fluids: 55 gm x 5% = 2.75 gm = 2.75 cc
c. Replacement fluids: 55 gm x 10% = 5.5 gm = 5.5 cc. This given over a three day period as follows:
   Day 1: 5.5 cc x 50% = 2.75 cc
   Day 2: 5.5 cc x 25% = 1.375 cc
   Day 3: 5.5 cc x 25% = 1.375 cc

DAY	**1**	**2**	**3**	**4**
Maintenance	2.75	2.75	2.75	2.75
Replacement	2.75	1.375	1.375	0.0
TOTAL	5.5	4.13	4.13	2.75
Volume given TID* to nearest 0.1 cc	1.8 cc	1.4 cc	1.4 cc	0.9 cc

* Three times a day

Fluid Selections

A balanced electrolyte solution such as lactated Ringer's solution (LRS) can be used safely for all routes of administration. The addition of 2.5% dextrose to oral and subcutaneous (SQ) fluids, and 5% dextrose to intravenous (IV) and intraosseous (IO) fluids provides a much needed energy source. If LRS is not available, Normosol R®, D5W, or half strength saline can be used. Hypertonic solutions, and solutions containing high sodium concentrations are not recommended for rehydration purposes.

Once fluids are opened, they should be used within twenty-four hours for IV or IO injections, and within five days (maximum) for SQ injections. Oral use may be continued unless the solutions become cloudy in appearance. Refrigerating opened fluids between uses will retard bacterial growth so that fluids can be used for five days for IV or IO injections, and for up to ten days for SQ injections.

Guidelines for Fluid Administration

Oral Fluids

"If the gut works, use it." Animals that are responsive, can maintain their head carriage, have functioning gastrointestinal (GI) tracts, and which are not seizuring or in shock, are good candidates for oral fluids

Oral fluids can be used in conjunction with injectable (parentera) fluids if the above criteria are met. With the exception of toxin ingestion, adult mammals are not gavaged but are allowed free access to bowls of oral fluids.

1. Pedialyte – a sterile solution that should be used within 48 hours of opening. Pedialyte provides water, some electrolytes, and a small number of colories.

2. Balanced electrolyte solutions (Normosol R®, LRS) – these sterile solutions provide water and electrolytes.

3. Dilute Gatoraid (mix 50:50 with tap water) – provides water, electrolytes, and some calories.

4. Emergency formula – one teaspoon salt and three teaspoons sugar in one quart boiled water (water should be boiled for five minutes and allowed to cool to room temperature; use solution within 48 hours).

The following solutions can be used to provide nutritional support and can be administered three to six hours after initial rehydration fluids are given.

1 Osmolite® or Ensure® (vanilla or fruit-flavored) – dilute 50:50 with water for the initial feeding. If the animal tolerates diluted Osmolite, it may be given full strength for the next feeding (keep open containers refrigerated and use within twenty-four hours).
2 Diluted Emeraid® (mix 50:50 with water) – this provides nutritional support in addition to fluids for birds, and is generally not given to severely dehydrated birds.

If the animals are stable, reasonably hydrated, and can tolerate full strength Osmolite but will not hand-fee or eat on their own, a diluted and strained gavage diet can be given. Follow fluid therapy guidelines for techniques and volumes.

Parental (injectable) fluids
These fluids are indicated in animals that are seriouslyl ill, very depressed or shocky, or which require very large volumes that cannot be given orally. Administrators should be trained in aseptic techniques and follow medical protocols. Consult section entitled "Calculating Fluid Needs" to figure out volumes required; sites for administration are discussed below.

1 Subcutaneous fluids – of all parenteral routes, subcutaneous fluids are the most easily administered. They are recommended for animals that cannot receive oral fluids but have adequate peripheral circulation and are not in shock. Subcutaneous fluids may be used alone or together with oral or intravenous fluid support. Consult "Calculating Fluid Needs" to determine relative volumes.

2 Intravenous fluids – recommended for animals that have poor peripheral

circulation, are in imminent danger of shock, or are suffering from severe blood loss, emaciation, severe dehydration or acute trauma. They are useful when large volumes of fluids must be given, and can be used in conjunction with subcutaneous fluid support. A bolus of up to 3% of the animal's body weight can be given if respiratory disease is not present and if kidney function is adequate. Care must be taken to avoid over hydration of head trauma patients and hematoma formation when administering IV preparations. In birds, IV catheters can be placed in the medial metatarsal vein. In mammals IV catheters can be placed in the cephalic vein or the saphenous vein.

3 Intraosseous fluids – recommended for animals requiring long term fluid support such as those suffering from acute kidney failure. Repeated administration of large boluses is possible through a catheter placed in the distal ulna (Ritchie, 1990). NOTE: Because pelicans' ulnas are pneumonic bones they cannot be used for intraosseous fluids. Instead, the tibiotarsi must be used.

Administration of Oral Fluids

1. Materials: Prepared fluids, syringe (approximately 20-50 cc), adapter, appropriately sized catheter (feeding tube).

2. Determine volume needed for basis of species and eight. Draw up slightly more than is needed.

3. Heat the fluids by placing them in hot water until they are just warm to the touch (approximately 100 degrees F). If fluids are too hot, they can scald the lining of the esophagus and crop.

4. Measure the catheter to the animal's neck, by holding it along the side of the bill and neck. Determine how much catheter should still be exposed once the tip has reached the crop area (base of neck in birds, or to the last rib in mammals). FIRMLY attach the catheter to the adapter and the adapter to the syringe.

5. Expel excess fluid to empty catheter of air.

6. Hold the animal's head by placing your fingers behind the jaw. Extend the neck up and forward. Open the bill or mouth and slowly insert the catheter down the back of the throat; no resistance should be felt and the animal should not gag. Feel the outside of the animal's neck along the

trachea; the catheter can often be seen or palpated as it is being inserted. Always check the glottis (the opening at the base of tongue in birds, not often visible in mammals) to make certain that the catheter was not inserted into the trachea by mistake.

7. It is safe to allow the bird's bill or the mammal's mouth to close slightly over the tube; this is often more comfortable than holding the mouth open. The edtes of the bill or mouth are not as sharp ????? commissures (corners of the mouth). Never allow mammal to completely close its mouth or in any way bit a gavage tube. ALWAYS leave enough tube exposed so that the hand holding the head can grasp the end of the tube; this insures that the animal will not pull its head away, tearing the tube from the syringe and leaving the tube in the throat.

8. Expel the fluids slowly, waiting briefly after administering each five ccs. If the animal beings to choke, regurgitate or if fluid begins to back up in the throat, pinch off the tube and remove it slowly. Allow the animal to shake its head and neck. Do not administer additional fluids at this time.

9. Once the fluid in the syringe is low, be careful to halt the feeding before any air is expelled into the gastrointestinal tract. Pinch the tube to prevent drips and possible aspiration, and slowly withdraw the tube.

10. Use a clean catheter for each animal.

Site for Injection

Subcutaneous fluids are given in the loose skin where the leg meets the body (inguinal area) in birds, or in the broad flat area where the neck joins the back in birds and mammals. The patagium is not recommended as an injection site. A 23 or 25 gauge needle is carefully inserted under the skin (needle should move freely under the skin); a blister or bubble will form as the warmed fluid is expelled, but administration should be discontinued before the skin becomes excessively taut.

IV fluids can be given to birds in the medial metatarsal vein (preferred) or the brachial vein using a 23 or 25 gauge butterfly catheter to administer a bolu of warmed LRS. IV fluids can be given to mammals in the cephalic vein in the forelimb, or the saphenous vein on the inside the hind leg. Fat mammals with short limbs (beavers, opossums, muskrats) may be inserted in the dorsal tail vein. The jugular vein is not recommended as an injection site. Once the needle is withdrawn, digital pressure should be applied to reduce the risk of hematoma formation.

Intraosseous fluids are given in a spinal needle positioned in the distral ulna of birds only.

Intraperitoneal fluids are given near the junction of the hind leg and abdomen of turtles, lizards and amphibians, being careful not to insert the needle too deep.

Editor's Note: All injections should be done under the direction of a veterinarian.

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Redig, P. 1983. *Fluid Therapy in Medical Management of Birds of Prey*. St. Paul, MN: Raptor Research and Rehabilitation Program, pp 38-53.
Ritchie, B.W. et al, 1990. A technique of introsseous cannulation for intravenous therapy in birds. *In* compendium of Continuing Education, vol. 12, no. 1, pp 55-58.

Fluid Therapy Chart (Maintenance and Replacement)

Animal Weights: 1 to 10 grams

Incoming weight (in grams)	1	2	3	4	5	6	7	8	9	10
Corrected body weight (in grams)	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11
Day 1 (cc per dose*)	0.04	0.07	0.11	0.14	0.18	0.21	0.25	0.28	0.32	0.35
Day 2 (cc per dose*)	0.03	0.05	0.08	0.11	0.13	0.16	0.19	0.21	0.24	0.27
Day 3 (cc per dose*)	0.03	0.05	0.08	0.11	0.13	0.26	0.19	0.21	0.24	0.27
Day 4 or maintenance only (cc per dose*)	0.01	0.04	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.18

Animal Weights: 10 to 100 grams

Incoming weight (in grams)	10	20	30	40	50	60	70	80	9	100
Corrected body weight (in grams)	111	22	33	44	55	66	77	88	99	110
Day 1 (cc per dose*)	0.36	0.7	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5
Day 2 (cc per dose*)	0.27	.05	.08	1.1	1.3	1.6	1.9	2.1	2.4	2.7
Day 3 (cc per dose*)	0.27	0.5	0.8	1.1	1.3	1.6	1.9	2.1	2.4	2.7
Day 4 or maintenance only (cc per dose*)	0.18	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.8

Animal Weights: 100 to 1000 grams

Incoming weight (in grams)	100	200	300	400	500	600	700	800	900	1000
Corrected body weight (in grams)	110	220	330	440	550	660	770	880	990	1100
Day 1 (cc per dose*)	3.5	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0
Day 2 (cc per dose*)	2.7	5.3	8.0	10.7	13.3	16.0	18.7	21.3	24.0	26.7
Day 3 (cc per dose*)	2.7	5.3	8.0	10.7	13.3	16.0	18.7	21.3	24.0	26.7
Day 4 or maintenance only (cc per dose*)	1.8	3.7	5.5	7.3	9.2	11.0	12.8	14.7	16.5	18.3

* Administer three doses per day

NOTE: When calculating the fluid needs for turtles and tortoises, use half their body weight as the Incoming weight

Equipment

Fluid therapy requires equipment that is not used in a simple assessment or well care exam. Syringes, needles, tubing or catheters, and your fluid of choice should all be on hand.

