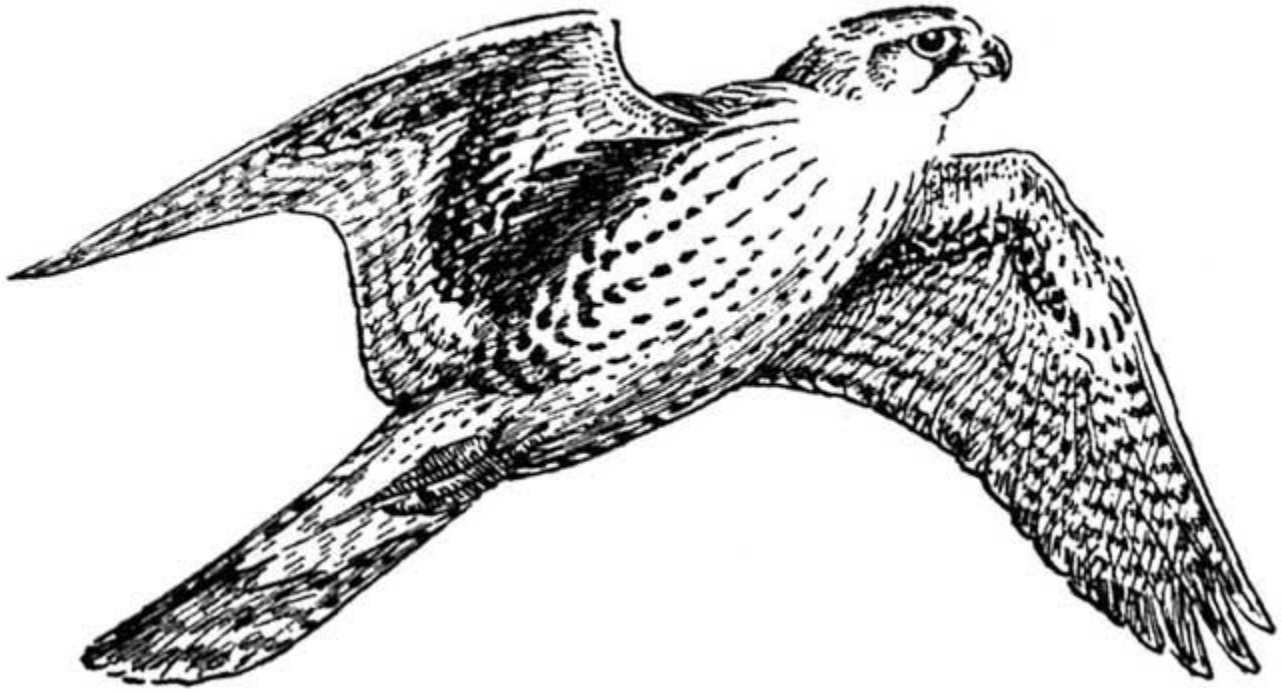
State of Utah

Falconry Guide



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Division of Wildlife
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https://wildlife.utah.gov/hunting-in-utah/hunting-information/falconry.html

Dear Prospective Falconer:

Thank you for your request for information pertaining to the Utah State Falconry Program.

Application for, or renewal of, a falconry license must be made on forms provided by the State of Utah Division of Wildlife. In order to be issued a falconry license, an applicant must:

1. Be a resident of the State of Utah
2. Be at least 12 years of age
3. Pass the Division's falconry examination by receiving a score of 80% or better
4. Construct DNR approved facilities for housing raptors
5. Submit a $45 fee for apprentice (3 year permit) or $75 for general / master (5 year permit)

All of the enclosed information should be carefully reviewed so that you will understand the procedures to follow in order to obtain your falconry license.

- The exam questions may cover the basic aspects of falconry, such as natural history, basic biology, diseases and treatment, housing facilities, handling, training and use of raptors, and federal and state laws and regulations.
- You must achieve a score of at least 80% on the true/false and multiple choice questions in order to receive a passing score. You will be notified by email of your score on the exam within 30 days.
- If you fail the falconry exam, you may retake the test after a 2 week waiting period.
- If you pass the falconry exam, you will be sent the following:
    - a. Apprentice Class COR Application
    - b. List of Division of Wildlife Regional Offices (in order to schedule your facility inspection)
    - c. Examination pass letter, detailing your exam score and COR Number
    - d. Guidelines for Raptor Housing and Equipment

After passing the written exam, you must meet the following requirements before obtaining your apprentice falconry license:

1. You must have a currently licensed General or Master Falconer agree to sponsor you and submit a letter stating this.

2. You must have your facilities and equipment inspected and approved by Utah DNR Regional Wildlife personnel.

If you have met all the requirements of your application for a falconry license, please visit your Regional DNR office or the Salt Lake office to obtain a copy of your Certificate of Registration.

The best of luck in reaching your goal, and if we may be of further assistance, feel free to contact the falconry program at **falconry@utah.gov**

Please note: This manual has been written as a guide to prospective falconers. The purpose of the manual is not to discourage the prospective falconer, but rather to inform the individual that there are some serious undertakings involved in the process. Becoming a falconer requires long hours of training and a long term commitment from the individual. Having a trained raptor is not the same as having a domestic pet. You cannot just leave it with a neighbor to watch when you go away. It is suggested that you read this manual not only once, but two or three times until you fully understand the responsibilities you are about to undertake. If, after reading and understanding the information in this manual, you still wish to continue, it is suggested that you follow the instructions provided here. We hope that this manual is helpful to you and answers most of your questions.

What is Falconry?

Falconry is the sport of hunting game with trained birds of prey (raptors). Falcons, hawks, eagles and owls have evolved to select certain prey species when hunting for food in the wild. The practice of falconry applies the natural predatory behavior of these birds in taking a wide variety of quarry as part of a cooperative hunting effort with the falconer.

Birds used in Falconry

Three taxonomic groups of raptors are most commonly trained for falconry in Utah; falcons, accipiters, and buteos. Falcons are adapted for the high-speed aerial pursuit of birds. Narrow, pointed wings and a streamlined configuration during flight enable these raptors to overtake pheasants, ducks and quail while hunting on the wing. Accipiters are hawks of the forest. Their short, rounded wings and long, rudder-like tails are adaptations for swift and precise maneuverability through thick cover. These birds are best suited for hunting forest dwelling game, such as grouse and squirrel. Because accipiters are highly active and often more nervous than most other raptors, training these birds requires expert-level skills and much patience. These are not hawks for the novice. The buteos, or soaring hawks, occupy the transition zone between open field and forested habitat, where they may often be seen hunting from tall trees along hedgerows, or soaring high above open land. Such broken habitat attracts rabbits, squirrels, and a variety of upland game birds. Eagles and great-horned owls are less commonly trained for use in falconry. The vast open areas required by eagles, and the nocturnal activity patterns of owls, have limited their application to falconry in Utah and elsewhere.

Modern Falconry

Awareness of the delicate balance of our ecosystems and the resulting commitment to apply ecologically sound hunting methods have sparked a resurgent interest in the ancient sport of falconry. Because predators are integral in the process of natural selection, hunting with trained raptors does not artificially compromise prey populations. Slower, weaker quarry comprise only a small percentage of the overall population, allowing the overwhelming majority to successfully elude predators. In fact, a trained raptor's frequency of successful capture is lower than that of any other method of hunting. For this reason, the fundamental attraction to falconry is not hunting success in the field, but rather the beauty of the raptors' flight, their aerobatic precision and lightening-swift reflexes, as well as the focused determination of a predator in the performance of a natural act. Falconry equipment, training methods, and hunting techniques have changed very little throughout the centuries. Advances in technology have supplied the contemporary sport with radio telemetry. Miniature transmitters, affixed to the legs, nowadays assist the falconer in tracking raptors that wander too far. But historical methods

of housing, conditioning, hunting, and meeting proper dietary requirements are tried and true, leaving little need or room for improvement.

Commitment to Falconry

Every responsible falconer understands that raptors are not pets. These birds are solitary, territorial predators and are too heavily armed with nature's weaponry to safely engage in social behavior. The only relationship we humans may establish with any raptor is that of a cooperative partner during the hunt. The falconer must be prepared to invest long hours, over weeks or months, during the training process. Even basic maintenance of a fully-trained captive raptor requires at least one hour each day.

Fundamental Reasons to Take up Falconry

First, individuals who are interested in alternative hunting methods have found that falconry affords them greater recreational opportunities. An increasing human population has made it difficult for hunting enthusiasts to find accessible land to hunt. Falconry is a field sport which can be practiced on smaller parcels of land, and it is easier to acquire permission to hunt with a raptor then when employing conventional hunting methods such as guns or archery. Second, a less tangible reason for practicing falconry today relates to an individual's desire to learn more about birds of prey. Many individuals who want to know more about raptor behavior and biology have discovered that falconry allows them the opportunity to closely observe birds of prey in a natural state without impacting the behavior of the predator or their prey. This quest for knowledge has motivated many young apprentice falconers to pursue careers in biological and scientific fields, as well as leading a number of scientists and researchers to become falconers. Falconry regulations, both federal and state, acknowledge this process of education through the practice of falconry by creating a licensing system with three levels of experience and expertise: apprentice, general and master. In summary, it must be emphasized that falconry cannot be treated as a passing fancy. The sport demands a high level of commitment, dedication and willingness to learn on the part of the falconer.

