ASSOCIATION OF ZOOS & AQUARIUMS

ANDEAN CONDOR
(*Vultur gryphus*)
CARE MANUAL

Andean Condor (*Vultur gryphus*) Care Manual

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Authors and Significant Contributors:

Michael Mace, San Diego Zoo's Wild Animal Park, Andean Condor SSP Coordinator
John Azua, Denver Zoological Gardens, Andean Condor SSP Treasurer
David Oehler, Cincinnati Zoo and Botanical Garden
Dr. Bruce Rideout, San Diego Zoo, Andean Condor SSP Pathology Advisor
Dr. Nadine Lamberski, Andean Condor SSP Veterinary Advisor
Dr. Michael Schlegel, Andean Condor SSP Nutrition Advisor
Mike Taylor, White Oak Conservation Center
Darcy Henthorn, Oklahoma City Zoological Park
Susie Kasielke, Los Angeles Zoo and Botanical Gardens, Andean Condor Studbook Keeper
Chriss Kmiecik**,** Cleveland Metroparks Zoo, Andean Condor SSP Education Advisor
Kim Caldwell, San Diego Zoo's Wild Animal Park
Colleen Lynch, Lincoln Park Zoological Gardens, Andean Condor SSP Population Advisor
Courtney Kelly, BREC's Baton Rouge Zoo

Reviewers:

Michael Mace, San Diego Zoo's Wild Animal Park, Andean Condor SSP Coordinator
John Azua, Denver Zoological Gardens, Andean Condor SSP Treasurer
Barbara Henry, MS, Cincinnati Zoo and Botanical Gardens, Nutrition Advisory Group Chair
Candice Dorsey Ph.D., AZA, Director, Animal Conservation
Debborah Colbert Ph.D., AZA, Vice President, Animal Conservation
Paul Boyle Ph.D., AZA, Senior Vice President, Conservation and Education

Andean Condor Care Manual Project Consultant:

Joseph C.E. Barber, Ph.D.

Cover Photo Credits: San Diego Zoo Global

AZA Staff Editors:

Candice Dorsey, Ph.D., Director, Animal Conservation
Debborah Colbert, Ph.D. Vice President, Animal Conservation
Lacey Byrnes, B.S., ACM Intern

Disclaimer: This manual presents a compilation of knowledge provided by recognized animal experts based on the current science, practice, and technology of animal management. The manual assembles basic requirements, best practices, and animal care recommendations to maximize capacity for excellence in animal care and welfare. The manual should be considered a work in progress, since practices continue to evolve through advances in scientific knowledge. The use of information within this manual should be in accordance with all local, state, and federal laws and regulations concerning the care of animals. While some government laws and regulations may be referenced in this manual, these are not all-inclusive nor is this manual intended to serve as an evaluation tool for those agencies. The recommendations included are not meant to be exclusive management approaches, diets, medical treatments, or procedures, and may require adaptation to meet the specific needs of individual animals and particular circumstances in each institution. Commercial entities and media identified are not necessarily endorsed by AZA. The statements presented throughout the body of the manual do not represent AZA standards of care unless specifically identified as such in clearly marked sidebar boxes.

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Introduction

Preamble

AZA accreditation standards, relevant to the topics discussed in this manual, are highlighted in boxes such as this throughout the document (Appendix A).

AZA accreditation standards are continuously being raised or added. Staff from AZA-accredited institutions are required to know and comply with all AZA accreditation standards, including those most recently listed on the AZA website (http://www.aza.org) which might not be included in this manual.

Taxonomic Classification

Table 1: Taxonomic classification for Andean condors

Classification	Taxonomy
Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Falconiformes
Sub-order	Cathartiae
Family	Cathartidae

Genus, Species, and Status

Table 2: Genus and species information for Andean condors

Genus	Species	Common Name	USA Status	IUCN Status	AZA Status
Vultur	*Gryphus*	Andean condor Argentinean condor Bolivian condor Chilean condor Columbian condor Ecuadorian condor Peruvian condor	Endangered	Endangered	Species Survival Plan®

General Information

The information contained within this Animal Care Manual (ACM) provides a compilation of animal care and management knowledge that has been gained from recognized species experts, including AZA Taxon Advisory Groups (TAGs), Species Survival Plan® (SSP) Programs, biologists, veterinarians, nutritionists, reproduction physiologists, behaviorists, keepers and researchers. They are based on the most current science, practices, and technologies used in animal care and management and are valuable resources that enhance animal welfare by providing information about the basic requirements needed and best practices known for caring for *ex situ* Andean condor populations. This ACM is considered a living document that is updated as new information becomes available and at a minimum of every five years.