• Syringes

Syringes come in a variety of sizes, based on the volume they contain. Syringe volume is usually measured in cc's or ml's. The small tuberculin syringes may indicate measurement in "units" but these figures should always be translated into cc's or ml's (100 units = 1 cc) for the purpose of our records. Some syringes come without a needle and one must be selected and attached. Others come with a needle, either permanently attached or with a removable needle already on the hub.

• Needles

Needles come in a variety of sizes, too. There are usually two measurements for needles, the length and the gauge. Needle lengths are usually 1 inch, 1 1/2 inch, or 2 inches. A needle's gauge indicates its circumference. The larger the *number* of the gauge, the smaller the diameter the needle will have. Needle gauges commonly range from 18 to 27. An 18-gauge needle will be larger than a 27-gauge.

• Tubing or catheters

Fluids can be given orally through tubing or catheters. Tubing is available in a variety of lengths and diameters. Long heavy tubing is needed to tube long-necked birds such as great blue herons. You will also need small thin soft tubes for hydrating hatchlings and other small birds. Small catheters are ideal for this purpose.

Types of Fluids

Fluid therapy can be accomplished with many types of liquids.

• Water

Ordinary tap water can be used as fluid therapy. A bowl of water can often provide what an animal needs—in a very low stress manner! If an animal can drink on its own, offering it water and a low stress environment are good options for fluid therapy. Tap water can also be administered orally (PO) by tubing the animal.

• LRS / Normosol

Normosol and LRS (lactated Ringer's solution) are commonly administered during fluid therapy. It can be administered by the Medical Services staff either orally (PO) or under the skin which is called subcutaneously (SQ).

• Normal Saline

0.9% Sodium Chloride (normal saline) can also be administered during fluid therapy. Like LRS, normal saline can be given by the Medical Services staff either orally (PO) or subcutaneously (SQ).

• D5W

5% dextrose (D5W) can be given if the animal is extremely weak and you need to get in additional calories. Similar to LRS and normal saline, D5W can be given by the Medical Services staff either orally (PO) or subcutaneously (SQ).

• Higher calorie products

It is important to understand the difference between 5% dextrose (D5W) and LRS with 5%. LRS with 5% dextrose can *only* be given orally by Medical Services staff. The products look very similar so caution should be used when reading labels. 10% dextrose and 50% dextrose must also only be given orally by the Medical Services staff.

• Emeraid

Fluid therapy can also be given with added nutritional ingredients. Emeraid has several different products that can be used. These should be diluted 50:50 with water and offered orally (PO).

Aseptic Techniques

It is important to use a sterile technique during any fluid therapy procedure. This is for the protection of the animal you are treating as well as for the protection of future animals that made need the same products. As the amounts of fluids used in birds are often very small, a 1000 ml. bag of fluid will last quite a long time! We must take precautions to ensure the bag's sterility.

Always follow the steps below.

- Always use a clean new needle and syringe each time you prepare fluids.

- Keep the bag of fluids sterile. Wipe the rubber end with alcohol before inserting your needle.

- Do not re-inject unused fluids back into the bag.

- Do not reinsert a needle into the fluid bag if it was already in an animal. If you need more fluids, get a new syringe and needle. Only sterile needles should be inserted into the bag.

- When you are filling your syringe, pull back on the syringe until you have reached the necessary amount and then withdraw the needle immediately.

Routes and Methods of Administration

This section will discuss the different routes of administration and methods that are used. Although there may other methods available, the ones discussed here are acceptable for use at Liberty Wildlife by trained Medical Services staff.

• Per Os (Oral - PO)

Tap water, LRS, normal saline, D5W, LRS w/5% dextrose, 10% dextrose, 50% dextrose, and other products such as Emeraid can be administered orally (PO).

• Offer water. Often, the best way to hydrate is to have the animal drink on its own! White wing, mourning, and Inca doves can have their beaks "dipped" in water to encourage drinking.

• Method

Place a bowl of water in enclosure.

• Tubing is the processing of providing warmed fluids directly into the crop or stomach through a tube or catheter. Great care must be taken when tubing animals to ensure they do not aspirate the fluid. Sometimes tubing an animal with a small amount of high-calorie liquid can help "jump-start" its system.

• Method

Measure tubing length to reach desired area.
Select the type and quantity of fluid
Draw up fluid into a syringe with the tubing attached
Carefully insert the tubing into the throat. (Care must be taken to avoid the trachea.)
Dispense the fluid (monitor the quantity carefully)
Remove the tube *slowly*

• Hydration through food. A mouse can be injected within a small amount of fluids to provide additional hydration. Worms can be drowned in water before offering. Standard feeding formulas can be diluted more than usual, providing more liquid. Food pieces that are being force-fed can be soaked in water, although care must be taken to make sure that liquid is not accidentally dripped into the trachea.

• Method

Inject into mouse. Don't make it too big!
Be cautious when hand-feeding soaked pieces.

• Parenteral

Parenteral fluids are given by injection. Medical Services staff will be giving subcutaneous (SQ) injections only. Additional parenteral methods will be reviewed here, however they are administered only by the veterinarians or senior Medical Services staff.

- Subcutaneous (SQ)

Subcutaneous (SQ) fluid therapy is the injection of fluids beneath the skin. LRS, normal saline, and D5W can be administered subcutaneously (SQ). The advantage of administering fluids subcutaneously is that the body will absorb the fluids as needed, without the risk of over hydrating or drowning your patient. There are several sites in birds that can be available for fluid therapy. The preferred site is the apterium on the side of the torso, lateral and proximal to the femur. This area contains loose skin to allow for the movement of the leg and can expand to hold a significant amount of liquid. Caution must be used to ensure fluids are not injected into the nearby air sacs. There are other sites, such as between the wings (scapulas) on the back and the area on the inside of the flap near the proximal humerus, however they do not have the expansion of the preferred site and therefore cannot hold the same amount of liquid.

- Method

Select your fluids.
Select your syringe size and needle.
Draw up the fluids using aseptic technique.
Warm the fluids in a bath of hot water.
Restrain the animal.
Locate the proper site. If you have difficulty locating the site, you can wet down the feathers with a small amount of alcohol. (Do not saturate bird as this might cause pain or burning at the injection site. Also, the alcohol will make the bird cold.)
Insert the needle at an angle (almost parallel) just under the skin. It is helpful to have the bevel up.
Pull back slightly on the syringe to make sure you are not in an air sac. You are checking for air or for blood. Watch the hub carefully, this can happen! If air or blood enters the syringe, stop, remove the needle, and try another location.
If you did not see air or blood enter your syringe, begin to inject the fluids. A small bubble will appear on the skin, which will slowly grow. Monitor the bubble carefully to be certain that the site does not become too hard.

- Intravenous (IV)

Intravenous (IV) fluid are injected directly into the vein. The advantage to this method is its quick entrance into the blood system.

- Intravenous (IV) fluids are given by the veterinarians or senior medical staff only.

- Intraosseous (IO)

Intraosseous (IO) fluids are injected directly into the bone.

- Intraosseous (IO) fluids are given by the veterinarians or senior medical staff only.

- Intraperitoneal (IP)

Intraperitoneal (IP) fluids are injected directly into the peritoneum

- These are not usually given to birds.
- Administered by the veterinarians or senior medical staff only.

Volumes for Fluid Therapy

It is critical to carefully determine the amount of fluids you are planning to administer, even if the method is subcutaneously. The volume will be influenced by the animal's species and condition, the type of fluid you are administering, and the method of administration. There is a specific method that calculates fluid therapy dosages and the timing of administration. A handout following this section details this procedure. The following procedures rely on a "rule of thumb" which will ensure safe administration based on the weight of the animal.

- Determining volume for SQ injections
  - Weigh the bird
    - The weight of bird must in grams
  - Take 10% of the bird's weight (divide weight by 10)
    - (10% of bird's body weight is blood volume and the blood volume is approximately 1cc/gram.)
  - This number (10%) is the *maximum* volume in cc's that can be safely administered.
    - You will not be exceeding 10% of blood volume.
    - (SQ volumes only! PO volumes are much less.)

MS6 Fluid Therapy Lab

SQ Fluids

Identify your specimen

Locate all injection sites on your specimen

Make a chart

Weigh your animal

Determine the amount of fluids

Select your equipment

Draw up using aseptic technique

Warm fluids

Position animal correctly for site

Administer the fluids SQ

Record your notes, add initials and date

Oral Fluids

Determine if animal has crop or stomach

Select your equipment

Draw up the fluids using aseptic technique

Warm fluids.

Position animal correctly.

Administer fluids.

Record in chart.

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• Section Seven •

Wing Bandaging

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267
Wildlife Hotline (480) 998-5550

Introduction to Bandaging

You have already learned about the Avian Skeletal System. Injuries to this system and to the tendons, ligaments, and muscles it supports, often require restriction of movement and stabilization in order to heal properly. Bandaging is often a crucial component of these treatments.

Bandages are used for many purposes. They may be used to reduce or stop bleeding. They may protect an open area on the body from contamination. They may hold a medication, dressing, padding, or splint in place. They may be used to protect an area from injury. Bandages are also used to immobilize injuries.

In this section we will review common bandage techniques, discuss products and supplies, and practice, practice, practice!

Avian Skeletal Review

Earlier in this program we divided the avian skeletal system into four sections for the purpose of study: the thoracic limbs (wings), the pelvic limbs (legs), the head, and the torso (thorax, pelvis, and tail). To study bandaging, it is important to be thoroughly familiar with the avian skeletal system and its system of bones and joints. This review will focus on the thoracic limbs.

The Thoracic Limbs

The thoracic limbs are the wings of a bird. They attach to the body at the shoulder and contain the humerus, elbow, radius, ulna, wrist, and the manus (carpus and metacarpus).

- Shoulder

The shoulder is the *point of articulation* between the wing and the body where the proximal humerus articulates with the glenoid fossa, a cavity formed by the scapula and coracoid.