Training

Although the practice of training raptors for the sport of falconry was developed through trial and error some four thousand years ago, it was not until the twentieth century that the scientific bases behind successful training techniques were actually identified. Modern ethnologists discovered that ancient falconers employed rather sophisticated models of animal behavior in training wild-caught raptors to hunt cooperatively with humans, and very little fine-tuning of the old tried-and-true methods is found in modem falconry. The full spectrum of raptor training, from capturing a wild raptor to the ultimate stage of free-flight, is based on behavioral conditioning and positive reinforcement. In simple terms, falconry relies on a food response system of training, where the bird is rewarded for repeating specific behaviors. Social animals such as canines respond to punishment as well as reward because the

evolutionary tendency of their social units has been to establish dominant hierarchies through aggression and submission. Raptors are primarily solitary, territorial creatures. They engage in very little social interaction. As a result, these birds do not struggle for social dominance and therefore have not evolved a favorable response to punishment. Training raptors for falconry requires, instead, a food reward system (**positive reinforcement**) where a desired behavior is reinforced by the falconer each time it is performed. Through frequent repetition, a hawk or falcon begins to anticipate a food reward for behavior it associates with visual or auditory cues from the falconer. This is referred to as building up a "**conditioned response**." For example, the bird earns food rewards by coming to sit on a gloved fist in response to a whistle or a fist raised in the air. This sort of behavioral conditioning applies to all eagles, hawks, falcons and owls, and must be observed during each phase of training. Any raptor, when first taken from the wild, must be handled cautiously and with respect. Virtually every aspect of life in captivity is alien to a wild-caught bird; for example being restrained by leather jesses, confining walls, sudden movements, loud noises, and perching on a gloved hand. The introduction and acclimation to these stimuli must proceed slowly to overcome the instinctive fear of man and his unnatural environment. All of the factors that we humans take for granted in everyday life impose stress on wild birds, and it is imperative to reduce stress before training can proceed. The process of acclimating raptors to new surroundings is called "**manning**," and is accomplished by the gradual introduction of new stimuli under the least stressful circumstances possible. The bird must be carried and fed on the fist at regular intervals and sometimes taught to regain its perch after attempting to fly off. The falconer must approach the bird slowly and carry it on a steady, elevated fist. The bird should be allowed to perch facing any visual activity because the bird perceives motion behind it as a threat. Falconers learn to read their birds' stress levels by observing overt behaviors. Maintenance activities such as preening, rousing, or bathing are not immediately survival-oriented, and thus normally indicate the bird is in a relaxed state. Freezing in position on the perch, tight feather compaction, or excessive vocalizing and attempting to fly from the fist or perch, while still attached (**bating**) indicate a stressed state. By analyzing a hawk's physical attitudes, the falconer is able to take appropriate measures to keep stress at a minimum. Raptors rely on visual cues more than any other sensory signals. For this reason, a hood is often used in manning as well as during activities that may visually alarm the bird. Lacking a human's cognitive powers, raptors distinguish day from night only by the presence or absence of light. Because hawks remain still through the night to conceal their roosting positions, the artificial darkness inside the hood serves to create a similar calming environment. A well-fitted hood is light-tight when in place over the bird's head and flares away from the orbits so as not to make contact with the bird's eyes (corneal abrasions pose unnecessary health risks). Acceptance of the hood is often a slow and painstaking process, but the benefits are invaluable in calming the bird during manning and later when transporting the bird to the field for exercise and hunting, especially with falcons. Once a hawk has been manned sufficiently to step up on the glove and eat readily on the fist, it must then be enticed to approach the falconer for food. This may be accomplished indoors with enticing morsels of meat held in the glove or attached to a lure. A **lure** is a dummy pulled by a line which is intended to mimic the

prey species you desire your bird to hunt. Normally, falcons are flown to an imitation bird lure, both because the lure provides an excellent exercise tool and because it more closely mimics the natural prey of these bird-hunting predators. Hawks are traditionally flown to the fist, although many species will readily accept a rabbit lure on the ground. With either method, the lure or glove is garnished with a morsel of raw meat and introduced to the raptor in close proximity, then progressively moved to farther distances. For example, a red-tailed hawk first steps up to the fist from its perch, where it is rewarded with a small amount of food, then is returned to its perch. This sequence is repeated until the hawk responds without hesitation, then the garnished glove is held out several inches in front of the hawk until it hops readily to the fist. As the distance is increased over a period of several days, the bird's food intake must be rationed to ensure a prompt response to the fist or lure. Daily weighing of raptors during training is an absolute imperative. Inexperienced falconers must rely on the expertise of others to provide them with the optimal "flying weights" of individual species and sexes of raptors (females are larger and fly at heavier weights then males). Both the overfeeding and underfeeding of raptors present the same clinical behaviors to the untrained eye. If the body fat content of a hawk is too high, the bird's appetite is dulled and its response to food will be sluggish. If the fat content is too low, the bird's stamina is weakened and its response to food likewise will be sluggish. The optimum weight range of raptors stimulates the bird's appetite to a responsive level without weakening stamina. Overweight birds become unreliable when not properly motivated and invariably will find an opportunity to go back to the wild; underweight birds are vulnerable to health risks due to their weakened state. A daily log should be maintained to record weight changes and corresponding behavior trends. Even within the same species and sex, each bird varies slightly in metabolism and overall size so that optimal flying weights vary accordingly. When a hawk or falcon responds by flying the full length of an indoor room to the fist or lure, distances may then be increased outdoors. This stage of training requires the use of a **“creance”–** a nylon cord weighted at one end and attached to the bird's jesses by a swivel at the other end. The creance is a safety mechanism to prevent the bird from escaping while being flown outdoors. Typically a hawk is distracted when first trained outdoors, and often a lower weight adjustment is required to increase the bird's response level. When the raptor responds on the creance from a distance of a hundred feet or more, bells and/or radio telemetry are affixed to the legs or center tail feather and the bird may be flown free. Bells and transmitters assist the falconer in locating a bird that has wandered off or perched concealed in dense foliage. The maiden voyage into free flight is often a harrowing experience for the falconer. The fruits of weeks of hard work hinge on the falconer's training skills, and fantasies of watching a jess trailing hawk drift over the horizon lurks in the minds of all falconers during this crucial stage. Free flight is conditioned just as every other phase of training until both falconer and raptor have attained mutual confidence in each other. Hawks may be taught to follow the falconer through the woods much like domestic dogs, returning to the fist periodically for reinforcement. Falcons may be flown to a swinging lure simulating a bird in flight. The falconer leads the falcon past him/herself during pass after pass to the lure, increasing the bird’s overall fitness. With sufficient exercise and conditioning, the hawk or falcon is ready to be introduced to game. This process

is called "**entering**." Just as the bird was conditioned to respond to the fist and a lure, it is now entered on a specific type of quarry--usually rabbit or squirrel for a red-tailed hawk; pheasant or duck for a large falcon. After the bird learns to take the lure representing the species it is being trained to hunt, it may then be introduced to wild game of that species. In this fashion, raptors can be conditioned to take prey not normally pursued in the wild, adding diversity and spectacular flights to the sport.

Is Falconry for You?

As a quick guideline, answer the following five questions:

1. Can you commit approximately one hour during daylight per day everyday to falconry?

2. Do you have the necessary space to construct a facility for your bird?

3. Can you afford the expense of food, equipment, and housing required to adequately care for you raptor?

4. Do you have a legal access to a large enough parcel of land(s) which allows you to hunt and train your particular raptor?

5. Is there adequate game for your raptor on your available land?

Falconry in Utah

If you can answer yes to the above questions the issue of deciding whether falconry is for you will be a little easier. Even experienced falconers should periodically ask themselves these questions as they advance to each new license category or with every intended acquisition of a new species of raptor. What may be adequate time and space for an apprentice with a kestrel may not be realistic for a master with a gyrfalcon. The Utah Division of Wildlife offers its residents a state falconry license. The minimum age for licensing is 12. Applicants must first pass a written falconry examination with a score of 80% or better/ Housing facilities must be constructed, inspected and approved by the division, and a $45.00 license fee (for a three year license period) is required. All applicants meeting the above requirements may enter at the level of Apprentice Falconer. Apprentices are more restricted than advanced-level General and Master Falconers in the numbers and species of raptors they may possess. Before obtaining an Apprentice Falconry license, an applicant must seek and be sponsored by a General or Master Falconer, who will then serve as mentor and oversee the capture and training of hawks or falcons by the apprentice. See the Falconry Regulations (**R657-20-9**) for details.

Sponsorship

Sponsorship of apprentices by General and Master Falconers is arranged individually by the apprentice applicant. The Division of Wildlife will work with you to help in finding sponsorship opportunities, but ultimately finding a sponsor is the responsibility of the individual wishing to enter into falconry.