Information presented is intended solely for the education and training of zoo and aquarium personnel at AZA-accredited institutions. Recommendations included in the ACM are not exclusive management approaches, diets, medical treatments, or procedures, and may require adaptation to meet the specific needs of individual animals and particular circumstances in each institution. Statements presented throughout the body of the manuals do not represent specific AZA accreditation standards of care unless specifically identified as such in clearly marked sidebar boxes. AZA-accredited institutions which care for Andean condor must comply with all relevant local, state, federal and international wildlife laws and regulations; AZA accreditation standards that are more stringent than these laws and regulations must be met (AZA Accreditation Standard 1.1.1).

AZA Accreditation Standard

(1.1.1) The institution must comply with all relevant local, state, and federal wildlife laws and regulations. It is understood that, in some cases, AZA accreditation standards are more stringent than existing laws and regulations. In these cases the AZA standard must be met.

Andean condors are the only new world vulture to show sexual dimorphism, with males exhibiting a fleshy comb and neck wattles (Bercovitz & Sarver 1988). Males weigh between 11– 15kg (24– 33 lb) and females weigh 8– 11kg (17- 24 lb). Their wingspan measures up to 320 cm (126 in) (Del Hoya et al. 1994).

The ultimate goal of this ACM is to facilitate excellent Andean condor management and care, which will ensure superior Andean condor welfare at AZA-accredited institutions. Ultimately, success in our Andean condor management and care will allow AZA-accredited institutions to contribute to Andean condor conservation, and ensure that Andean condors are in our future for generations to come.

The Andean condor (*Vultur gryphus*) was described by Linnaeus in 1758. The species has a significant range in South America from Colombia and Venezuela to the Strait of Magellan and Tierra del Fuego (Peters 1979). The species was first listed by CITES as endangered on July 1, 1975. Andean condors are listed as endangered under IUCN, CITES and USFWS regulating agencies. They are exceedingly rare in the northern ranges of South America, and are most frequently sighted in Colombia, Venezuela, Peru, Chile and Argentina. The condor is still subject to persecution by poisoning and gunshot over most of its home range. It has been historically difficult to monitor the population in the wild (Amadon 1977).

The Andean condor zoo population has been designated as a Species Survival Plan® (SSP) Program by the AZA Raptor Taxon Advisory Group (TAG), and a target population size has been set at 80 (Raptor TAG Regional Collection Plan 2009). The current population is 75 specimens distributed among 37 AZA institutions. The AZA Andean Condor SSP's goals for the population (SSP Master Plan April 2007) include the maintenance of a sustainable North American population, as well as providing condors to range countries for reintroduction into the wild. In addition, efforts have also included international collaboration with zoological institutions in South America. Comprehensive genetic and demographic analyses of the North American Regional Andean Condor Studbook (current to 1 Dec 2006) were performed in January 2007, resulting in the current SSP Master Plan for this species (Mace et al. 2007).

Chapter 1. Ambient Environment

1.1 Temperature and Humidity

Animal collections within AZA accredited institutions must be protected from weather detrimental to their health (AZA Accreditation Standard 1.5.7). Andean condor adults have been housed and or exhibited in temperatures that have ranged from-27 to 47 °C (-17° to 116 °F). This species appears to be tolerant of these temperature fluctuations. However, these represent extreme ranges, and Andean condors should have access to areas within their enclosures that are either cooler or warmer so that they have the opportunity to thermoregulate effectively during the day. This species has been historically housed or exhibited in facilities that have ambient temperatures that fall within the range of -27 to 37 °C(-17° to 98° F) without behavioral or physical health complications.

AZA Accreditation Standard

(1.5.7) The animal collection must be protected from weather detrimental to their health.

Humidity: Humidity levels have not been noted within the zoological management of Andean condors as being problematic at any specific levels. *Ex situ* management of condors has shown that overheating may occur while providing neonatal care or during capture and restraint, with hyperthermia being reduced through the use of a misting system with a water sprayer.