- Humerus

The humerus is the bone of the wing located between the shoulder and the elbow. Although the humerus is a bone, it is also part of the respiratory system in birds. When this *pneumatized* bone has open or compound fractures there is a danger that liquid entering the bone through the fracture site could actually cause the animal to drown. Pneumatized bones should never be flushed because of their respiratory connection.

- Elbow

The elbow is the *point of articulation* between the distal end of the humerus and the proximal ends of the radius and ulna.

- Radius and Ulna

The radius and ulna are the bones of the wing located between the elbow and the wrist. The ulna is the larger of the two bones. The secondary wing feathers attach directly to the ulna. The radius is the smaller bone and is located closest to the patagium.

- Wrist joint

The wrist joint is the *point of articulation* between the distal ends of the radius and ulna and the carpalmetacarpals.

- Carpus, metacarpus

The carpalmetacarpus bones are in the distal wing. The carpus consists of the radial carpal bone and the ulnar carpal bone. The minor and major metacarpals fuse, both distally and proximally, to form an opening called the intermetacarpal space. These bones support the alular digit or thumb (digit one). The remaining two digits are the proximal and distal bones of the second phalanx (digit two) and the small phalanx minor digit (digit three). Most of these bones are extensively fused and modified to support flight.

Vocabulary

The following terms help to describe avian anatomy by function or position. Also included are the common bones and joints of the limbs.

Caudal	Toward the tail
Cephalic	Toward the head
Distal	Away from the point of attachment
Dorsal	The top side or back
Lateral	Farther away from the midline
Medial	Closer to the midline
Proximal	Closer to the point of attachment
Ventral	Bottom, toward the abdominal side

Can you identify?

Shoulder
Humerus
Elbow
Ulna
Radius
Wrist
Carpal
Metacarpals

Equipment and Supplies

• Bandage scissors
Scissors that have one blade flattened at the end to slip under bandages. They are designed for cutting tight bandages without cutting the patient.

• Vet Wrap
Vet wrap is an elastic product that adheres to itself. It is available in many widths and can be cut into very small sections for tiny wraps. The advantage of vet wrap in avian treatments is that it does not stick to feathers. Vet wrap is ideal for many situations; however, caution must be used because if it is applied too tightly, constriction or swelling can result that can irreparably damage tissue or a limb.

• Rolled cotton
Rolled cotton is an excellent material to use for padding areas that require extra protection. It can be used in small amounts to provide a softer wrap or be used in large thick wraps for support such as in the Robert Jones wrap.

• Gauze
Gauze can also be used for padding. It is particularly helpful when bandaging feet.

• Tape
Tape fixes to a surface. *Paper tape* adheres lightly and can be removed with minimal damage to feathers. *Masking tape* is very useful for splinting or for shoes on small birds. *White adhesive tape* sticks firmly in place and does not stretch, but does damage feathers. *Elasticon* is an adhesive tape that stretches. However, caution must be taken when using Elasticon. If applied too tight, Elasticon can cause swelling that can irreparably damage a limb or the patagium. *Steri-strips* are thin strips of threaded tape. They are very sturdy and can attach to the skin sometimes in place of sutures.

• Splints
Splints are commonly used to secure fractures. Simple splints may be made from tongue depressors, wire, swab stems, tape, or custom splinting products such as SAM splint.

Stabilization

Stabilizing your bandage is a necessary step to ensuring its success. Stabilizing can be accomplished in several ways:

• Bone against bone
The bones in the legs or wings adjoining the fracture or trauma site, will act as a splint.

• Bone against body
The body itself will act as a splint, providing additional support.

• Splints
Sometimes external materials are needed to add stiffness to stabilize a site. There are many materials available that can be used as splints.

• Nesting donut
Support for the animal when it is not standing can provide additional stabilization. A towel wrapped in the shape of a ring can provide a nesting structure that will keep the animals head elevated and limit its attempts at movement.

• Substrate
Substrate is a particular surface below the animal aids in the healing process by providing a stable surface. For example, an animal that has one leg wrapped might find newspaper too slick for one-legged mobility. Softer, firmer, easier to grip, rougher, or smoother are all options for substrate modifications. The one you choose will depend on the condition being treated. Most often the caging is the correct substrate.

• Cage rest
Just do nothing! Sometimes an animal will hold a limb in the correct position and a wrap can actually unstabilize the site by tension or even by its weight. This is often the case with very small birds. Not using a wrap but providing complete cage rest may be the best treatment. Some common non-bandaging conditions are fractures of the keel, pelvis, or the pectoral girdle.

Bandaging Techniques

There are many bandaging techniques. Some are standards used for specific situations, but many will be techniques you develop for animals with special needs. Common bandaging techniques of the wing are listed here.

Figure 8

The figure eight bandage is commonly used for injuries to the wing. The folded wing is wrapped in place and secured using vet wrap. If the alignment in the wrap was correct, this wrap is very effective. The critical technique for the success of this wrap is to secure the joints above and below the injury site. This limits any movement in the site. This wrap is most effective when dealing with injuries with the radius / ulna and the manus.

Figure 8 w/body wrap

When the figure eight bandage is used to secure the humerus, the joint below the injury site is secured. However, the joint above the site, the shoulder, is impossible to secure within the wrap and therefore additional stabilization is needed. After wrapping the wing, continue the wrap around the body. This will secure the shoulder be preventing movement of the wing.

Figure 8 w/splint

When a fracture to the wing is compound, there may be poor support within the wing itself. If additional support is needed, a splint should be considered. A splint can be made of wood, cardboard, or various medical products such a SAMM splint. The splint is usually incorporated into the wrap. Some splints are surgically applied as they attach directly to or through the bone.

Bandaging Considerations

There are many points to consider when deciding whether or not to bandage, what bandage to use, and how to apply it.

Here are some points to remember:

Swelling

Significant swelling can sometimes be found at a fracture site. In this circumstance, it is often preferable to wait and bandage the limb after the swelling has begun to subside, particularly if the animal can hold the limb in a natural position. If the injury is such that waiting is not an option, the bandage should be as loose as possible.

Blood flow

When securing a bandage do not make it too tight. If you have secured a limb, but cut-off the blood supply, the tissue will be damaged or even die. Make your bandages as loose as they can be and yet still be effective.

Mobility

You will have to consider the mobility of the animal. If wrapping both legs seems to be indicated, how will the animal get around? Will it be able to obtain food and water? If an animal has two injured wings should you plan on wrapping both?

Stress

Will the animal be under less stress if it is not restrained by a wrap? This is a real possibility as some birds can experience such a tremendous degree of stress that they may not be able to stand, eat, etc. Remember, severe stress can result in death, so be prepared if your initial treatment plan must change.

Stiffness and Fusion

Another factor to consider is the unplanned result of immobility from a wrap. If an animal has a limb wrapped for an extended period of time, the joints in that area may become stiff or even fused into position. It is important to remove wraps as soon as they have done their job. If movement still needs to be restricted, an animal can be placed in a small enclosure until healing is completed.

Babies

Young animals have special bandaging guidelines. Their growing bones can quickly make a correct bandage into one that is too tight. Bandages on young animals need to be removed and re-applied every three days to ensure that their growth is not compromised.

Secure Bandage

Sometimes we are overly cautious about the wrap being too tight and we tend to make them too loose. This can cause more trauma than the original injury due to damage the animal can cause to itself by thrashing or simply moving around. A simple break can become a compound break overnight.

Efficiency

Be aware of how much wrap is being applied. You don't want your bandage to out-weigh the bird!

Management

The final component to bandaging is to make a plan for the continued care of your patient and should include every step of the process, especially when follow-up action may be required.

Some areas to be included are:

- Check wraps
  - Babies
  - Adults
- Redoing wraps (especially orphans since they grow so fast)
- Monitoring of weight and eating
- Monitoring of general condition
- Monitoring condition of cage
- Noting mental condition
- Noting physical condition
- Noting appropriate social behaviors
- Schedules for physical therapy or other treatment
- Compensate for bandage-caused immobility
- Additional cage rest after wrap is removed
- Medical charting
- After the wrap
  - Wellness checks (ongoing care)
  - Release readiness

Medical Services Workshop

MS8 Bandaging Lab

Wing wraps
- Wrist
- Radius/Ulna

Wing wraps with body wraps
- Elbow
- Humerus
- Shoulder

Adding splints

Liberty Wildlife Medical Services

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• Section Eight •

Leg Bandaging

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Review on Avian Bandaging

As you have learned, injuries to the avian skeletal system and to the tendons, ligaments, and muscles it supports, often require restriction of movement and stabilization in order to heal properly. Proper bandaging is a crucial component of these treatments.

Again, bandages are used for many purposes.

- To reduce or stop bleeding
- To protect an open area on the body from contamination
- To hold a medication or dressing in place
- To hold padding in place to protect an area from injury
- To hold a splint in place
- To immobilize injuries

In this section we will review common bandage techniques used on the leg and foot, discuss products and supplies, and practice, practice, practice!

Avian Skeletal Review

In an earlier session, we divided the avian skeletal system into four sections for the purpose of study: the thoracic limbs (wings), the pelvic limbs (legs), the head, and the torso (thorax, pelvis, and tail).

This section will focus on the avian skeletal system of the pelvic limb and its system of bones and joints.

The Pelvic Limbs

The pelvic limbs are the legs of a bird. They attach to the body at the hip and contain the femur, knee, tibiatarsus, fibula, ankle, tarsometatarsus, and the digits or toes.

- Hip

The head of the femur articulates with the ilium of the pelvis at a cup-shaped structure on the ilium called the acetabulum. This joint is usually located within the trunk of the body.

- Femur

The long proximal bone of the leg is the femur. The femur is located between the hip and the knee.

- Knee

The knee is the *point of articulation* between the femur and tibiatarsus.

- Tibiatarsus/fibula

The tibiatarsus is the long bone that is distal to the femur. It is a fused bone containing the tibia and upper bones of the foot. The fibula is a small bone that runs parallel to the tibiatarsus on the lateral side of the leg.

- Ankle

The ankle is the *point of articulation* between the tibiatarsus and the tarsometatarsus.

- Tarsometatarsus

Distal to the tibiatarsus, the lower bones of the foot are fused and stretched to form the tarsometatarsus.

- Digits

The digits, metatarsals, are the toes of the foot.

Vocabulary

The following terms help to describe avian anatomy by function or position. Also included are the common bones and joints of the limbs.