Falconry Facilities and Equipment

The following guidelines were developed by the State of Utah for the purpose of ensuring that facilities and equipment of prospective falconers meet minimum acceptable standards. The inspection and approval of facilities and equipment is a prerequisite to being granted a falconry license to practice the sport. These guidelines should be considered as minimum requirements. This document does not include descriptions of all acceptable systems. Wide variations, especially in housing, may be expected.

Raptor's housing requirements are simple. The primary need is shelter from direct sun, wind, rain and snow. Dryness, fresh air and an absence of draft are also important. These are conditions that a wild raptor seeks, and the closer the falconer comes to providing maximum levels of such, the more his or her raptors will benefit in health and comfort. The quarters in which the raptor is to be kept, whether indoors (**mews**) or outdoors (**weathering area**) or a combination, should ideally be set aside exclusively for the bird(s).

Indoor Facilities (Mews)

The mews may be a separate building or a room within a building. Ordinarily, sunlight and ventilation requirements make windows on the south or east exposures most desirable. The size of the mews varies with the species kept and the space available. Suggested minimum mew dimensions, per the State of Utah, are as follows:

6'x8'x7'	6'x6'x6'
Northern Goshawk Rough-legged Hawk Ferruginous Hawk Red-tailed Hawk Swainson's Hawk Harris' Hawk Gyr Falcon Prairie Falcon Peregrine Falcon	Cooper's Hawk Sharp-shinned Hawk Northern Harrier American Kestrel Merlin

Here the raptor may be kept loose or tethered to an appropriate perch. Tethering is very much a matter of individual preference. It is most definitely preferable where more than one bird is kept and is

mandatory where raptors of different sexes and/or species are kept in the same room. Accipiters (sharp-shinned, Cooper's and goshawks) must never be placed free among other birds (including their own kind) as they may kill all others. The wise falconer provides separate mews or partitions the facilities for accipiters even when they are tied, so that in the event of escape, disaster is avoided. When in training, raptors are generally tethered. The interior of the mews should be severely plain with no beams or ledges to tempt the raptor to fly to a higher perching place (unless the bird is un-tethered, in which case such beams or ledges become, in essence, additional perches). Anything that appears to offer a foothold above their rightful perch holds a raptor's attention. In a well-ordered mew, a raptor sits at ease when tethered because there is no other inviting perching place to sharpen that inherent desire, characteristic of the birds of prey, for a higher pinnacle from which to survey their surroundings. Windows should be protected on the inside by vertical bars or doweling spaced closer than the bird's width, whether or not birds are kept tethered in mews. Please note that chicken wire is NOT ACCEPTABLE. Chicken wire can cause issues when raptors grasp the mesh and can cause damage to plumage or cause other injury. The mews should be capable of being darkened without interfering with overall ventilation, if newly caught wild birds are to be placed in it. Mews doors should be secured (by lock if necessary) and should, additionally, have some sort of hook or spring so that the falconer can keep the door safely closed while inside. It is suggested, but not required, that doors of any mews which open directly to the outdoors should be protected by an additional door or protective covering inside to prevent escape of a bird free in the mews (intentionally or otherwise) as the door is opened (this is called **secondary containment**). Such protective covering can be achieved by a hanging cloth or plastic sheet. If this is placed at an angle inside the mews, it provides the falconer with a small enclosed alcove into which they may step and close the outer door behind them before pushing aside the cover to enter the mews itself. The floor of the mews should be constructed so as to facilitate cleaning. A layer of moisture-absorbing dirt, sand, pea gravel, or wood shavings is excellent. Such covering must be changed frequently for cleanliness. Straw, hay, sawdust, or similar material is not normally acceptable as it retains moisture and provides a medium favorable for the growth of pathogenic fungi and bacteria dangerous to the birds' health. Although, as indicated, numerous variations in a captive raptor's housing may be appropriate under given circumstances, bird cages of the pet store variety or other such enclosures are totally unacceptable, as are facilities which do not afford the bird proper space or protection.

Outdoor Weathering Facilities

Most falconers prefer to place their charges outdoors for sunning, called **"weathering,"** conditions permitting. The birds are placed on appropriate perches on some soft, resilient surface such as a thick, heavy lawn. The surface should be cleanable, or in the case of the lawn, the perch moved frequently enough to prevent soiling the area beneath it. Soft sand should be avoided as it is inclined to get between the bird's legs and the jesses and cause abrasion of the skin. Perches must be placed so that birds are not exposed to direct midsummer or mid-day sun. Any site where birds are to be weathered

unattended must be fenced to prevent the raptors from attack by dogs or cats and from undue disturbance by strangers or children. Without such fencing, no bird should be weathered unless under the immediate and continuous supervision of the falconer. Please refer to Falconry Rule (**R657-20-6)**

Captive raptors may be kept more or less permanently outdoors in an adequately protected weathering site. The structure should be constructed of light-reflecting material or painted for maximum light reflection to keep down the interior temperature. Where a bird would be left out overnight using such a shelter, the weathering site must have overhead protection. Attacks by wild predators (mammal or bird) on falconers' birds can occur even in relatively built-up suburban areas. This is especially true of attacks by wild owls on birds left out overnight. In areas where wild predators may constitute a problem, a totally enclosed weathering site with overhead protection in the form of wire or netting becomes extremely desirable, if not mandatory. This overhead wire or netting must be high enough (6-7 feet) so that the bird cannot touch it when at the end of its leash and so that the falconer can comfortably enter and leave or work inside the enclosure. As in any weathering site, the bird should not be able to touch the peripheral fencing or any other raptor in the same enclosure. NOTE: A bird or birds should never be placed free in such an enclosed weathering site, but rather, tethered by leashing on normal outdoor perches.

Necessary Equipment

Raptor Glove: Some type of pliable leather glove is a necessity (one left-only). For smaller species of raptors, a light leather gardening glove is sufficient; for larger species, an all-leather welder's glove is appropriate.

Leash: Leashes vary in size and type depending on the species of raptor. A knot (called a "**button**" or "**raptor knot**") is tied in the end to prevent the leash from slipping through the swivel. Several types are used.

Swivel*:* The classic "figure 8" swivel may be purchased from people who manufacture hawking equipment, or a heavy-duty fishing swivel may be used. The larger the bird, the larger the swivel required. The swivel attaches the leash to the jesses and prevents twisting.

Jesses: These are soft strips of tough, thin leather, permanently fastened to each leg of the captive raptor. Overall lengths of 4-6 inches for kestrel or 8-10 inches for red-tailed hawk are appropriate. Jesses are fitted and attached immediately upon receipt of any raptor. **Aylmeri jesses** consists of a "cuff" and miniature leash for each leg. The leather cuff is placed around the leg and its ends held together by a grommet. The miniature leash is passed through the grommet and its slit end is then attached to the swivel as are traditional jesses. The use of Aylmeri jesses is encouraged. Not only are they more efficient, but a bird escaping with such, readily loses (or removes) the miniature leashes, leaving it far less encumbered than with traditional jesses.

Bath Pan: A large, shallow pan, tub or cut-down wooden barrel, 6 inches deep with a diameter several inches longer than the length of the bird (at a minimum) provides both drinking and bathing water. It should be cleaned and the water changed frequently (at least weekly and more frequently in hot weather). If the bird is kept free in the mews, the bath pan may be installed there; otherwise the bath should be provided outside when the bird is weathering.

Bells: Certain bells are specially made for falconry and are small, lightweight and have an especially loud tone. They must be purchased from people who manufacture hawking equipment. Commercial Christmas-type jingle bells are not suitable. Bells should be affixed immediately upon receipt of the bird, either on the jess or with a small piece of leather called a "**bewit**". Bells provide a useful signal when something causes an untrained raptor to move about unduly. In the field, they assist the falconer in locating the bird when it is out of sight and serves to alert people that this is a captive bird. Normally two bells, each having a different tone, are used. Some falconers choose to bell their birds at the base of the tail or from a strip of leather around the neck. Birds belled in the latter manner should retain those bells only while hunting as opposed to bells on the legs and/or tail which are permanently affixed. Unfortunately, bells suitable for small species such as merlins, kestrels or sharp-shinned hawks are very difficult to obtain.

Name Tag: A small, light metal tag bearing, at a minimum, the owner's telephone number (and normally their name and address as well) should be attached to a jess or bewit. It should be placed on the bird in case of escape. The value of the name tag in retrieving lost raptors found by others cannot be overstressed. Some falconers place their contact information on the raptor's bells or on the jesses but such are not nearly so likely to be noticed by the uninformed.

***Scale*:** Traditionally, falconers have judged their raptors' condition by the amount of flesh on its breast (sternum) and thighs. This judgment is a difficult one, especially for the beginner. Additionally, a lean raptor need not be hungry and a fat raptor may, in fact, have an excellent appetite. Falconers seek the ideal medium to keep birds in the best condition. The best and safest method of determining the amount to be fed is to weigh the bird daily. Beam or balance (as opposed to spring) scales are preferred. For smaller raptors, scales should register in grams or ¼-ounce graduations. For larger species, 1-ounce graduations (if the nearest ¼ ounce can be interpolated readily) are acceptable, though the finer graduations are preferable.