Climate Control Systems: AZA institutions with exhibits which rely on climate control must have critical life-support systems for the animal collection and emergency backup systems available, while all mechanical equipment should be included in a documented preventative maintenance program. Special equipment should be maintained under a maintenance agreement or records should indicate that staff members are trained to conduct specified maintenance (AZA Accreditation Standard 10.2.1).

AZA Accreditation Standard

(10.2.1) Critical life-support systems for the animal collection, including but not limited to plumbing, heating, cooling, aeration, and filtration, must be equipped with a warning mechanism, and emergency backup systems must be available. All mechanical equipment should be under a preventative maintenance program as evidenced through a record-keeping system. Special equipment should be maintained under a maintenance agreement, or a training record should show that staff members are trained for specified maintenance of special equipment.

1.2 Light

Careful consideration should be given to the spectral, intensity, and duration of light needs for Andean condors in the care of AZA-accredited zoos and aquariums. Andean condors should be housed in conditions where they have access to a natural light source and within a normal photoperiod for the holding institution. An exception to this recommendation would be in temporary situations where birds are housed indoors for medical purposes, the 30-day quarantine period, or during other temporary housing situations.

Photoperiod is the principal environmental cue used to time various life history stages, e.g. breeding and molt. These circannual rhythms are mainly controlled by the seasonal changes in photoperiods. Day length effects both gonadal development and molt through the release of hypophysial hormones. Courtship displays have been seen throughout the year near the equator. To the far south nesting occurs from May through August. Egg-laying is generally February-June in Peru and September-October in Chile, and their season may be about April-December in Colombia.

Vultures show well developed sunning behavior, stretching out their wings in relationship to the position of the sun, particularly in the early morning. Cathartid vultures display this behavior to a higher degree than most birds, perhaps to raise their core body temperature back to normal daytime levels and to use the heat from the sun to relax the keratin in the feathers so each feather can relax back to a proper shape after being warped during long flights. Access to preferred roosting areas with ample sunlight may create competition and social structure within groups of condors at a roost. Contact with sunlight is recommended since UVB radiation may produce beneficial skeletal effects in Calcium and vitamin D-deficiencies in neonates.

Roosting areas for outdoor enclosures should be strategically placed to provide condors with access to early and late sun for sunning. Multiple sites will eliminate competition for prime sunning areas. Indoor facilities should use UV-transmitting skylights and/or high frequency fluorescent lighting, to provide UV spectrum and reduced perceived flickering.

Natural photoperiods within U.S. and European facilities, for outdoor enclosures, appear to be sufficient stimuli for periods of full gonadal maturation and subsequent regressions required for breeding and molt, although timing of egg production does vary along latitudinal changes. Artificial manipulation of photoperiods should be used for indoor enclosures, for temporary housing during quarantine or medical purposes, to ensure full progression of all circannual rhythms. Minimal light intensity of 500 lux, for safety within enclosures is similar to that required for human activities and is sufficient to register changes in changing day length.

1.3 Water and Air Quality

AZA-accredited institutions must have a regular program of monitoring water quality for collections of aquatic animals and a written record must document long-term water quality results and chemical additions (AZA Accreditation Standard 1.5.9). Monitoring selected water quality parameters provides confirmation of the correct operation of filtration and disinfection of the water supply available for the collection. Additionally, high quality water enhances animal health programs instituted for aquatic collections.

> **AZA Accreditation Standard**
>
> **(1.5.9)** The institution must have a regular program of monitoring water quality for collections of fish, pinnipeds, cetaceans, and other aquatic animals. A written record must be maintained to document long-term water quality results and chemical additions.

Cathartid vultures in the wild may be capable of going two weeks without food or water and appear to be quite unharmed. Although Andean condors may have the ability to survive extended periods without water, all enclosures should contain a bathing pool or container with a diameter sufficient to allow access for intake of water and for normal bathing activities. All pools should have a non-slip, cleanable surface devoid of sharp edges. Pools should be kept filled with clean fresh water, and the recommended depth should be equal to the length of the bird's legs. Condors also have been observed to bath in pools deep enough to cover their backs.

The size of indoor enclosures and the number of housed specimens should be evaluated to determine the effectiveness of ventilation systems and air quality. Sufficient airflow should be provided to reduce humidity levels and remove the build-up of noxious gases, which may create a predisposition to respiratory diseases.

1.4 Sound and Vibration

Consideration should be given to controlling sounds and vibrations that can be heard by animals in the care of AZA accredited zoos and aquariums. At this time, it is unknown what the tolerances are for sound and vibration, however, as with any wildlife, those disturbances should be kept to a minimum. More research is needed on the effects of sound and vibration on Andean condors.