Caudal	Toward the tail
Cephalic	Toward the head
Distal	Away from the point of attachment
Dorsal	The top side or back
Lateral	Farther away from the midline
Medial	Closer to the midline
Proximal	Toward the point of attachment
Ventral	Bottom, toward the abdominal side

Can you identify?

- Hip
- Femur
- Knee
- Tibiatarsus
- Fibula
- Ankle
- Tarsometatarsus
- Digits

Equipment and Supplies

• Bandage scissors
Scissors that have one blade flattened at the end to slip under bandages. These were designed for cutting tight bandages without cutting the patient.

• Vet Wrap
Vet wrap is an elastic product that adheres to it self. It is available in many widths and can be cut into very small sections for tiny wraps. The advantage of vet wrap in avian treatments is that it does not stick to feathers. Vet wrap is ideal for many situations; however, caution must be used because if it is applied too tightly, constriction or swelling can result that can irreparably damage tissue or a limb.

• Rolled cotton
Rolled cotton is an excellent material to use for padding areas that require extra protection. It can be used in small amounts to provide a softer wrap or be used in large thick wraps for support such as in the Robert Jones wrap.

• Gauze
Gauze can also be used for padding. It is particularly helpful when bandaging feet.

• Tape
Tape fixes to a surface. *Paper tape* adheres lightly and can be removed with minimal damage to feathers. *Masking tape* is very useful for splinting or for shoes on small birds. *White adhesive tape* sticks firmly in place and does not stretch, but does damage feathers. *Elasticon* is an adhesive tape that stretches. However, caution must be taken when using Elasticon. If applied too tight, Elasticon can cause swelling that can irreparably damage a limb or the patagium. *Steri-strips* are thin strips of threaded tape. They are very sturdy and can attach to skin or feathers.

• Splints
Splints are commonly used to secure fractures. Simple splints may be made from tongue depressors, wire, swab stems, tape, or custom splinting products such as SAM splint.

Stabilization

Stabilizing your bandage is a necessary step to ensuring its success. Stabilizing can be accomplished in several ways:

• Bone against bone
The bones in the legs or wings adjoining the fracture or trauma site, will act as a splint.

• Bone against body
The body itself will act as a splint, providing additional support.

• Splints
Sometimes external materials are needed to add stiffness to stabilize a site. There are many materials available that can be used as splints. The Schroeder-Thomas and Robert Jones splints are two specific splinting techniques.

• Nesting donut
Support for the animal when it is not standing can provide additional stabilization. A towel wrapped in the shape of a ring can provide a nesting structure that will keep the animals head elevated and limit its attempts at movement.

• Substrate
Substrate is a particular surface below the animal aids in the healing process by providing a stable surface. For example, an animal that has one leg wrapped might find newspaper too slick for one-legged mobility. Softer, firmer, easier to grip, rougher, or smoother are all options for substrate modifications. The one you choose will depend on the condition being treated. The cage flooring is usually sufficient in most cases.

• Cage rest
Just do nothing! Sometimes an animal will hold a limb in the correct position and a wrap can actually unstabilize the site by tension or even by its weight. This is often the case with very small birds. Not using a wrap but providing complete cage rest may be the best treatment. Some common non-bandaging conditions are fractures of the keel, pelvis, or the pectoral girdle.

Bandaging Techniques

There are many bandaging techniques. Some are standards used for specific situations, but many will be techniques you develop for animals with special needs. A few of the more common bandaging techniques are listed here.

Leg Wraps

A simple bandage is needed to wrap a leg. Pad the leg first to prevent secondary trauma from the wrap. Then, fold the leg up. The lower leg bone will rest against the adjoining one. When you have folded the leg onto itself, wrap it in position. This wrap is used in injuries to the tarsometatarsus and the tibiatarsus. The uninjured bone acts as a splint or stabilizing force.

Leg Wraps w/body wrap

If the femur has been injured you will need to wrap the leg to itself and then wrap it to the body to provide additional stabilization. This usually needs to be accomplished by adding a loop of wrap up and across the ventral thorax and over the opposite shoulder of the bird. Then continue down to the leg and attach.

Ball bandage

Injuries to the foot or toes can be helped by the application of a ball bandage which distributes the pressure evenly across the foot. This bandage can help damaged toes or bumblefoot. A ball bandage is made by placing gauze or other padding material onto the pad of the foot and wrapping in a figure eight pattern in and out of the toes.

Shoes

Birds can have problems with their feet which cause them to maintain a “closed” or clenched foot position. This can be caused from fractures, dislocations, pulled tendons or ligaments, or even from illness. These animals will often need “shoes” to correct the condition. Shoes can be made from tape, cardboard, or other stiff materials. The material is dependent on the type and age of the animal. Shoes can be applied for just a few days or for a much longer period.

Hobbles

Hobbles are used to hold a bird’s leg in a particular position, usually as a corrective measure for splayed legs. Splayed legs overextend from the sides of a bird’s body and must be correctly positioned quickly to avoid permanent dislocation. Hobbles can be effective in just a few days and may need to be in place longer.

Bandaging Considerations

There are many points to consider when deciding whether or not to bandage, what bandage to use, and how to apply it.

Here are some points to remember:

Swelling

Significant swelling can sometimes be found at a fracture site. In this circumstance, it is often preferable to wait and bandage the limb after the swelling has begun to subside, particularly if the animal can hold the limb in a natural position. If the injury is such that waiting is not an option, the bandage should be as loose as possible.

Blood flow

When securing a bandage do not make it too tight. If you have secured a limb, but cut-off the blood supply, the tissue will be damaged or even die. Make your bandages as loose as they can be and yet still be effective.

Mobility

You will have to consider the mobility of the animal. If wrapping both legs seems to be indicated, how will the animal get around? Will it be able to obtain food and water? If an animal has two injured wings should you plan on wrapping both?

Stress

Will the animal be under less stress if it is not restrained by a wrap? This is a real possibility as some birds can experience such a tremendous degree of stress that they may not be able to stand, eat, etc. Remember, severe stress can result in death, so be prepared if your initial treatment plan must change.

Stiffness and Fusion

Another factor to consider is the unplanned result of immobility from a wrap. If an animal has a limb wrapped for an extended period of time, the joints in that area may become stiff or even fused into position. It is important to remove wraps as soon as they have done their job. If movement still needs to be restricted, an animal can be placed in a small enclosure until healing is completed.

Babies

Young animals have special bandaging guidelines. Their growing bones can quickly make a correct bandage into one that is too tight. Bandages on young animals need to be removed and re-applied every three days to ensure that their growth is not compromised.

Secure Bandage

Sometimes we are overly cautious about the wrap being too tight and we tend to make them too loose. This can cause more trauma than the original injury due to damage the animal can cause to itself by thrashing or simply moving around. A simple break can become a compound break overnight.

Efficiency

Be aware of how much wrap is being applied. You don't want your bandage to out-weigh the bird!

Management

The final component to bandaging is to make a plan for the continued care of your patient. Notes on *care management* should include every step of the process where additional attention will be required.

Some areas to be included are:

- Check wraps
  - Babies
  - Adults
- Redoing wraps (especially orphans since they grow so fast)
- Monitoring of weight and eating
- Monitoring of general condition
- Monitoring condition of cage
- Noting mental condition
- Noting physical condition
- Noting appropriate social behaviors
- Schedules for physical therapy or other treatment
- Compensate for bandage-caused immobility
- Additional cage rest after wrap is removed
- Medical charting
- After the wrap
  - Wellness checks (ongoing care)
  - Release readiness

Medical Services Workshop

MS8 Bandaging Lab

Leg wraps
- Tarsometatarsus
- Ankle
- Tibiatarsus
- Toes and digits

Leg wraps with body wraps
- Tibiatarsus
- Femur
- Hip

Adding splints

Hobbles

Shoes

Liberty Wildlife Medical Services

Medical Services
Training Program

• Section Nine •

Avian Wound Care and Management

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Avian Assessment Review

It is important to always keep in mind the criteria for safe and successful avian assessment. Before beginning the material on wound care, review the assessment basics listed below.

- Can you safely assess the animal? Is the animal compromised to the degree that handling it for even the simplest exam could be detrimental? Remember our three easiest treatments, warmth, dark, and quiet, sometimes provide the best results.

- When you assess an animal, it's important to be thorough, but it's important to use your good powers of observation and common sense, too! Was the bird standing? Was it moving easily and comfortably? Did it run away from the rescue volunteer? If so, its legs are probably fine. You can wait to complete the leg exam until the animal is stable and less stressed. Did the bird fly? If so, its wings are probably fine. Be sure to note these as *assumptions* in the chart and include your reasoning.

- Don't treat the first injury you see. There may be other serious injuries you have not discovered that will affect your assessment of the animal.
    - You may have an animal that was found near a road that is very depressed, head hanging, bleeding from the mouth, and showing neurological impairment—understandably suggesting a "hit by car" scenario. However, further investigation might reveal trichimoniasis (canker) traveling up into the head—a condition requiring different treatment.
    - You might see a bird that is holding out one wing or dragging it on the ground indicating damage to the wing or shoulder. Further investigation might reveal a broken leg or pelvic injury which is causing it to use its wing for balance.
    - You may take the time to clean and treat an injury only to later discover sadly that a second condition exists, so severe that the animal has to be euthanized.

- Remember the two-minute exam

Have a system that allows you to provide a good thorough exam in two minutes or less.

- Palpate the entire wing including bone structure and the patagium. Check the movement in the shoulder by firmly, but gently grasping and rotating the humerus. Check rotation in other wing joints. Check ventral and dorsal surface of wing for wounds.
- Check legs, feet, and toes. Check the movement in the hip and other joints.

- Feel the keel and breast area. Check for abnormalities in the surface of the keel. Check for wounds to the breast. Check weight.
- Look over the torso. Check skin to estimate the dehydration level. Note scabs, tears, or abrasions.
- Open the mouth. Note color and condition. Estimate dehydration level.
- Study the head. Note any unusual tilting. Check eyes, cere, throat, and surrounding tissues. Look for indicators of depression or shock
- Check overall feather condition

• Limit interaction

Keep your interaction with an animal as brief as possible. If you find yourself with a task that requires an extended period of time, put the animal back in to its enclosure. Even the calmest, kindest restraint is still stressful. Do not continue to have an animal held while you complete work or preparations.