Outdoor perches: *Ring perch*. This type of perch is used with birds which normally perch on tree limbs, i.e., the accipiters and buteos. For the perching portion of the ring, a thickness of about 1.0 inch is appropriate for small hawks, 2 inches for larger species. The overall diameter is generally about 12 inches. That portion on which the bird perches should be covered with a fabric such as canvas or carpeting.

Block perch. This type is used for the "true" falcons as they normally perch on flat surfaces. Diameters vary, normally from 4 to 8 inches, depending on the size of the bird. The top diameter must be sufficiently broad to prevent the two jesses from "straddling" the perch (slipping over both sides simultaneously).

Bow perch. The basic bow perch is just that - a bow of metal or wood with a perching surface where the bird will stand. These can be made in all different sizes. With a bow perch, the diameter of the perch is of consequence. A bow that is too small in diameter will allow the bird's talons to hit the skin on the opposite side of the foot, possibly causing damage. A bow too wide in diameter is uncomfortable. It is best to provide several different diameters for your bird by giving her several perches as that will ensure that the whole bottom of the foot is treated properly. These should feature a round perching surface that the entirety of the birds toes will grip.

Indoor perches: *Screen Perch*. This type of perch is appropriate for use with all species of raptors used in falconry and is suitable for use by more than one raptor simultaneously. It consists of a horizontal bar over which a strong cloth such as burlap has been draped. This bar is fastened at chest height to the walls of the mews or to upright posts. The cloth should hang down at least three feet on both sides of the bar and be fastened to a second lower bar either attached to the mews walls or upright posts, or it may swing free. The upper (perching) bar is normally padded with carpet and should be long enough so that the bird can reach neither the ends nor any other birds tethered on it. Caution should be exercised in the use of this type of perch. It should not be used for sick or weak raptors, and no raptor should be left unattended on a screen perch until the falconer has ascertained that the bird is capable of regaining the perch after attempting to fly from it.

Round Perch. This type of perch is most suitable for the accipiters or the "true" falcons. It is shaped very much like a large garbage can. As in all perches described, its size depends on the species of raptor for which it is intended. A goshawk uses a round perch about the size of a 55-gallon drum on end, with other species requiring proportionally smaller sizes. The sides and top rim (perch) are padded, and the bird is tethered to a swivel arrangement in the center of a horizontal platform below the surface of the top of the perch

Shelf perch. This is considered most appropriate for use with the "true" falcons and normally consists of a shelf approximately 1 ft. x 2 ft. with a padded edge. All exposed edges and corners of the shelf must be rounded and smoothed so as not to inhibit leash movement. The shelf is mounted projecting from an inner wall or inside corner of the mews. A shelf perch is normally used in combination with a block perch set in on the mews floor so as to give the bird a choice of perches. The leash is either tethered to the block in the normal fashion with its length allowing access to the shelf, or to an eye-bolt at the base of the wall beneath the shelf, the leash length then providing access to either shelf or block. In the latter arrangement, care is required that the leash is not so long as to allow it to become entangled around the block.

T perch. The T-Perch is unsafe for a leashed bird as the leash can get can get caught on one of the T pieces, the jesses can straddle a piece, or the bird can generally get tangled, but this can be a favored spot of a free-lofted bird. It can be placed high up giving the bird the location she wants, and it can "give" slightly as well.

Food*:* An adequate and reliable supply of proper food is as important to the raptor's well-being as are considerations of shelter and equipment. Although the proper type and amount of food varies considerably with the species of raptor and the time of year and stage of the bird's training, there are certain basic principles that apply in all cases. The best food for any raptor is natural food, which should make up the principal proportion of the diet. The best and most appropriate examples of such a natural diet are sparrows, feral pigeons*****, starlings, mice and rats. It is unlikely that the falconer can shoot unprotected birds or animals in sufficient numbers to provide a continuous and reliable supply, even for one hawk. (Caution: Ingesting 0.1 lead shot in birds or animals killed with a shotgun may cause lead poisoning in raptors). A supplemental food supply such as meat or chicken parts may be used temporarily when natural food is unavailable. Vitamin and mineral supplements are an important part of a captive raptor's diet, especially if the bird is fed non-natural foods more than occasionally. Use of such supplements should be undertaken only after consultation with a veterinarian to determine proper types and dosages since some synthetic vitamins can prove harmful to raptors, as can some supplements containing iron.

***** There is some question as to the advisability of feeding pigeons to raptors unless considerable care is exercised. Both wild and domestic pigeons are commonly infected with Trichomonas galljnae, a protozoan that causes a disease of the mouth and the tongue in raptors. It is difficult to treat and frequently fatal. Any pigeons used as food for captive raptors should have the head and crop removed and be allowed to cool for at least one hour (preferably longer) after death.

Optional Equipment

Lure**:** This is a padded leather device, ordinarily covered with the wings or fur of the intended quarry (a fresh carcass of such quarry will also suffice as a lure). The lure is used to call the bird back to the falconer after an unsuccessful flight or for exercise. A four to six-foot line fastened to the lure allows the falconer to swing it in a large arc or circle, making it more visible and attractive. A raptor may or may not be trained to come to the lure. Such training, however, has much to recommend it, since, in essence, it constitutes a safety measure. A raptor will often come to a lure when, for one reason or another, it is reluctant to come to the fist.

Hood: Although symbolic of falconry, the hood, even more than the lure, is a matter of individual preference. Hoods come in a variety of shapes and designs, but the most important factor is proper fit. The edges of the beak opening should not rub or chaff the soft parts around the bird's beak, nostrils or mouth. The interior of the hood must not touch the raptor's eyes (as revealed by moisture inside the

hood when removed) and the portion of the hood passing under the raptor's "chin" must not be so tight as to be constrictive.

Raptor Diseases and Maladies

Apoplexy

Apoplexy is marked by an uncontrollable jerking or contraction of the muscles typically caused by hypoglycemia, Vitamin B deficiency, calcium deficiency, and Vitamin D3 deficiency. Although the hypoglycemia is usually the trigger for fits and the immediate solution for treating, the full nutrition and fitness level should be evaluated. Typical in freshly-trapped small Accipiters such as Sharp-Shins and Cooper's hawks, but also can occur in captive birds.
Treatment is usually placing the bird in a cool, dark place and administering a sugar-water substance - Gatorade, Pedialyte, and even orange or cherry juice can be used to try to balance the hawk's electrolytes. Three or four eye-droppers full of flat cola (not Diet or non-sugar) every two hours will also start to treat the condition. Nutrical is a good additive for this bird until she is past this.

Aspergillosis

Aspergillosis, or Asper, is a fungal infection and the most lethal type of infection, and in particular the arctic birds tend to develop and die from this. Gyrfalcons, Goshawks, and Snowy Owls in particular are susceptible. This can be of two forms. Nodular asper attacks the air sacs, lungs, and trachea. Systemic asper attacks the kidneys, liver, or other organs. The fungus that causes asper, *Aspergillus fumigates*, is found everywhere except the frozen arctic and Antarctic regions; birds are constantly exposed to it. Elevated levels will be found in areas where there is carpet, wet or damp substances, or materials that promote the growth of fungus such as burlap, hay, or straw. Fecal matter and dead vegetation (straw and shavings) should be kept to a minimum in any aviary enclosure. To contract the disease the bird usually has a depressed immune system either from another disease, poor health, extended antibiotic usage, or poor nutrition. Arctic birds, such as the Gyrfalcon, are more susceptible to Asper than some other species (Goshawks and Golden Eagles, particularly). The earliest sign of asper is a slight gurgling behind the breathing or a slight hoarseness behind any voice. Asper's hallmarks are difficulty breathing (although this may not be apparent), extreme thirst, easily over-exerted and low in energy, food flicking or difficulty eating or lack of interest in eating, weight loss or poor appetite, voice change, and a general ruffled appearance. Sometimes there is a stinky black fluid thrown up by the bird. Despite the bird's extreme thirst, dehydration occurs. This can be clinically confirmed by high white blood cell counts, tracheal cultures, ELIZA test, and x-rays. An upper respiratory problem can sometimes be nailed down when difficulty exhaling is observed, whereas a lower respiratory problem may be involved when trouble inhaling is observed. Asper and pneumonia look a lot alike.
The best treatment for asper is prevention. Although birds may recover, this is a highly problematic disease to treat. Veterinarians may prescribe AmphotericinB with Clotrimazol, Itraconazol,

Fluconizole, Voriconazole, Ancoban, Flucytosine, Sporanox, or Intracon (a note to be careful in handling AmphotericinB as it can cause renal problems in humans). A nebulizer with 2cc clotrimazole with 1cc sterile water or clotrimazole 10mg/ml in polyethylene glycol (Lotrimin solution) for 30 - 60 minutes for 5 days is one modern treatment. Another favored treatment is Terbinafine once a day for 60 days. Continuing to gently exercise the bird, but not to the point of being winded, may help to clear out the lungs and keep the lymphatic system moving. Birds treated for Asper should be monitored for 6 months to verify that the bird has completely overcome the infection and is not going to relapse. A bird can succumb to Asper in anywhere from 2 days to a week. Only 25% of patients will recover.