Chapter 2. Habitat Design and Containment

2.1 Space and Complexity

Careful consideration should be given to exhibit design so that all areas meet the physical, social, behavioral and psychological needs of Andean condors. Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs (Bitgood, Patterson, & Benefield 1988) (AZA Accreditation Standard 1.5.2).

AZA Accreditation Standard

(1.5.2) Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single specimens should be avoided unless biologically correct for the species involved.

Enclosure Design: North American zoos and aquariums have exhibited Andean condors in a variety of exhibit types. Based on AZA Andean Condor SSP space surveys, the average enclosure size for birds housed in North American institutions is 1744 m^3 (61,591 ft^3). The average height of enclosures is 7.6 m (25 ft), with the tallest enclosure having a recorded height of 30.5 m (100 ft). The length and width of exhibits is generally quite variable, but the average length is 16.5 m (54 ft), with the longest enclosure measured at 30.5 m (100 ft), and the average width is 11 m (36 ft), with the widest exhibit being 24.4 m (80 ft).

Artificial rock work is typically incorporated in the designs of many Andean condor enclosures, and can serve several purposes, such as providing perching, nesting, and display sites for the birds. Large cut tree limbs also are commonly used for exhibit perching and display locations, and may be additionally beneficial by promoting foot care. Exhibit landscaping can include live mature trees and shrubs, and a natural floor substrate with dirt or grass. Natural substrates are preferred for this species to ensure foot health. Nesting can be accomplished in natural looking cave(s) in artificial rockwork or an adjacent nestbox (see Figures 1 and 2). The substrate used in nest boxes or caves should be small and granular in nature (e.g., sand, decomposed granite, soil). See Chapter 7, sections 7.3 and 7.4 for additional information on nesting recommendations. Adding a water feature to condor enclosures helps to increase the complexity of the space. Water features that are commonly used include concrete pools approximately 2.4 m (8 ft) in diameter, and between 30.5-45.7 cm (12-18 in) deep. At some institutions, pools within Andean condor enclosures include a running water stream feature. There is no need to drain enclosure water features for this species during nesting and chick rearing because chicks are quite large when they fledge at about two months of age. The water feature, pool or stream should have a valve for draining water and the control of the valve and the fill water control should be outside of the exhibit for better keeper safety and easy access.

Figure 1. Example of condor exhibit rockwork and cave nesting. There is sand substrate in the cave.
Photo credit: John Azua

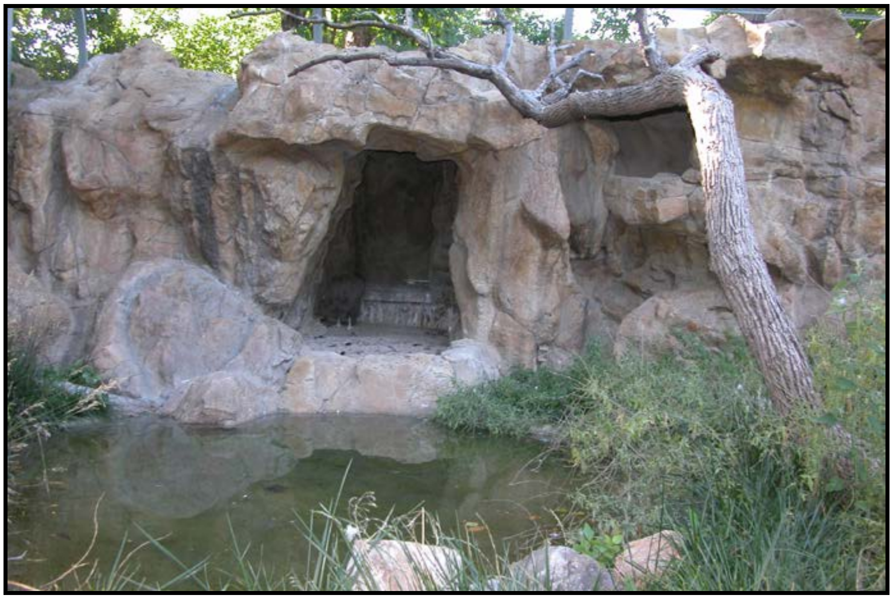

Figure 2. Example of exhibit rockwork, associated perching and water feature.
Photo credit: John Azua