• Prioritize treatments

You may find fractures, diseases such as pox or trichimoniasis, soft tissue damage, bleeding, or other conditions.

Decide if you have a life-threatening condition and determine what is most important or possible to treat immediately.

• Euthanasia

The decision to euthanize an animal is never made lightly. If the animal does not have the possibility of surviving in the wild after its injuries have healed we try to determine if it can be placed in an educational or display program with another licensed facility.

Introduction to Avian Wound Care

The skin is the largest organ of the body. It provides protection from microorganisms. The skin also protects the tissue underneath from injury and helps to insulate tissue and other organs against heat and cold. The skin has many other beneficial functions. Openings in the skin or in the skin and its underlying tissues can cause disruption of some of these functions. These openings are wounds.

Depending on the location and severity of a wound, other difficulties can arise. A tear in a muscle can affect movement. Infections can set in from exposure to dirt and debris. Organs may be injured.

This section is about wounds. We will discuss types of wounds and how wounds heal. Products and supplies used in the treatment of wounds will be presented. Five steps of wound care will be introduced, along with common types of wounds and how they are treated. Wound management will also be discussed.

This section will end with a lab in which you will treat a variety of wounds. In Sections Seven and Eight you learned about bandaging. This section will incorporate the treatment of wounds with bandaging techniques.

How Wounds Heal

Healing is the process by which the interruption in the continuity of the body's structure is restored with viable tissue. The healing process starts immediately after an injury and may continue for months or even years depending on the problem. Variations in wound healing are the result of differences in location, severity of the wound, and the extent of injury of the tissues. Other factors affecting wound healing are age, nutritional status, and general health of the animal and its body reserves and resources for the regeneration of tissue.

The healing process is basically the same for all types of wounds and follows one of the following three methods.

- Healing by first intention

  Primary union. Restoration of tissue occurs directly, without granulation. Healing by first intention includes surgical procedures, such as suturing, as well as non-surgical procedures such as the use of Steri-strips or skin glue.

- Healing by second intention

  Secondary union. Wound repair following tissue loss (as in an ulceration or open wound) is accomplished by the closing of wound with granulation tissue. Dressings, ointments, or antibiotics may be used to aid healing by second intention.

- Healing by third intention

  Delayed primary closure. Occurs when a wound is initially too contaminated to close and is closed surgically four or five days after the injury. This is a combination of the other two types of healing. Healing by second intention occurs, followed by healing by first intention as soon as a positive result can be achieved.

Types of Wounds

Wounds are sites where the continuity of the body's structure has been injured by physical means.

Common types of wounds or open tissue trauma:

- Abrasion — A wound caused by rubbing or scraping the skin or mucous membrane.
- Laceration — A wound in which the tissue is torn.
- Open — A wound that communicates directly with the atmosphere.
- Puncture — A wound caused by a sharp, usually slender object, which passes through the skin and into the underlying tissue. Also called a penetrating wound.
- Sucking — A penetrating wound through which air is drawn in and out.
- Degloving — The avulsion or tearing away of skin from underlying structures, like peeling off a glove or a sock. Besides the possibility of injury to other structures, there may be a problem with viability of the skin involved.
- Compound
- Fracture — A fracture with a wound that communicates directly to the site of the break. Also called a open fracture.

Products and Supplies

Outer cleaning solutions
- Tap water
- Betadine *scrub*
- Chlorohexadine
- Normal Saline (0.9 Sodium Chloride)

Flushing solutions for inside the body
- Betadine *solution*
- Chlorohexadine
- Normal saline (0.9 Sodium Chloride)

Wound dressings
- Telfa
- Telfa with Furazone ointment
- Wound powder
- Comfeel
- Duo Derm
- Elastigel
- Tega Derm

Other products
- Steri-strips
- Vet wrap
- Rolled cotton
- Gauze
- Telfa
- Splints
- Trypzyme spray
- Caravet

Avian Wound Care

Birds handle infections in their systems differently than mammals do. Rather than creating pus, the avian system tends to wall-off or encapsulate infections. It is still important, however, to provide an atmosphere in a wound that is conducive to healing.

For the purpose of this section, the procedures involved in avian wound care have been divided into the following five steps.

Assess	Determine the type of wound or trauma
Clean	Prepare an environment conducive to healing
Treat	Complete appropriate procedure for injury
Stabilize	Secure treatment and prevent further injury
Manage	Plan and document further care

Assess

Assessing the wound

- What type of wound do you have? Is just the outer layer of skin torn? Does it penetrate deeper? Are other structures or organs involved?

- Is there an unusual amount of bleeding? You may have a vein or artery that has been damaged.

- Can the animal tolerate further investigation and care?

- What steps will be needed?

Clean

It is important to provide a thorough initial cleaning of wounds to provide a condition that is conducive to healing. *Debridement*, or the removal of all foreign material and devitalized tissue from the wound area, can be a simple as wiping an abrasion with moistened gauze or as complex as cutting away dead tissue and bone fragments.

- Skin and feathers (outside the body) that need to be cleaned can be washed with warm water or with Betadine scrub.

- Removing debris.
  Large pieces of debris can be removed with a forceps or hemostat. Softening matted feathers with warm water will often expose the true problem below.

- Flushing open wounds
  Flushing rinses a wound carrying away smaller dirt and debris. Flushing with an antibacterial solution may help counteract infection. Open wounds should be flushed thoroughly too clear debris that may have entered the area. Wounds can be flushed with normal saline (.9% Sodium Chloride) or with a dilute Betadine solution (use Betadine *solution*, not Betadine *scrub*). Never flush open wounds of the humerus or femur as the bone is part of the respiratory system.

- Advanced debridement
  Some wounds will be old and have additional damage to the surrounding tissues. These wounds may require more complicated cleaning. Advanced debridement may include cutting away dead tissue, removal of bone fragments, further opening of the wound to allow for removal of dead tissue, and other procedures. Advanced debridement procedures are completed by experienced medical staff only.

Treat

Once you have determined the type of wound or injury, and decided on an action plan, you can begin the treatment. Again, treatments vary according to the condition. Treatments can be non-surgical or surgical in nature. You will be providing non-surgical treatments.

Common types of non-surgical treatments

- Hydration

- Systemic products such as antibiotics

- Debridement (may be surgical if tissue removal is required)
  - Clear foreign matter
  - Allow time for tissue to granulate in

- Pressure (control bleeding)

- Clean and leave alone
  - Scientific neglect! Complete cage rest often gives the animal's system the opportunity to heal itself.

- Administration of topical products
  - Agents to dry the wound (exudate draining)
    - Keep environment dry if it is too wet
    - Open to air to dry
  - Agents to keep the wound moist (muscle exposed)

Keep environment moist
Antibiotic ointments or powders
Eye drops or ointments (non-steroidal)

• Wound dressings or coverings
Dressings to dry the wound
Gauze will pull away moisture
Keep environment dry
Dressings to keep the wound moist
Telfa, Elastigel, Comfeel
Keep environment moist

Common surgical procedures (experienced veterinary staff only)

• Advanced debridement

• Advanced splinting

• Suturing

• Pinning

• Exploratory procedures

Stabilize

You wouldn't want to apply an ointment with a wound dressing only to have it fall off the first time an animal moved, would you? Stabilizing your treatment is a necessary step!

Stabilizing can be accomplished with:

• Wrap

Vet wrap is an elastic product that adheres to it self. It is available in many widths and can be cut into small strips for tiny wraps. The advantage of vet wrap in avian situations is that it does not stick to feathers. Caution must be taken when using vet wrap. If it is applied too tight it can cause swelling that can irreparably damage a limb or the patagium.

• Tape

Tape has the advantage of fixing firmly to a surface. Paper tape adheres lightly and can be removed with minimal damage to feathers. Masking tape is very useful for splinting or for shoes on small birds. White adhesive tape sticks firmly in place and does not stretch, but does damage feathers. Elasticon is an adhesive tape that stretches. Caution must be taken when using Elasticon. If applied too tight, Elasticon can cause swelling that can irreparably damage a limb or the patagium.

• Splints
Splints are commonly used to secure compound fractures. In order to provide the best opportunity for healing, the joints above and below the fracture site should be immobilized. Splints may keep a bone from sticking through tissue
.
• Shoes
Birds will often need “shoes” for injuries or trauma to the foot. Shoes can be made from tape, cardboard, or other materials.

• Ball bandage
Injuries to the foot can be helped by the application of a ball bandage which distributes the pressure evenly across the foot. This bandage can help damaged toes or bumblefoot.

• Substrate
Substrate is a particular surface below the animal that aids in the healing process. Animals with wounds on the feet must have very clean substrates to avoid infection. Removing papers and allowing mutes to fall below an open grate floor will help reduce the opportunity for infection. Also, a softer, firmer, easier to grip, rougher, or smoother surface might be selected, depending on the condition being treated. The cage flooring is usually sufficient.

• Cage rest
Just do nothing! Sometimes this treatment is the best.

Manage

Make a plan for the continued care of your patient. Notes on care management should include every planned provision you have made. Some areas to be included are:

Medical charts

Medication schedules

Schedules for physical therapy or other treatment

Monitoring of weight and eating

Monitoring of swelling

Monitoring of general condition

Monitoring cleanliness or wound and wound area

Monitoring condition of cage

Noting mental as well as physical condition

Noting appropriate social behaviors

Redoing wraps (especially orphans since they grow so fast)

Wellness checks

Common Wound Conditions

There are many types of wounds that are commonly seen at Liberty Wildlife. These conditions and their treatments are outlined below.

- **Degloving wounds to the head**

Although any species can have this type of wound (and it can be in areas other than the head) it is a common condition found on doves. It frequently leaves the skull of the animal exposed. First, the area must be thoroughly cleaned. Use saline to avoid damage to the eyes. At this point, the wound should be covered until advanced debridement or suturing can be completed. Degloving wounds can be covered by moist wound dressings such as Duo Derm or Comfeel. They usually have to be secured with a stabilizing product such as wrap or tape. Degloving wounds can also be covered by using the flap of remaining skin as a bandage. The flap is pulled over the open area and then secured with Steri Strips. Only use this last procedure if you were able to completely clean the wound and if the Steri Strips completely close the open area. The wound can then be sutured at a later time when the animal is stable.