Avian Influenza

Avian influenza isn't typically seen in raptors, however since the typical host are ducks and chickens, raptors can be exposed to this.

Blackhead

This is a disease that affects turkeys and chickens in commercial poultry, but could develop in a raptor. The cause is a protozoa and can lay dormant in the ground for years. Birds that are infected give a watery yellowish mute. The bird must be removed and the area cleaned to prevent others from developing this.

Blockage

Although not a disease, this may be mistaken for one. Some birds are quite greedy and will manage to swallow more than they should. These birds must be watched carefully should they manage to swallow large connected segments of an animal to ensure they put over the crop correctly passing food on through, and cast appropriately. Care should be taken to not feed on top of a difficult crop of food like this.

Bumblefoot

Bumblefoot is a disease of the bottom of the feet caused by any number of different types of bacteria. Birds have an amazing ability to heal their skin, but unfortunately it can end up encapsulating bacteria and allow the colony to continue producing. In the case of Bumblefoot, the bird has sustained an injury, however small, to the bottom of the foot and bacteria has been allowed to take hold. The skin may continue to heal around this colony. It begins as a small, hardened corn which develops into a fevered hot spot or open sore. Other symptoms are a bird who lays down or won't put weight onto the feet. This corn, or a spot on the foot skin, is usually an early sign of Bumblefoot when it can still be reversed relatively easily. Untreated, Bumblefoot doesn't just impact the foot and her ability to stand comfortably, it can devolve into septicemia and even kill a bird. Falcons appear to be particularly sensitive to Bumblefoot, possibly from the way they strike prey.

Like Asper, the best treatment is prevention. The main causes are from injury (i.e. improper furniture

design or enclosure injuries or from prey), perching surfaces (i.e. improper surfaces or design), poor hygiene, inactivity, obesity, and poor diet (particularly an insufficient amount of Vitamin A). Having proper perching surfaces, varied surfaces, and varied diameters of perches is the best maintenance. Keeping perching surfaces clean is important - this means clean from mutes as well as cleansing agents which may irritate the skin. The area around the perch is important, too. Birds perched on hard dry ground, or hard icy ground, are likely to bate, damage the foot skin, develop a crack and allow infection to set in. Proper nutrition is key. Soaking or scrubbing the hawk's feet once in a while or if soiled helps to prevent dirt and blood from becoming encrusted. Some have reported a mixture of glycerine and rosewater sprayed on the feet occasionally helps keep them in good shape. Keeping the skin under the talon where it meets the talon clean is another good step. Any injury to the bottom of the foot can allow bacteria to take hold. Gyrfalcons, Cooper's Hawks, and Prairie Falcons are observed to particularly develop these problems, possibly due to the way they strike their prey. Gyrfalcons tend to bate a lot and that may also be why they develop Bumblefoot more. Keeping them on softer ground where they cannot bruise the foot can help.

If a bird has developed a corn, scrubbing the foot with a Betadine scrub is a good place to start. This can be rinsed with Nolvasan, if you have it. Using a salve of 1 part Anhydrous Lanolin mixed with 1 part Dermaclense or an antibiotic ointment like Corona (very tiny amounts massaged in FULLY) can quickly revert any small problem. A slightly more progressed case can use Preparation-H massaged into the foot. Many rehabilitators also use a CEH cream preparation. A cracked callus which could develop further into infection can be treated less aggressively with foot soaks every other day (Nolvasan would be one choice for a foot soak solution), CEH cream, and wrapped with Tegaderm and VetWrap. If necessary, the foot can be covered with rolled gauze then covered in vetwrap to keep the cream on the foot and off the feathers. Very serious cases require taking the pressure off the infection part of the foot, which can be done with donut bandages or with a product such as Sideline, a Sole Support Impression Material. This is like a modeling clay allowing you to create a foot impression and create a sort of orthopedic shoe that can then be wrapped to the bird's foot with VetWrap. More serious cases can require surgery. Advanced cases of Bumblefoot are very difficult to cure.

Treatment beyond topical and supplemental Vitamin A may consist of Piperacillin or Ceftazidine. Treatment for extreme (Grade V) may require amputation or euthanasia as the bacteria will actually eat the bone.

Candidiasis

Yeast infection. Symptoms include plaques in the mouth (easily mistaken for frounce, capillaria, or Vitamin A deficiency), lack of appetite, vomiting, dehydration, and depression. Treated with Nystatin, Fluconazole, Itraconazole.

Capillaria

Capillaria is also called Small Roundworms typically picked up from crows or small birds. These

roundworms, *Capillaria amulata*, embed themselves in the lining of the esophagus, crop, or small intestine. Typically, a very low level of these is seen. As they are very difficult to get rid of, unless it poses a problem to the bird's health, the low levels of infestation are acceptable. Some of the marks of this disease are depression, weakness, weight loss, diarrhea, "sitting," coughing, gasping, anemia, excessive salivation, and bad breath. Note that there are two manifestations, one of which looks very much like Frounce.
There is some work being done in Europe to identify a successful course of treatment. This involves Thiabendazole, but is lengthy, stressful for the bird, and not guaranteed. Ivermectin is a preferred treatment in a single dose of about 0.2mg/kg of body weight, but this is not always effective. Panacur or Levamasole may also be used to address it. Many vets will advise to leave it alone if there is only a very low level present as it is almost always present even in a healthy bird's system.

Chlamydiosis or Avian Chlamydia
Chlamydiosis is also called Avian Chlamydia and is very common in parrots, sometimes called parrot fever. It is caused by an intercellular bacterium called *Chlamydophilia psittaci*. Symptoms vary from no symptoms with a latent bacteria for months to a sudden death. Some typical symptoms are inflammation of the eye (both the conjunctiva and the cornea), inflammation of the nasal membranes, and shortness of breath. Mutes may be yellowish-green or watery-gray. Can attack the air sacs, the liver, heart, spleen, or brain.

Coccidiosis
Coccidiosis is a disease of the digestive system caused by a parasitic protozoan. This protozoan appears in two forms, *Isospora* and *Eimeria*. Isospora is the form found in Falconiformes and Strigiformes. These develop inside the cells that line the intestinal tract. As they take over more and more cells, the cells begin leaking preventing the bird from absorbing nutrients or liquid. This loss of blood and fluid is what causes the reddish (or red spotty) diarrhea that marks this disease. The loss of blood and fluids can be fatal. Merlins can be particularly susceptible to this and will rapidly decline.
Coccidiosis is usually marked by first by a lack of energy, then diarrhea, dehydration, weight loss or odd fluctuations in weight, lethargy, flecks of red in the mutes or bloody mutes, food flicking, foul smelling castings, and poor appetite leading to complete lack of appetite. The flecks of red in the mutes are blood spots, but sometimes the flecks are small enough to give the mute an overall pink color. If the mutes have turned completely black, then there is a significant amount of blood being passed through the tract and treatment at this stage is less effective. The castings are slimy as though greasy or coated in petroleum jelly, and may be brown and have a different smell. If reviewing your own fecal slides, this can be mistaken for Round worms. Note that these are much smaller than Ascarid eggs.
This is typically treated first by rehydrating, then with antibiotics such as Flagyl (250 mg/10 ml with 3 ml administered TID in food for 7 days), Baycox, Albon (250 mg/5 ml with 0.5 ml administered SID in food for 10 days), or Appertex (clazurilum). Once treatment has concluded, Benni-Bac (Avian

Lactobacillus) may be a good idea to supplement with as the good system bacteria has also been reduced. Simple foods or an emaciation diet are good to get these birds stable.

Coryza (also called Infectious Coryza)
Bacterial infection that isn't typically fatal, but is difficult to treat. Birds will develop swelling around their faces, discharge from their eyes and nares. They also tend to develop green mutes. Treatment tends to use sulfathiazole and spectinomycin.

Cramp (also called Sprattling)
Cramp affects nestling raptors that get chilled. The chick cannot regulate its body temperature, and therefore is dependent on its environment (parent or incubator) for proper warmth. When the chick gets too cold, the intestinal gut flora dies and the chick's digestive process begins to fail. If the chick still has gut motility, then food will pass through almost undigested. If there is no gut motility, then the food sits in the chick and spoils. Chilling causes muscle contractions and spasms in an attempt to warm the body. This inhibits their ability to process calcium.
Cramp is prevented by using a brooder box, heat lamp, or heating pad. Calcium is sometimes given as a treatment, but if the bird cannot process it, it will not help.

Dehydration
Although not a disease, dehydration is a common symptom and needs to be identified. One way is by pulling the skin of the upper foot away from the body, pinching it up, and noting if it remains tented or returns to the normal shape. Skin that remains pinched and tented is typical of a dehydrated animal. You can also open the mouth to see if there is stringy mucousy liquid across the back of the bird's mouth. If there is, then the bird is dehydrated.

Escherichia Coli or E. coli
E. coli is typically passed from infected birds through mutes and fecal matter. Typical symptoms include ruffled appearance and listlessness, although some birds display no symptoms.
Treatments include antibiotics such as Kanamycin or Gentamycin.