Future building recommendations: The AZA Andean Condor SSP recommends that any future Andean condor enclosures or modifications meet or exceed the average enclosure dimensions described above (16.5 m x 11 m x 7.6 m / 54 ft x 36 ft x 25 ft), and calculated using data collected in the 2007-08 AZA Andean Condor SSP exhibit survey. Certain exhibit elements are necessary for various condor behaviors and successful reproduction. Andean condor habitat throughout their native South American range consists of large patches of paramos, treeless alpine plateaus within the Andes mountain range that include steep cliffs and rocky ledges. Zoological enclosures should consist of elevated structures made of a variety of materials, such as plywood housing, artificial rockwork, natural rocks, telephone poles, natural tree deadfall and other similar items. Large artificial or natural rockwork is preferred in exhibits because it depicts natural South American habitat and aids in educational messaging.

The requested height of 7.6 m (25 ft) for condor exhibits will nicely allow the inclusion of sizeable and expansive rockwork for birds to perform courtship displays such as walking back and forth with outstretched wings and making hissing and clucking sounds. In addition, Andean Condors will spread their wings in the morning and throughout the day to aid them in thermoregulation and flight feather maintenance (Donazar & Feijoo 2002)

Natural and artificial dead fall tree trunks or limbs can be used in public and off exhibit enclosures. Perching with large limbs that are elevated should be adequately supported with stout wire, cable or welded sleeves attached to the exhibit macrostructure, possibly in tandem with secondary cable. Such exhibit items can also be used for breeding and non-breeding behaviors. There should be double door access in exhibits (along with man gates for daily servicing) measuring eight feet or more to accommodate machinery that will aid in changing out wood deadfall, substrate, perch replacement, etc. In off exhibit facilities, or when trying to have economical savings, old telephone poles can be used as perching or partially buried dead fall.

Holding Enclosures: The same careful consideration regarding exhibit size and complexity and its relationship to the animal's overall well-being must be given to the design and size of all enclosures, including those used in exhibits, holding areas, hospital, and quarantine/isolation (AZA Accreditation Standard 10.3.3).

An off-exhibit holding enclosure (see Figure 3) is highly recommended for all Andean condor facilities, as this allows the birds to be shifted off exhibit, and provides animal caretakers with safe access to the exhibit. The size and configuration of holding

AZA Accreditation Standard

(10.3.3) All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.

enclosures can be variable, depending on the intended use of the enclosures, but should include two or more separable pens to allow for the separation of condors off exhibit. If the condors are aggressive to people, the shift area can be used to hold birds before caretakers enter the primary enclosure.

Figure 3. Example of condor holding enclosure
Photo credit: John Azua

Enclosure Cleaning: Cleaning of enclosures and watercourses may be inhibited by nesting activity of breeding pairs. A modified cleaning schedule during certain periods may include postponing normal cleaning routines that may be extended to once or twice a week to avoid disturbance of breeding pairs and placing keeper staff in challenging situations.

2.2 Safety and Containment

Animal exhibits and holding areas in all AZA-accredited institutions must be secured to prevent unintentional animal egress (AZA Accreditation Standard 11.3.1). Exhibit design should be considered carefully to ensure that all areas are secure and particular attention should be given to shift doors, gates, keeper access doors, locking mechanisms, and exhibit barrier dimensions and construction.

> **AZA Accreditation Standard**
>
> **(11.3.1)** All animal exhibits and holding areas must be secured to prevent unintentional animal egress.

Traditionally, standard 5 cm (2 in) chain link has been used for Andean condor enclosure walls and roofs, but welded wire (~12-14 gauge) at approximately 5 cm x 10.2 cm (2 in x 4 in) size has also been used. Either type of exhibit mesh is acceptable for containment in Andean condor exhibits. It is common practice for condors to have 24 hour access to their public exhibits. Harp wire has been used as a containment barrier for enhanced public viewing, but tightness should be checked often to maintain integrity. In general, the AZA Andean Condor SSP does not recommend the use of harp wire in Andean condor exhibits due to birds' 24 hour access and the possibility of them getting entangled during unsupervised periods. Condors have very muscular necks and can manipulate their beaks into somewhat small places such as harp wire or welded mesh. Locks that do not allow the key to be removed while in the open position should be used on all keeper access, service and animal transfer doors. There should be an ample buffer area around public condor exhibits to prevent contact with the public and condors that may lead to human or condor injuries.