- **Electric shock injuries**

Injuries from electrical shocks are not always immediately evident. A "burned" smell might be your only clue initially, however small wounds eventually appear, followed by sloughing of a larger area of dead tissue. This sloughing period can continue for a few weeks. Electric shock injuries usually have an entrance wound and an exit wound indicating the path of the electricity. Since the tissue surrounding these wounds has been "cooked" with high voltage, infection is not usually an issue. The electricity has basically sterilized the site.
These wounds will need to heal by second intention. The healing process can be very slow if a large amount of tissue is affected. Wounds of this nature should be covered with Elastigel and wrapped to secure. Bandages should be changed regularly and checked frequently during the sloughing period.
Continue to check body surfaces regularly to monitor any new areas of sloughing or dead tissue.

- **Compound fractures leg/wing**

With a fractured bone communicates with the outside air through an opening in the tissue, it is called a compound fracture. Compound fractures have a good potential for infection. Antibiotics are commonly needed. Initial treatment for a compound fracture is the securing of the limb along with the covering of the ends of the bone if it is still exposed. This can be completed by the use of nitrofurazone ointment, Telfa, and vet wrap. Senior medical personnel will complete the process of debriding the bone and reinserting it into the limb if needed. Splints may be needed to secure bones in the proper place.

- **Torn crops**

An opening in the crop allows the escape of food as well as dehydration and the other complications that wounds can bring. Crops wounds should be cleaned with normal saline. The wound can then be covered with a dressing to close it until it is sutured. Depending on the location, other precautions must be taken. Wounds in the caudal crop must be securely closed so that food lying in the crop does not escape into the body cavity. Wounds in the anterior portion of the crop are not as critical, as limiting the amount of food can prevent leakage from the area.

- **Cat attacks**

Cat attacks usually leave puncture wounds from teeth and claws. These wounds can leave bacteria deep into the animal's tissue. Cats have natural bacteria that can be toxic to birds. If a bird is presented with multiple punctures from a cat attack, it should be placed on antibiotics. If the paperwork indicates cat attack and you cannot locate any punctures or lacerations, antibiotics are not needed.

- **Dog attacks**

Dog attacks tend to leave bigger wounds and abrasions. If you suspect a dog attack and a bite, be sure to check the other side of the body for the opposing teeth marks. These wounds should be cleaned. Antibiotics might be indicated depending on the severity and age of the wound.

- **Gunshot**

Just because you see a hole in an animal, does not mean it has been shot. Other types of trauma can produce a similar wound. Sadly, however, gunshot wounds do still appear with regularity. When the bullet or pellet enters the body, it usually brings with it a "plug" of debris that includes dirt and feathers. This material needs to be removed. It may take more than one session to do this. Until the body is debris-free, the hole does not usually completely close. Thus, an open wound may indicate that there is still material inside that needs to be removed. Remove obvious debris. Flush the wound with saline if you can safely do so. Cover the wound with nitrofurazone ointment and Telfa and wrap to secure. The pellet does not always need to be removed. If the pellet is lead, it will only be a problem if it has settled in the digestive tract where the digestive juices will release lead into the bodies systems. If it has settled into tissue, the body will encapsulate it, rendering it harmless.

- **Barbed wire fence**

Surprisingly, we do see a significant number of injuries from birds flying into barbed wire. If this results in damage to the patagial area (which it commonly does) the animal may be non-releasable. The patagial area has a very thin layer of skin that does not close easily. Holes in this area often heal leaving an opening. This opening prevents the wing from obtaining the necessary "lift" needed for flight. On occasion, the wing coverts will grow to cover this area. If this happens, the coverts "close" the hole, returning function to the wing.

- **Cactus needles**

When a bird has been on the ground in the desert, it is common to find cactus spines in its feet and other areas. Hemostats will often be needed to pull out the spines. After removing the spines, wipe the area with Betadine to clean. Wrap is usually not needed as long as care is taken to provide a clean environment.

Successful Wound Management

If you have assessed correctly, cleaned and treated the condition according to procedure, stabilized the area as needed, and provided a sound plan for continued management, you have given the animal its best possible chance for survival.

How do you make sure that the plans you have made for the animal will be completed as you planned? Do *your* part, if everyone, each day, completes the necessary procedures, treatments, and wellness checks as they are assigned, our care will truly be the best we are able to provide.

Keep current. Read through the charts and become familiar with each animal and its condition, even if you are not treating it personally that day. Do what you can and ask for help when you need to. Make sure each animal receives the care necessary to complete its successful treatment.

Section Nine • Wound Management

Avian Wound Care Lab

• Look for the following conditions on your specimen:

Abrasion
Laceration
Puncture
Sucking wound
Degloving wound
Compound fracture

• Add a wound dressing to the following wraps

Wing wraps
- Wrist
- Radius/Ulna

Wing and body wraps
- Humerus
- Shoulder

Leg wraps
- Toes/talons
- Tarsometatarsus

Leg and body wraps
- Tibiatarsus
- Femur

Common Conditions

There are many conditions that you will learn to readily recognize as you see more and more wildlife being treated. Here are some of the common conditions you will experience.

Trichimoniasis (Canker)

Canker is caused by a protozoa. It is spread easily from one infected bird to another, often from doves, finches and other seed-eating birds sharing the same food and water sources. The disease moves up the food chain when an affected bird is eaten by a larger bird.

Symptoms

- Clumps of cheesy looking yellow/white matter in the bird's mouth and throat. It can also be in the crop and up in the sinus areas.
- Birds may have difficulty breathing due to obstructed airways.
- Birds may be emaciated due to inability to swallow food.

Treatment

- Carnidazole tablets (Spartrix)
- Metronidazole (Flagyl) suspension

Precautions

- Keep all isolation birds separate, even if two have the same condition.
- Do not necessarily leave food. The animal can choke trying to feed itself without a passage in its throat.
- Wash your hands immediately after handling.
- Avoid cross-contamination of food and water bowls, perches, or other utensils by disinfecting everything during cage cleaning.
- Cages must be cleaned and disinfected with dilute bleach or other strong disinfectant. If an animal dies, disinfect the cage immediately.
- If a bird is being tube fed, the tube and syringe should be washed immediately in hot soapy water, rinsed, and put into a soaking solution.
- Post "Medical Isolation" signs on the cage indicating the condition

Avian Pox

Avian pox is a viral condition. It is most likely seen in birds with compromised immune systems or those under extreme stress.

Symptoms Pox manifests itself in several ways. The most easily noticed is an inflammatory swelling of small lumps on exposed areas such as the feet, face, and vent. This cutaneous form begins as tiny white bumps, becoming larger and changing color to yellowish or pink. Finally, they form a dark tough, brown scab. The scabs that drop off naturally leave smooth scar tissue underneath. This form is called *dry pox*. The opposite form, *wet pox*, is caused by the same virus but affects the mucus membranes of the mouth, throat, and nasal passages. It starts as tiny white nodules and may later become larger yellow cheesy areas lining the mouth.

Treatment

- Keep lesions clean and watch carefully.
- Medications are not currently available to treat.
- There is no cure for pox. It is a virus that must run its course.

Precautions

- Keep all isolation birds separate, even if two have the same condition.
- Wash your hands immediately after handling.
- Avoid cross-contamination of food and water bowls, perches, or other utensils by disinfecting everything during cage cleaning.
- Cages must be cleaned and disinfected with dilute bleach or other strong disinfectant. If an animal dies, disinfect the cage immediately.
- If a bird is being tube fed, the tube and syringe should be washed immediately in hot soapy water, rinsed, and put into a soaking solution.
- Post “Medical Isolation” signs on the cage indicating the condition

Bumblefoot

Bumblefoot (posodermatitis) is a term commonly used that refers to an injury to the foot. Its most common in captive raptors.

Symptoms

• Large open sores commonly found on the bottom of the metatarsal pad or the digital pads. These sores appear to look like a corn or are open, swollen or infected. They can start out as an abrasion or a puncture.

Treatment

• Treatment varies depending on the severity of the bumblefoot. If it is more severe with infection, the foot is cleaned with Betadine solution or Chlorahexedine solution, then an antibiotic ointment is applied with telfa, gauze for padding, and vet wrap. If there is infection, sometimes the wound is often cultured and the bird is started on antibiotics. The wraps need to be checked to see if there is any swelling around the toes if the wraps are too tight. The wraps also need to be monitored for dryness. If a bird is standing in water, the vet wrap can become tight and the moisture on the feet can become a bed for other bacteria. If the wounds are less severe, sometimes the foot may be wrapped with A&D ointment, telfa, and vet wrap. This helps to soften the corn and condition the foot.

Precautions

• Bumblefoot is often a sign of housing problems. The enclosure and perches may need changes that are conducive to the birds needs.

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Fractures

Fractures are breaks in parts, especially in bones. Most bird bones are hollow. Fractures often cause shattering of the bone, making it difficult to align the pieces. Common fractures involve the wings, legs, back, or pectoral girdle. There are many type of fractures, some of which are listed here:

Complete - Involving the entire cross-section of the bone
Comminuted - The bone is splintered or crushed
Compound - An open wound that connects to the break
Non-union - An open space between the ends of the bone
Stress - Produced by stress created by the pull of muscles
Closed - A fracture that does not break the skin

Symptoms

- Interruption of bone or part
- Unable to use limb or part
- Unable to fly or walk

Treatment

- Align bone correctly and secure
- Secure joint above and below fracture site if possible
- Provide cage rest until limb heals

Precautions

- Provide cage rest when first unwrapped
- Provide for joint movement as soon as possible
- Check wraps frequently for swelling and security

Fractured Keel

Description: Fracture of the keep or breastbone. Fracture can be compound. Bone may be chipped, dented, cracked vertically or horizontally, or even splayed open.

Symptoms: · Cannot fly
· Flight limited or labored

Treatment: · Cage rest to restrict movement

Prognosis: · Varies with degree of injury and location

Identifying Keel Injuries

The keel is the anchor for the large breast muscles that control flight. Injuries to the keep can affect these muscles. In cases where muscle attachment has been compromised, the bird may not be able to fly. Birds that have fallen from great distances or have other impact trauma are always candidates for keel injuries. If an animal cannot fly, you should rule out an injury to the keel. Fractures of the keep can sometimes be felt or seen. If you run a finger down the front edge of the keel, you might feel a depression or break in the edge signifying an injury. Lateral X-Rays can be useful in identifying the location and degree of injury. Keel fractures can be compound.