Fluke or flat worms (Trematodes)
Flukes are a very common parasite occurring in many to most wild raptors and usually non-pathogenic. Many believe that treating flukes is not necessary if the level of the fluke infestation is not harming the animal (only one or two per slide). Through normal hunting and eating of prey there will likely be a re-infestation. However, if the level of infestation is beyond normal, Praziquintel has been used to successfully treat flukes.

Fowl Cholera or Avian Cholera

A bacterial disease that is uncommon in raptors, but can occur. There are two forms of this disease: acute and chronic. Acute fowl cholera has a bird with anorexia, high fever, mucal diarrhea and mucal discharge from the mouth and murky greenish diarrhea. The bird tends to have a ruffled appearance and generally dies quickly. Chronic fowl cholera may just be a localized infection in the sinus cavity or the joints. This is marked more by discharge from the eyes, raspy breathing, and a twisted neck (torticollis). This is typically treated with antibiotics and the area the bird has been in needs to be disinfected.

French Moult

In domestic avian husbandry, almost any feather abnormalities or moult is called a *French Moult*. This could be the bird moulting at the wrong time of year, moulting twice in a summer, or feathers coming in that are misshapen. The causes of this can be nutrition, environmental, depressed immune system, or infectious, most commonly Polyomavirus. An improper moult in raptors has recently signaled the potential of West Nile Virus as misshapen or pinched feathers are now being seen after a bird recovers from a WNV infection.

Notice the split in the feather shaft and the malformed shaft near the tip.

The feather on the left was moulted normally prior to contracting West Nile Virus. The feather on the right was dropped shortly after growing in. The feather on the right is substantially shorter than the normal feather and the shaft is warped and twisted.

Another comparison of these two feathers.

Frostbite

Some birds are very hardy and tolerate cold well. Others, like a Harris Hawk or desert falcon, are sensitive to the cold. Conditions involving wind, rain, snow, and ice can make this worse, and friction along with cold can leave skin irritated. Frostbite can be very mild or extreme enough to cause tissue death and even result in the bird's death. The usual site of damage for frostbite is the foot appearing as pale and dry. Bad frostbite will eventually darken as the tissue dies and will fall off. If this is suspected, immediately bring the bird into a normal living environment where they will be in a comfortable ambient temperature. A foot can be rinsed or soaked in cool to lukewarm water or saline to begin to warm the tissues. Warm or hot water should never be used. The bird should be kept in a warm and quiet environment, should be well hydrated with a balanced electrolyte if possible, and should receive sufficient food. Ensure the tissue is completely healed before the bird is exposed to cold again. If there are open wounds, Neosporin can be used. If there are not open wounds, an Aloe Vera gel or an ointment such as Corona may help encourage the skin to recover.

Prevention is the best part of avoiding frostbite. In cold weather, consider taking up any bathpans or water so a bird cannot get wet accidentally. Make certain that the perching surface is not one that will sap the heat from the bird's feet - sisal or wood is an excellent perch surface in cold whereas metal will draw all heat from the bird's foot. Any tiny piece of metal edge that the bird's toe may accidentally touch can cause significant damage. If a bird tends to bate, the cold skin may not be frostbitten but more irritated from the combination of cold and friction. A bird of this temperament may need to come inside the house at a warmer temperature than a bird that does not tend to cause damage to herself in such weather. Those who keep chickens and other fowl have some practices that may be useful. Some

rub Vaseline into their bird's feet both as a protective layer and to massage the blood flow into the tissue. Care should be taken that Vaseline does not get on the feathers.

Frounce (or Avian Trichomoniasis)
Frounce is a highly contagious yeast infection of the digestive tract. Frounce is caused by a protozoan called *Trichomonas* which is frequently present in the crops of pigeons. For this reason, pigeon heads and crops are generally not fed to raptors. The typical signs of Frounce are white spots in the mouth or crop, often described as "cheesy" or "white plaques." These alone are not enough to diagnose Frounce as plaques could be candidiosis, capillaria, or even Vitamin A deficiency, but it is one hallmark of the disease. Other signs are head bowing, head flicking, difficulty breathing, or even regurgitation of food. There is a particular smell to Frounce. Green mutes may also appear. A bird may suddenly appear to be in yarak, even without other changes. A swab and wet prep on a slide will show protozoans.
One common treatment is to treat the bird with 25 - 50 mg/Kg of Metronidazole twice a day for 7 - 10 days and swab the frounce areas with a dilute Betadine or Nolvasan solution, or even Emtryl, to try to remove some of the plaques. Make sure to check that no plaques are blocking the airway or esophagus. Plaques in the throat may necessitate smaller bites or food more easily swallowed. Plaques should reduce or fall off in ten days. Some plaques are better being gently removed while others will bleed resulting in a bird choking.
Birds who are untreated usually succumb to Frounce within 7 - 10 days. Goshawks, Great Horned Owls, and Barred Owls appear to be very susceptible to this. Peregrines are thought to be less susceptible to this and possibly developing a resistance, so a Peregrine showing frounce symptoms should also be investigated for diseases which may give similar symptoms such as Capillaria.

Gapeworms
Gapeworms are caused by *Syngamus trachea* which attach themselves to the inner lining of the trachea. Generally death is quick as the worms cause asphyxiation. Symptoms are coughing, wheezing, and shortness of breath. Gapeworms are not easily treated, but Thiabendazole or Panacur may be prescribed.

Gout
Gout is caused by kidney problems which leaves excess uric acid in the system that cannot be cleaned out. This is typically seen as a swelling in the foot and joints (distinguishable from Bumblefoot), but internal organs sustain damage as the acid deposits on their surfaces.
Nutritional deficiencies are what lead to this. Ensure you are not over feeding vitamins and that you are balancing the food sources. A properly hydrated bird can also stave off this disease longer than a dehydrated bird can as the hydration better allows the bird to flush her system.

Haemoproteus

Haemoproteus is a blood infection spread by flat flies. Pigeons and doves are frequently infected with low levels, but commercial flocks are not typically seen with infection.

Herpes or Avian Herpes
There are three closely related viruses which cause avian herpes. One strain causes Pacheco's Disease, one strain causes Marek's disease, and the rest fall into the category of "other". Birds will pass this virus through their mutes and dander. This is noted to be particularly deadly to Gyrfalcons and Peregrine Falcons, and these birds as well as Goshawks seem to be particularly vulnerable to developing it.
Avian herpes causes inflammations, swellings, bleeding of the liver, kidneys, and spleen, and ultimately death. Since there are several different strains, there are several different clinical signs. The progression is slow and some signs of it are tremors, seizures, swellings, and general lethargy. Fecals may be green with yellow or orange urates. Although this has been treated successfully with Acyclovir injections, the prognosis for recovery is not good.

Impaction
Impaction of the crop, gizzard, or stomach is fairly uncommon. Flooring materials such as wood shavings or sand can be ingested and impact in the bird and begin to breed bacteria and create a crop infection. Plenty of water will help many things either move through the system or be cast back up. Symptoms are usually that the bird acts active, yet shows no signs of interest in food. The impaction can usually be felt through palpation. If the bird is able to cast up the impaction material, then the system will usually resume normal functionality. Plenty of hydration, and small amounts of very tiny hydrated tidbits can sustain a bird through this. Take care not to give any food containing casting material. Overeating can also lead to food sitting in the crop for an extended period of time leading to bacterial growth and a crop infection. Materials stuck in the crop may also have punctured a hole in the crop. Small punctures typically heal on their own, although falconers will feed several small meals through the day so as not to stretch the skin in that area and allow it to heal.
Crop infections can be noticed when the bird has a loss of appetite, or regurgitates food or has undigested food in the casting material. Dehydrated birds are at risk of developing crop infections, and emaciated birds must be hydrated well with any nutrition they are given. Treatment must be done within a few days. Larger birds are easier to flush the crop, treat with antibiotics, and rehydrate.

Lead poisoning
Lead poisoning causes nervous system damage and digestive system problems and can directly impact the kidneys, liver, blood, reproduction, and immune systems. Symptoms are shaking, weakness, nervous system oddities, brown diarrhea (chocolate milk-like) may occur, high blood pressure, and renal failure. A quick way to diagnose is by drawing the blood and viewing under a black light - the compound created by the presence of lead in the system will cause the blood to fluoresce. More

extensive tests can be done for a definitive diagnosis and analysis of the level of poisoning. X-rays will show any lead bodies in the bird.
This necessitates a veterinary visit if your bird has consumed any lead, such as lead shot. The vet will normally treat with a chelating agent to help prevent the lead from entering the system. Peanut butter or Metamucil may be administered to speed the lead through the GI tract.

Leucocytozoonosis
This is a blood infection of both red and white blood cells that is transmitted by black flies. Typically seen when the black fly population is high. Birds rapidly develop anemia, breathlessness, listlessness, and typically have a green mute, but death is very quick. Treatment typically involves sulfamonomethoxine or sulfadimethoxine.