Public Barriers: Exhibits in which the visiting public may have contact with animals must have a guardrail/barrier that separates the two (AZA Accreditation Standard 11.3.3). There should be an ample buffer area (~1.2 m/4 ft or more) around public condor exhibits to prevent public contact with condors that may lead to human or condor injuries.

> **AZA Accreditation Standard**
>
> **(11.3.3)** Special attention must be given to free-ranging animals so that no undue threat is posed to the animal collection, free-ranging animals, or the visiting public. Animals maintained where they will be in contact with the visiting public must be carefully selected, monitored, and treated humanely at all times.

Emergency Protocols: All emergency safety procedures must be clearly written, provided to appropriate staff and volunteers, and readily available for reference in the event of an actual emergency (AZA Accreditation Standard 11.2.3).

In regions of North America that experience severe weather events, such as, hurricanes, floods, fire, etc. an emergency response plan (ERP) should be developed and re-examined on a regular basis (yearly is recommended). The ERP should explain animal handling recommendations and hierarchy of decision making and contact information for all applicable personnel (phone tree). An alternative holding location should be identified for short-term emergency movement of condors. The placement of portable extra large airline kennels (as stated in Chapter 3), handling gloves and large capture nets near condor exhibits can aid in the prompt transfer of birds in emergency (and non-emergency) situations.

Staff training for emergencies must be undertaken and records of such training maintained. Security personnel must be trained to handle all emergencies in full accordance with the policies and procedures of the institution and in some cases, may be in charge of the respective emergency (AZA Accreditation Standard 11.6.2).

Emergency drills: Emergency drills should be conducted at least once annually for each basic type of emergency to ensure all staff is aware of emergency procedures and to identify potential problematic areas that may require adjustment. These drills should be recorded and evaluated to ensure that procedures are being followed, that staff training is effective and that what is learned is used to correct and/or improve the emergency procedures. Records of these drills should be maintained and improvements in the procedures duly noted whenever such are identified. AZA-accredited institutions must have a communication system that can be quickly accessed in case of an emergency (AZA Accreditation Standard 11.2.4).

AZA-accredited institutions must also ensure that written protocols define how and when local police or other emergency agencies are contacted and specify response times to emergencies (AZA Accreditation Standard 11.2.5)

AZA-accredited institutions which care for potentially dangerous animals must have appropriate safety procedures in place to prevent attacks and injuries by these animals (AZA Accreditation Standard 11.5.3). Animal attack emergency response procedures must be defined and personnel must be trained for these protocols (AZA Accreditation Standard 11.5.3).

Andean condors can be very curious and aggressive to animal care staff. The use of off-exhibit holding enclosures should be used to eliminate the risk of condors harming staff.

Animal attack emergency drills should be conducted at least once annually to ensure that the institution's staff know their duties and responsibilities and know how to handle emergencies properly when they occur. All drills need to be recorded and evaluated to ensure that procedures are being followed, that staff training is effective, and that what is learned is used to correct and/or improve the emergency procedures. Records of these

AZA Accreditation Standard

(11.2.3) All emergency procedures must be written and provided to staff and, where appropriate, to volunteers. Appropriate emergency procedures must be readily available for reference in the event of an actual emergency. These procedures should deal with four basic types of emergencies: fire, weather/environment; injury to staff or a visitor; animal escape.

AZA Accreditation Standard

(11.6.2) Security personnel, whether staff of the institution, or a provided and/or contracted service, must be trained to handle all emergencies in full accordance with the policies and procedures of the institution. In some cases, it is recognized that Security personnel may be in charge of the respective emergency (i.e., shooting teams).

AZA Accreditation Standard

(11.2.4) The institution must have a communication system that can be quickly accessed in case of an emergency.

AZA Accreditation Standard

(11.2.5) A written protocol should be developed involving local police or other emergency agencies and include response times to emergencies.

AZA Accreditation Standard

(11.5.3) Institutions maintaining potentially dangerous animals (sharks, whales, tigers, bears, etc.) must have appropriate safety procedures in place to prevent attacks and injuries by these animals. Appropriate response procedures must also be in place to deal with an attack resulting in an injury. These procedures must be practiced routinely per the emergency drill requirements contained in these standards. Whenever injuries result from these incidents, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident.

drills must be maintained and improvements in the procedures duly noted whenever such are identified (AZA Accreditation Standard 11.5.3).