Treatment

Keel injuries require complete cage rest. Make sure enclosures are designed to limit movement. Lower all perches to prevent attempts at flight. Limit activity in area to reduce instances of defensive behaviors utilizing the wings. By limiting wing movement, you will limit the strain on the breast muscle where it attaches to the keel.

If the injury is compound, it should be treated with the standard protocol established for that type of wound. If wraps are required, a body wrap will be needed. Be sure to include a wrap above and below at least one wing to present slipping. Monitor wounds in the keep area closely, as wraps and bandages are likely to slip. Antibiotics should be administered if indicated by the type or condition of wound.

Cage resting for this condition will vary depending on the type of injury. Three to four weeks often shows improvement. To test, move the animal from its limited movement enclosure to a flight enclosure to test fly. Allow the animal some time to adjust, but if it is not flying, return it immediately to the smaller cage for more time. Test flying can continue weekly until the situation resolves. Animals not flying after a reasonable period must be re-evaluated.

Head Injury

Symptoms

- Poor balance or spinning
- CNS problems
- Cranial tilt or inversion
- Head tracking
- Blind
- Blood in eyes, ears, mouth
- Broken beaks

Treatment

- Steroid medication
- Cage rest
- Provide donut if not standing
- Hand or force feed if necessary

Precautions

- Do not provide open water unless standing correctly

Spinal Injury

Symptoms

- No pain response (toe pinch)
- Rounded rump or “shrimping”
- Unable to stand
- Unable to use feet
- Unable to mute

Treatment

- Steroid medication
- Cage rest
- Provide donut if not standing
- Hand or force feed if necessary

Precautions

- Do not provide open water unless standing correctly

West Nile Virus (WNV)

West Nile Virus (WNV) is a Flavivirus that was introduced to the U.S. in 1999 from Africa. It has slowly but surely made its way across the country, and has now been found in every state in the continental U.S., except Oregon. It is spread by mosquitoes; several species are susceptible, including humans, horses, and many avian species, particularly crows, jays, and raptors.

Symptoms

The symptoms of WNV disease are neurological – birds may show signs of weakness, circling, torticollis (twisting of the head and neck), seizures, etc.

Treatment

There is no specific treatment for WNV. Supportive care is all that can be done at this point.

Precautions

- As this is a mosquito-borne virus, environmental control of mosquitoes – i.e. do not allow standing water, spray with safe insecticides, etc. – is a key step in prevention.
- Vaccination – WNV vaccine is available as an equine preparation at this time. The equine vaccine's efficacy in birds is still being tested, but has been shown to be nonharmful. Collections of birds across the country (zoos, Liberty, etc.) have been vaccinating in the hope that the vaccine will provide at least some immunity for susceptible species.

Exotic Newcastle Disease (END)

Exotic Newcastle Disease (END) is a viral disease that is highly contagious, and highly virulent, among birds. It is a reportable disease, meaning suspected cases need to be reported to the State Vet who then takes over the case. The virus is quite hardy and can be spread by bird to bird contact or via fomites (inanimate objects), people, mice, etc. that travel/move from infected areas to noninfected areas. Because END is easily spread and has a high mortality rate, eradication of sick or exposed birds with subsequent quarantine in surrounding areas is the 'treatment of choice'.

Symptoms

Clinical signs of END can range from no symptoms (birds can become asymptomatic carriers) to sudden death. The disease can affect the respiratory, gastrointestinal, and/or the nervous systems, with signs including respiratory distress, sneezing, coughing, nasal discharge, diarrhea, depression, nervousness, muscle tremors, drooping wings, twisting of head and neck (torticollis), complete paralysis, swelling of tissues around the eyes and neck, drop in egg production, and sudden death.
There is no cure. Some birds can recover on their own.

Precautions

Precautions being taken at Liberty include:
- foot baths at every entrance and in strategic locations around the property
- physical separations between education and rehab birds
- during high-risk times (i.e. spring 2003 when nearby counties were quarantined) volunteers in contact with birds in other locations must shower and change clothes before entering the facility
- rodent control
- restriction on bird intake to native wildlife only – pigeons have been named as a potential carrier species

Unfortunately, despite all our precautions there is a very real risk that if END were to be found within a one mile radius of Liberty all the birds on the property would be destroyed. If it were to be found in the county, Liberty would go into complete lockdown, with no animals allowed on or off the property.

Liberty Wildlife Medical Services

Medical Services
Training Program

• Section Ten •

Well Care Program

Liberty Wildlife, P.O. Box 14345, Scottsdale AZ 85267

Wildlife Hotline (480) 998-5550

Introduction to Well Care

There are many animals located in the outdoor flights and enclosures at Liberty Wildlife. They may be *education* animals, permanent residents at the facility. They may be *active-rehabs* which are animals that are still in the process of recovery. They may be *non-releasable;* which are animals that have completed their rehabilitation and yet would not be able to survive in the wild.

The active rehab, non-releasable, and education animals must continually monitored. The program that supports the care of outside wildlife is the Well Care program.

This section will introduce the animals normally seen at the facility. You will learn the four main components of the Well Care program: routine weekly visual examinations, monthly full physical examinations, close-monitoring programs (animal specific), and release preparedness. You will learn the steps to conducting Well Care assessments and routine check-ups as well as common types of close monitoring.

Let's begin!

Visual Examinations

First, as always, keep in mind the timeless medical adage, do no harm. If an animal appears unduly stressed by your observation, stop. If you are feeling uncomfortable, stop. The amount of human interaction that wildlife can tolerate (even from a distance) varies greatly by the species, individual animal, recent history, and even the season or the time of day. Only do what you safely can—for you and the animal.

The purpose of the visual exam is to provide regular monitoring of wildlife using low-stress methods. The visual exam is an extremely important tool and must be conducted thoroughly. Always take your time. In addition to the points discussed in this section, note anything you feel is unusual—even if you don't see the significance at first.

The visual examination focuses on evaluating the animal by observing key indicators. This type of exam can be divided into two separate sections. The first section covers external observations. The second section covers observations that are specific to the animal.

Visual exams will usually be conducted weekly, but may be scheduled more frequently depending on the animal and its condition.

External

There are many important observations you can make that are not directly connected with looking at the animal. First of all, you can determine that the animal is correctly identified and located in the proper enclosure. You can make sure it has been provided with the correct supportive conditions for its enclosure. You can promote its future success by monitoring its medical chart, food intake logs, and even the physical condition of its enclosure.

• Prepare

Determine which animal you will be checking. The schedule for the Well Care program is located in a binder on the desk in the bird room. Pull the animal's chart and review it thoroughly before beginning. Take a blank form with you so that you can make notes during the examination.

• Identification

Proper identification of wildlife at the facility is critical. This means the species, as well as the log number of each individual animal. Confirm that the appropriate tag is on the outside of the animal's cage. Verify the identification information against the chart. If a tag is not on the enclosure, make one if you can confirm the animal's identity. If you find a discrepancy with the log number or any other means of identification, bring it to the attention of a senior vet tech. It is *very* easy to get these animals mixed-up. Please don't assume identifications, assumptions can cause mistakes!

• Enclosure
Check the condition of the enclosure carefully. Look closely at each wall and at the roof to make sure they are free of holes or potential hazards. Look carefully at the floor of the enclosure, too. Ask yourself standard questions on enclosures. Are there any escape routes in this enclosure? Do you see any potential hazards? Are there snags that might catch talons or jesses? Does the enclosure need cleaning? Has old food been removed? Does the surface need changing? Does it need more rock? Is the door functioning properly? Anything that you can correct, fix that day. Any repairs that you are unable to make should be listed on the Repair Log in the bird room.

• Perches and Surfaces
Many enclosures must be customized for the animal inside. Make sure that each enclosure you encounter is set up appropriately for the animal it contains. Animals with wing injuries must have ramping systems to allow them access to perches and perches should be lowered to prevent injuries. Make sure food and water are not located below perches as they can become contaminated. Also, make sure that the water is located away the door as it can be a hazard to people entering the enclosure.

The surfaces of perches, their heights, and circumferences should be appropriate for the type of bird. Perches should always be covered with sisal rope, astro-turf, indoor-outdoor carpet, or whatever other product is appropriate. Check perch coverings for loose fibers or hanging material. Follow the length of the perch to make sure there aren't any slits in the wood or other hazards that might catch a talon or toe.

• Food
Quite a bit of information can be determined from studying the animal's eating pattern on the food chart. Monitor food intake closely to determine if the animal is eating. Is it being offered the correct food for its species and age? Note the trends that you see. Sometimes animals will eat one kind (or even one size) of food readily and yet leave another untouched. Animals that have been eating well in Intensive Care, may suddenly quit eating when placed outside. Animals that have not been eating well inside may be put outside to see if a less stressful environment will affect their appetite.

• Mutes
Don't miss a great opportunity! A bird's "flight or fight" response will often kick-in at the sign of any potential threat, which will be *you* as you make your observations. The animal's first action is usually to mute, to make itself lighter for flight. Take advantage of this reaction to note the condition and color of the mute. It can be a good indicator of possible problems.

• Record
Make note of all of your observations.

Animal Observations

After making notes on all of the above external observations, focus your attention on the animal. Much information can be obtained by quietly observing the animal from outside of its enclosure.

• Attitude

A good indicator of an animal's condition can be its attitude or demeanor. A healthy animal should appear bright, alert, and responsive. Although it should exhibit the normal aversion to humans, it should not appear unduly stressed in light of its species and condition.

• Overall Appearance

Does the animal look as you would expect from viewing the chart? For example, if an animal had a shoulder injury and was just put outside, you might expect that the wing placement might be a little different on the side of the injury. However, if an animal had a shoulder injury and was favoring one foot, it might be an indication of another problem. Observe the animal's feathers carefully. Twisting or ruffled feathers might be a sign of an underlying problem. Is the animal banded?

• Perform a head-to-toe visual exam

- The animal's head should be held in a normal position without any unusual or jerky movement or tracking.
- Are its eyes clear? You should not see any crustiness, drainage, cloudiness, blood, lesions, or swelling. If you can see its pupils, are they reactive and equal?
- The beak should be of the proper size and length, not overgrown.
- The wings should be folded correctly without drooping at the joints. As recent injuries can affect wing placement, it is important to understand the nature of the animal's condition.
- The legs should appear healthy for the species and should support the animal evenly. Birds often stand with one leg tucked up, so be sure to wait until the animal moves before assuming there is a problem.
- The animal's tail can be a critical factor in its flight ability and agility. Make sure it is healthy and intact.