Louse or Lice
An external parasite looking almost like a white worm, but with legs. These insects bite the bird and cause irritation. Lice tend to crawl around the vent area and lay eggs along the feather shafts. Treat by spraying the bird with a Pyrethrin spray (like 8-in-1's Ultra-Care with 0.03% Pyrethrins, 0.3% Piperonyl butoxide). If you cannot spray the bird safely, spray a paper towel and rub that along the bird.

Maggots
Eyas birds are sometimes infested with maggots, typically in the head. This can be seen on very young birds as a grey dot at the top of their skull.
Treatment for this can be Vaseline (or other petroleum based product such as a chapstick) rubbed onto the top of the skull, or a solution of equal parts vinegar and water. The petroleum will suffocate the maggots and the solution will alter the pH of the ear canal forcing them to back out of the ear. Maggots can be fatal to an eyas.

Malaria specifically Avian Malaria
This protozoa is transmitted primarily by mosquitos tending to occur when mosquito populations are high. Birds are listless with puffy, almond-shaped eyes and may display difficulty with balance or eyesight, anemic, sometimes vomiting, and typically have a high temperature. The fecal of the mute may be any color, but the urate is a dull jade green color as the protozoa attack the liver. Prognosis is not good with birds often dying within hours of displaying symptoms. This can be positively identified with a blood smear. There is a drug regimen that can be done with Chloroquine phosphate or doxycyline, but with low success. If this is diagnosed the CDC should be notified.

Metabolic Bone Disease MBD
A very sad disease and usually preventable through proper nutrition. MBD comes on in immature,

growing birds who are not receiving enough calcium or Vitamin D3. Their bones are not calcifying, break very easily, and do not show up as dense calcified bones on radiographs. The bone breaks are extremely painful to the bird. Treat with a proper diet with the Calcium:Phosphorus ratio of 1.5:1, CaGluconate IV, and supportive care.

Newcastle Disease

A highly contagious viral disease transmitted through eating diseased birds or through infected water, food, equipment, or fecal matter. The disease attacks the nervous system with symptoms like twitching, shivering, convulsions, twisting of the neck, or paralysis. Sight may be impaired and the bird may have difficulty with breathing or coughing. Most telling is the greenish mutes from infected birds. There is no effective treatment other than supportive measures, but death is usually sudden. Controlling the virus is key - all equipment should be disinfected, premises should be disinfected, and infected animals must be destroyed. Note: This is VERY rare in Utah/ The US.

Parasites

External parasites generally only affect the plumage, and most particularly they tend to damage the white areas of feathers. The parasites can cause the bird to look ruffled or roughen the edges of feathers. This can make her feathers less effective, but moreover, irritate the bird or transmit diseases. Feather lice tend to focus on the lighter portions of feather. Because of this albino or leukistic birds may be in worse shape than their darker counterparts.

The feather should be smooth edged. Here the lighter portions have been eaten away by feather lice causing this feather to have "steps" along the edges.

External parasites such as feather lice and hippoboscids are common. Hippoboscids have been described as looking like flying ticks. These can be treated with a topical treatment of 2% Sevin powder or a 0.03% Pyrethrins, 0.3% Piperonyl butoxide spray - any pet store caged bird spray will likely work. Apply once starting at the neck and working your way down, spray only lightly the beak, then reapply 7 days later. If you cannot spray the bird safely, spray a paper towel and rub that along the

bird. Avoid spraying in areas where the spray would land that the bird would also eat off of, such as on a block perch on the gauntlet. Taking a few small precautions avoids these treatments from being ingested. Also you will likely want to treat for both internal and external parasites in an area that is not used for birds or people, and can easily be completely cleaned or avoided. Once the parasites crawl off or are flushed from the system, you don't want them infesting something else.
Parasites, like maggots, can also settle into the ear. This is not uncommon in wild birds, and can lead to death as they grow. One way to handle them is to flush the ear with mineral oil and the maggots should crawl out.
Internally, parasites can attack any number of places. Air sac worms are not uncommon, but are not seen enough to readily be identified. Typically there is regurgitation, and some amount of weight loss, although symptoms can be very subtle until the bird succumbs. It is usually a good idea to fatten a bird slightly having her well fed and hydrated before treating for internal parasites.

Pneumonia
Pneumonia is often found as a secondary disease to Asper and sometimes when found separately they can be mistaken for the other. It has many primary causes including bacterial and viral.
Proper treatment for bacterial pneumonia is antibiotics, stress reduction, good food, and dark, quiet space. Viral pneumonia will require a similar regimen except instead of antibiotics aimed at the bacterial pneumonia, Baytril (or other antibiotics) is typically prescribed to prevent secondary bacterial infections.

Poisoning
There are many different types of poisons that raptors can be affected by.
Organophosphate There are over 36 different organophosphates in thousands of products in the US. Acute cases are not seen in live birds as these birds die immediately, typically by the hundreds. Chronic cases will be seen. Symptoms of this are the typical "sick bird," green mutes, twisted neck, laying down, and seizures. Immediately treat with Atropine (0.02 mg/kg), toxiban, and supportive treatment. If there are seizures, treat with Valium.
Carbamate These act like organophosphates, although there is a better chance of survival as carbamate bonds are slowly reversible. Treat with Atropine (0.02 mg/kg) and supportive care.
Organochlorides These are rarely seen in the US as organochloride use is not permitted here. However as they are still produced here and there may be private amounts still in storage, this could be seen. Treatment is supportive, but rarely is effective.
Metaldehyde This is the ingredient found in slug and snail bait and is most common in household pets. Almost no treatment is effective and euthanasia should be considered.
Rodenticides Rarely seen except in the occasional Barn Owl. This is usually easy to diagnose due to the bleeding into the chest cavity. Poking a needle into the chest and watching for the blood to seep out is a sign of this type of poisoning. Treatment is to induce vomiting and treat with Vitamin K for 4 - 6

weeks. If the blood seepage into the chest cavity is extensive, pressure may need to be released. Treatment for the poison should go for at least 4 weeks to ensure it has fully treated the entire system.
Lead See above listing for Lead Poisoning.
Carbon Monoxide Carbon monoxide poisoning can occur when the bird is in an enclosed space where exhaust fumes can enter, such as the back of a truck. Rust or holes in the area allow exhaust fumes to enter the area. Birds are highly susceptible and readily die from even a small exhaust entry. If a bird is suspected to have been exposed, getting her into fresh, clean air immediately is key. Don't leave her in her hawk box outside, but perch her outside and away from vehicles. Birds also are sometimes set in a hawk box near the back of a car not realizing the exhaust is flooding the bird, possibly poisoning her. Other scenarios are sometimes with certain garage setups or other locations where an exhaust system puts out carbon monoxide that we otherwise would not notice.
Teflon Teflon is in many homes and kitchens, but needs to be monitored by those with birds or raptors. Brand new pans with a new Teflon coating emit a gas when first heated, and Teflon coated pans emit this chemical when heated to around 450° which the birds then breathe in. This chemical doesn't do anything to us or many of our pets, but birds of all kinds are highly susceptible to this. Bird owners have accidentally left a Teflon pan on the stove on high only to later find their birds dead. If you are using a new Teflon pan, consider ventilating the area and removing the bird from the area.

Poultry Ticks Argasidae or soft ticks
These external parasites are quite tiny appearing just to be specks and can be difficult to see without magnification. Birds can be dusted with poultry dust, or any 0.25% Permethrin or other poultry preparation. Within an hour these tiny ticks will come crawling out, so treat in an area away from unaffected animals. These are also very difficult to get rid of once they infect an individual or a site. Birds can be treated internally as well with a 0.02% Ivermectin preparation. If left untreated, this will kill a bird.

Pox (also called Avian Pox)
This slow spreading viral disease is easily transmitted through a number of vectors including contact with infected individuals, ingestion of infected individuals, and even contact with surfaces that infected individuals touched - it can be spread more quickly between individuals by mosquitoes. Be very careful if an infected bird has touched a mews, perch, or glove as these will need to be disinfected before another bird can touch them. The most common form causes warty bumps to appear on the cere, legs, mouth, and even around the eyes and the upper respiratory system. Eventually these growths will cause difficulty breathing or seeing. The three common strains which have been identified are fowl pox, pigeon pox, and canary pox.
Pox must be treated topically and a diluted mixture of Betadine is considered effective along with antibiotics for any secondary infections. Soaking or swabbing the affected areas with a cotton ball or

Q-tip soaked in the solution and then dressing the area with an antibiotic balm such as Neosporin is an effective treatment for mild cases. More serious cases may require Betadine soaks, vigorous scrubs, and oral Clindamycin as well as pain and anti-inflammatory medication. A healthy diet and stress reduction are also necessary. More extensive cases may necessitate treatment by curette or cauterization, and are now being treated with laser surgery which has reduced recovery time significantly.