• Movement

- Review the chart. If there are no problems that would limit movement or indicate cage rest, you can continue.
- If you haven't yet seen the animal move, encourage movement *to the degree that the animal is capable*.
- Is it standing on both legs, using both legs equally?
- Does it extend its wings correctly?
- Is the animal flighted? If it is in a flight enclosure, flush it from perch-to-

perch and watch it fly. Is it flying well? Does it appear to be compensating in any way? Does it land on both feet normally? Is it hitting its perch?
• Is its breathing labored? Is it taking longer than normal to recover from the activity?
• Birds healing from wing fractures will often have a notation in their chart that says, "put outside and see if it can fly." This process is not as quick and simple as it sounds. An animal that has been in intensive care for any length of time will need several days, or even several weeks, outside in a small or medium enclosure before it is ready for time in a flight. The animal's progress should be monitored carefully as it progresses and, when ready, it should be moved to a larger enclosure.

• Estimating Weight / Food Intake

If an animal has been eating regularly and is bright, alert, and responsive, we do not always need to put it through the stress of capture to check its weight each week. When possible, use the food charts combined with other visual indicators to identify potential drops in weight, unless stated otherwise in the chart or on the enclosure.

- A/R or N/R enclosures with one or two birds
  - If there are only a few birds in an enclosure it may be possible to make an acceptable determination
  - If an animal has been eating regularly but does not appear bright, alert, and responsive, its keel should be checked.
  - Use the chart history on that animal to determine what you should expect to find while examining the keel. For example, did the animal arrive very thin, a short time earlier? Does the animal have a wing amputation that is causing muscle atrophy on one side? Was the animal was in Intensive Care for a long time and just recently placed outside? Is the animal young and has not yet developed its flight muscles? On a healthy bird of the correct weight, you should be able to feel the proper thickness of muscle tissue on either side of the breast bone for the species.
  - Be sure to record the details of your estimate in the chart. Review the animal's weight history and note any unusual gains or losses.

- A/R or N/R enclosures with a larger group of animals
  - You may not be able to estimate weight from food logs and other indicators.
  - Animals that are not bright, alert, and responsive should be physically checked.
  - Try to "time" physical examinations to check keels or weights so that they coincide with cage movements. For example, moving from a small cage into the 20-foot, from the 20-foot to 30-foot, or from 30-foot to the 60-foot.

- Record the details of your estimates and observations in the chart.
- Review the animal's weight history and note any unusual gains or losses.

- Education Animals
  - The same process for estimating an animal's weight using the food charts and other external observations applies to education animals.
  - In order to maintain the animal's training, education animals are weighed when their weights need to be checked.
  - Only staff that are properly trained in the handling procedures for each specific education animal should attempt weighing. You must be trained on the animal and be signed-off to conduct its handling by yourself. *This is crucial to properly maintaining the animal's training*.
    - Weighing procedure for education animals
      - *You must be properly trained*.
      - Select a scale and move it to a suitable surface.
      - Turn on the scale.
      - Using the proper handling technique, bring the bird to the scale.
      - Ask the animal to "step off" onto the scale's perch.
      - Note the animal's weight and record it in the chart.
  - Record the details of your estimates and observations in the chart.
  - Review the animal's weight history and note any unusual gains or losses.

Full Physical Examinations

The full physical examination is a hands-on evaluation which will provide a head-to-toe assessment, the actual gram weight of an animal, and the opportunity to perform any additional procedures such as coping beaks or trimming talons. Repair of ankles and jesses on education animals can be timed to coincide with this examination.

• Teamwork!
Full physical exams are accomplished more easily if you work in teams. Try to schedule a time when you and another Medical Services volunteer can team-up to complete one or two exams. This can be done by overlapping shifts on a given day or by having an extra person come in on an "off" day. It's a good idea to rotate the teams to get input on technique from more than one person.

• Prepare
Before you begin, review the animal's chart with your partner. Discuss things that you might check closely and the conditions you might expect to find. Prepare an examination area in the bird room.

• Visual Exam first
Before you remove the animal from its cage, follow the procedure for the visual exam and complete each step. Be sure to record all observations in the animal's chart.

• Capture and restrain
Bring the animal inside the bird room according to procedure. Use additional equipment such as hoods or body socks to help calm the animal during the examination.

• Assess
Conduct a head-to-toe assessment:

- Carefully check the feet for any beginning signs of bumble foot or any other injury.
- Apply A&D ointment to the feet.
- Inspect the beak and talons, and cope or trim them if necessary.
- Repair anklets and jesses, or note the needed repair
- Check wings and body
- Check mouth and head

• Weigh the animal.
Be sure to tare the scale with the weight of any additional equipment such as hoods, towels, or leashes before weighing. Education animals should be weighed from the glove by properly trained staff using the procedure appropriate for that particular animal.

• Put animal back
Return the animal to its enclosure as quickly as possible.

• Record
Record the weight in grams in the chart.
Record the details of your examination in the chart.

Close-Monitoring Programs

A close-monitoring program is needed for any animal that is receiving scheduled treatment or requiring close observation, either ongoing or on a specific schedule. Some examples of close-monitoring programs:

- An animal that is transferred from intensive care and newly placed outside may need to be on close-monitoring for a few days to be sure he is acclimating properly.
- Physical therapy might be ordered to support rehabilitative efforts on an animal that has been injured.
- Animals that are put out with wraps or other bandaging still in place need to be checked regularly for swelling or other problems.
- Animals may need routine observation to determine if they are eating correctly and adjusting well to outdoor active rehabilitation conditions.

It is extremely important to conduct all close-monitoring activities in a timely manner and to record all scheduled treatments and observations in the animal's chart. Animals on close-monitoring programs will have their charts located in the hanging bin labeled "Close-Monitoring Outside". When you arrive for your shift, review the charts that you find there. After reviewing the charts, determine which animals need care during your shift. Also, look on the door of the medicine cabinet for posted treatment schedules for animals outside requiring physical therapy or other scheduled activity.

- Physical therapy may be needed in order to return a limb to its former function. Some examples of this might be extending a bird's wing or leg, holding the bird and forcing it to flap wings in a flight motion, or encouraging it to fly from perch-to-perch. The type of activity, range of motion, duration, and frequency for each specific activity will be detailed in the chart and on the posted therapy schedule. Be sure to note the physical therapy on the posted schedule or in the chart once it is completed.

- Other treatments such as bandage changing or removal must also be completed on schedule. Again, the type of care needed and frequency will be posted. Note in the chart or on the schedule when you have completed the treatment.

Release Preparedness

The work of many hard-working individuals goes into bringing an animal to the point which it can be released. Although we wish this were the outcome of all of the animals at the facility, the reality is that only about half of them will be returned to the wild. Of the other half, some will die of their injuries and some will have to be euthanized. There will be still others that will complete their rehabilitation and yet be unable to successfully survive in the wild. Whenever possible, these animals are placed in situations that provide a safe and healthy environment for them to live out their lives. These placements include nature centers, education facilities, zoos, breeding facilities, and other environmental programs.

Animals that are returned to the wild must prove that they can successfully survive. There is a system for this process.

• Animal Movement
When animals complete their rehabilitation in Intensive Care they are moved outside. Often, this first move is made into an enclosure that continues to restrict their movements to some degree. Once they have successfully adapted to the outdoor environment and their first enclosure, they will be moved to a larger enclosure. Eventually they will be placed in an enclosure where they can demonstrate the skills they will need to survive.

All animal movements must be recorded in the chart. Make sure that the information on tags, bands and charts are correct and that they follow the animal's movement.

• Adult Active-Rehabs
Animals must exhibit the abilities they will need to survive in the wild. Only active rehabs are put through this process. Once an animal is determined to be non-releasable it is moved to a low-stress enclosure to await placement.

Active rehabs will need to fly, maneuver, hunt, socialize, and demonstrate any other necessary skills that might be needed for survival. As animals are placed outside, observations should begin.

Medical staff will monitor the animal's progress. Notes will be made to indicate if a bird is flying straight, if it can fly from the ground up to a perch, if it has the maneuverability necessary for its species, if it flies without compensating in any way, and if it does not appear to be winded after periods of exercise. If it is an owl, it should be flying silently as well. It should be able to easily complete an established number of laps in a large flight enclosure.

• Orphan Readiness
In the wild young animals are shown how to hunt by their parents as part of their normal development. Although this behavior may be more or less instinctive, orphaned birds of prey must be tested prior to release to insure a successful reintroduction to the wild. This is accomplished by introducing live prey into their enclosure. From the demonstration of a "teacher" bird or foster parent, the youngster learns that the live animal is the same as the dead food it has been provided. The young animal must demonstrate that it can hunt successfully before it can be scheduled for release. In addition, all orphans must all exhibit the correct social behavior by demonstrating avoidance of people to the degree that it is possible in its enclosure.

Specific Species

The success of the Well Care program depends greatly on the knowledge and experience of the person conducting the exam.

It is crucial to become familiar with the wildlife that you will find on the property. This section will list the common wildlife you will encounter. Become familiar with their identification, habits, food preferences, and other conditions that will help you while providing care.

Education Wildlife

In order to respond effectively and correctly to a medical situation involving an education animal, you must become familiar with their species, location, individual history, and commonly shown behaviors.

Start now! Conduct a Well Care assessment on an education animal each shift.

- Select an educational animal to review.

- Read information on the species. There are books in the reference cabinet at Liberty Wildlife. Also, there are many books available in bookstores or in the library.

- Now that you know that natural history of the animal you have selected, pull its chart and read it carefully. Determine when the animal arrived and why. In addition, note its medical history. This information will be valuable for you to know should an emergency arise.

- Taking the chart and your natural history notes, find the animal.

• Study the identifying marks (field marks) of the species on the individual animal so that you can properly identify when that species arrives in the future.

• If the animal shares an enclosure with another individual, learn identification marks to separate it from the others. Identifying characteristics might be size, type or location of injury, behavior, or coloration.

• Learn the natural history, including habitat, food requirements, and behavior of each species. You can properly identify the species should one arrive on your shift.

• Provide the location, species, natural history, medical history, and any additional notes when given that individual's name.