Rickets

Primarily seen in young birds who are still building bone mass, this is caused by a deficiency in Vitamin D, Calcium, or Phosphorous. In breeders it will cause poor quality egg shells. Young birds with rickets walk with stiff legs, are slow to grow and have enlargements at the ends of long bones. Eventually they will develop bent or broken bones, seizures, heart disorders, and tetany. The worst cases end in paralysis and death. A low calcium, high Phosphorous diet that lacks proper amounts of Vitamin D creates a state known as Hypervitiminosis D. Since birds can synthesize Vitamin D from sunlight and various precursors, birds with proper amounts of sunlight are far less likely to be as sensitive to the diet. Birds who do not receive the proper amount of sunlight will be more sensitive to not receiving the proper balanced diet. The stress here is balanced. A diet that is too high in Vitamin D will cause calcification of the organs.

Round worms or Ascarids

Roundworms are a parasitic infestation of the digestive system by a nematode, *Ascarida galli*. Typical signs of this disease are diarrhea, weight loss, and sometimes foul smelling mutes. There are many ways that a bird can get roundworms, and most birds in the wild have at least a low level infestation. If you are out hunting with your bird the chances are that it is exposed to these, either through rabbits or birds it is catching. After you trap and after you have ended the hunting season, it's a good idea to get to your vet for a check-up and have a fecal done to ensure your bird is not carrying worms. These are easily treated, and can cause a lot of problems from general condition and malaise at hunting to delaying a moult. The worms are sometimes found in the bird's mutes or castings. If reviewing your own fecal slides, this can be mistaken for Coccidia. Note that these are much bigger than Coccidia.

A roundworm in a mute and in a casting

Roundworms are treated with Ivermectin, Panacur, Piperazinel, Piperazine, Thiabendazole, levamasole, or Nemex.

Seizures
Seizures are an affliction of the nervous system, although the initial cause may be from other sources such as metabolism. Seizures are best dealt with by placing the bird in a cool, dark place and quickly getting them to a vet.

Sinusitis
This is a bacterial infection of the sinuses. It is most often diagnosed when the skin in front of the eye moves in and out as the bird breathes. In extreme cases the sinus can be nearly completely blocked with swelling of the orbital sinuses. The bird will have wheezing coming from the nares in this case. Typically treated with saline flushes of the sinus cavity and antibiotics.

Sour crop (also known as Crop Stasis)
Sour crop is a bacterial infection of the digestive system. A bird does not put over a crop into her stomach in a timely manner. The food that remains in the crop is warm and not treated with the stomach acids, so as it sits there the bacteria grows. The bacteria may be salmonella, in which case the bacterial growth can be very difficult to manage.
It can be caused by overfeeding, dehydration, improper feeding methods, rotten food, parasitic infections, ingestion of petroleum products, crop burns, crop lacerations, and even high temperatures or bright lights. It is marked by regurgitation of the crop contents, foul smelling breath or castings, loss of appetite, but increase in thirst. Birds that have not regurgitated their crop contents will need help to very carefully remove the contents and rinse the crop. It is essential to start sour crop treatment with removing all the matter that is breeding bacteria. Often falconers report that they left food on the counter all day to defrost, then noticed the bird develop sour crop. It is much preferred to defrost food quickly in warm water serving it as soon as it is defrosted. This warms the food, defrosts it quickly so that bacteria do not multiply as much, and replaces some of the water lost when the food was frozen helping to keep the bird hydrated.
Birds that are sick, weak, or stressed are less likely to be able to handle an over-full crop and therefore more likely to develop sour crop.
Mild sour crop can be treated with Pedialyte directly into the crop and a small amount of Pepto Bismal or Kaopectate. Any hydrating fluid will help hydrate the material in the crop and encourage her to throw it up flushing the crop out. If there is no improvement within 8 hours, a veterinarian is required. This is an emergency requiring veterinary assistance. Treatment routine may include emptying the crop, flushing with sterile water, and treatment with an antibiotic such as 50 - 60 mg of Amoxicillin twice a day for several days. Birds need to be kept warm, dry, and calm to fight off the bacterial infection. Full recovery may take a couple weeks. Watching her mutes throughout will let you track the

progress of her GI tract recovery.

Stargazing (sometimes called Twirling or Ataxia)
Stargazing is an affliction of the nervous system, particularly inflammation of the brain, stemming from nutritional deficiencies (primarily Vitamin B1 or D3), metabolic problems, or poor management. The nutritional deficiencies themselves may be stemming from another disease or affliction or may be due to the particular diet the bird is eating. Typically the muscles to the sides of the neck will be contracting causing a twitching and twisting if they contract singly, or pulling the head directly back pointing the beak to the sky if they contract together.
Stargazing's effects can be reversed with sunlight and Vitamin B1 (thiamine) and a whole food diet with proper supplements, although if another disease is causing the bird to not create or process vitamins, then that must be identified. Frequently a poor diet consisting solely of fish or organ meats will cause this. Birds fed fish must be considered for thiamine supplements, especially if the fish is not absolutely fresh. Thiamine deficiency, lack of B1 in the diet, can also come from only feeding muscle meat. This will also tend to present a bird with floppy feet and seizures. Valium can be used to treat the seizures, and thiamine can be given IM.
Similar symptoms to Stargazing will be seen in birds with head trauma. This is typically referred to as *Torticollis* where the bird displays the "upside-down" head posture with some amount of spasm or twitching. Some of these may be treatable, but others are irreversible effects of trauma.

Tapeworms
Tapeworms are a parasitic infestation of the digestive system. Symptoms include diarrhea, weight loss, and general malaise. If worms are seen in the mutes and they are moving, then they are more likely to be tapeworms. Roundworms are not usually alive when they pass through the bird. Tapeworm segments tend to stand straight up when they pass through appearing like tiny grains of rice or cucumber seeds in the mute. Tapeworms are typically treated with Yomesan, Droncit, hexachlorophene, or Butynorate.

Torticollis (sometimes called Wry Neck)
Torticollis is typically a symptom of another disease. It is an affliction of the nervous system stemming from a variety of problems including trauma to the head, heat stroke causing nerve damage, West Nile Virus, or a variety of other diseases and shows similar symptoms to Stargazing in that the head is held in an odd position. Unlike Stargazing, the head may be twisted forward and bent up as if looking forward, but upside-down. Other behaviors may include walking in circles instead of a straight line. The effects of Torticollis can be lessened with Metacam (meloxicam), vitamin B, and NSAIDs such as aspirin, although there are many irreversible forms of this.

Torticollis in a Coopers' Hawk - on the top is before treatment and on the bottom is after being treated with Metacam (meloxicam).

Tuberculosis

Avian tuberculosis is caused by *Mycobacterium avium*, which can infect people with suppressed immunities. The tuberculosis granulomas can infect the gastrointestinal tract, liver, or spleen and cause white plaques which may be visible on x-rays, otherwise the organ would have to be aspirated to detect. Other symptoms are elevated white blood cell count and increased liver enzymes. Avian TB can also create external lesions which appear similar to Avian Pox, but will not respond to the same treatment. Usually by the time external lesions are seen the damage to the internal organs is significant and symptoms are very apparent. Although this can be treated with Banacol, it is not highly successful.

Uropygial Gland Infection
While not common, the uropygial gland, or preen gland, can become infected sometimes seen with a cheesy substance coming out of it. This may come from a combination of long-term illness, lack of exposure to sunlight, lack of preening, and overall poor condition. Warm compresses, flushing it or expressing it daily, antibiotic ointment, and exposure to good sunlight will help clear up an infection, even within a week.

West Nile Virus
West Nile Virus is a disease spread by mosquitoes. Some falconers are able to screen in their mews thereby reducing the mosquito population that is able to get to their hawks. Others have vaccinated their hawks with the equine vaccine.
The symptoms of this disease are loss of interest in food, weight loss, listlessness, weakness, fever, sleeping and, in highly progressed cases, tremors or seizures. Also frequently seen are squinting (one or both eyes), head tilt, staggering, shuffling, inability to focus, nasal discharge, voice change (due to the paralysis setting in the throat), and spookiness. Absolute diagnosis is through a serology panel.
There is no one identified procedure for guaranteed recovery. General care is fluids, warmth, and good nutrition as well as non-steroidal anti-inflammatories such as Metacam, Meloxicam, Banamine, or Celebrex. Vitamin B1 is sometimes also given to help support the bird's immune system. Necropsy of kidney or brain tissues will confirm the virus.

Wingtip Edema
Also known as Dry Gangrene Syndrome. Normally seen in young (less than 2 years old) desert climate birds such as Harris' Hawks being tethered at flight weight in cold weather (not necessarily freezing). It is believed to be a circulatory disorder. Although exact causes are not known, there is a direct correlation with low weight, low amounts of exercise, and cold temperatures. There is also a theory that these desert birds are being over-hydrated through their food source and are not able to properly flush that amount of water from their system under these circumstances.
Most commonly seen in the UK, the birds display a significant swelling at the wing tip. Treatment is to warm the bird gently, encourage the bird to exercise the wings to encourage circulation, and a broad spectrum antibiotic.

Note: When using Aureomycin products to on your birds, you should skip any calcium supplements you have been giving.

In addition to this document, is highly suggested that a potential falconer study and know the State of Utah Falconry Rule, found here:

https://wildlife.utah.gov/rules-regulations/954-r657-20--falconry.html