If an animal attack occurs and injuries result from the incident, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident (AZA Accreditation Standard 11.5.3). In the unfortunate situation that a staff member is harmed condors should be secured in an appropriate enclosure or transfer crate and injured staff member(s) should report injury to their immediate supervisor in accordance with their zoo's policies.

Chapter 3. Transport

3.1 Preparations

Animal transportation must be conducted in a manner that adheres to all laws, is safe, and minimizes risk to the animal(s), employees, and general public (AZA Accreditation Standard 1.5.11). Planning and coordination for Andean condor transport requires good communication among all affected parties, plans for a variety of emergencies and contingencies that may arise, and timely execution of the transport. At no time should the condors(s) or people be subjected to unnecessary risk or danger.

> **AZA Accreditation Standard**
>
> **(1.5.11)** Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to.

Transport Crate: All transporting containers for Andean condors should follow IATA guidelines and standards (IATA 2009). Andean condors are potentially destructive to their wings when confined within crates, and care should be taken to minimize all risks to the birds. Interior padding (that cannot be ingested) and large crates are recommended to minimize such damage.

Type of crate: The AZA Andean Condor SSP recommends using the Vari Kennel Extra Large 500 (101.6 cm x 68.6 cm x 76.2 cm/40 in x 27 in x 30 in). The Deluxe version of this crate should not be used. There are additional ventilation holes on the upper back side of the deluxe crate which are not protected by a metal grate.

Roof: Soft "non-destructible padding" attached to the roof of the crate is required by IATA regulations (IATA 2009). The material is heavy, and can make the crate dangerously top heavy. The padding should also be secured with bolts, which adds another hard surface to the inside of the crate that can be a potential health hazard. Persistent condors can eventually shred the padding, which is hazardous if ingested. It is suggested that the top of the crate be left as is, with no additional padding. However, this issue may need to be discussed with the airline to ensure that crates are not refused on the day of shipment. Figure 4 illustrates what the crate looks like on the inside and outside with the padding, which is thick rubber flooring cut to fit inside the top of the crate. The matting is easier to install prior to assembling the crate.

Figure 4. Outside and inside of a transport crate
Photo credit: San Diego Zoo Global

Assembling the crate: A sturdy wire (14 gauge) should be used to assemble the crate. On occasion, the nuts and bolts used in crate assembly have failed.

Ventilation and curtains: Curtains to minimize light and noise for Andean condors during shipment are strongly recommended. The following protocol provides instructions for adding a suitable visual barrier without restricting ventilation.

1. A 2.5 cm (1 in) hole saw should be used to cut holes 5 cm (2 in) apart along the lower portion of the crate (Figure 5).
2. A strip of 0.6 cm (¼ in) welded wire should be duct-taped to cover the ventilation holes at the lower portion of the crate and the two upper slits.
3. A front door curtain, two upper slit curtains, and three lower ventilation curtains should be fabricated. A dark fabric and a light fabric should be used, and should be cut so that they are larger than the area they are covering (Figure 5). The light and dark pieces should be attached together using duct tape. When the fabric is attached to the crate, the white side should be facing

out, as this helps to reduce the shadows visible to the birds. Duct tape should be used to attach them to the crate. Once the crate is completed, it should be stored in an enclosed, temperature-controlled area so the curtains remain attached to the crate.

Figure 5. Ventilation holes, curtains, and bottom grate of transport crate.
Photo credit: San Diego Zoo Global

Door: A hole for securing the door should be drilled in the bend near the door handle. A piece of wire about 15.2 cm (6 in) long should be cut and duct taped to the top of the crate. After the bird is loaded, the door should be secured with the wire.

Floor: A 5 cm x 5 cm (2 in x 2 in) 10 gauge PVC coated welded wire (green) can be used to make a grate for the bottom of the crate (Figure 5). The wire can be purchased from McNichols (telephone 1-800-237-3820).

1. The wire described above should be cut into a piece 12 squares wide with bolt cutters. The wire will already be the correct length.
2. The four corners should be snipped out, and the four sides should be bent down. The wire can be placed on the edge of the table and the sides bent down using a rubber mallet.
3. The fit of the grate should be checked in the crate before installing the water bowl (see below), as it will be easier to make adjustments at this time, if needed.

Food and water containers: A sturdy stainless steel bowl should be provided for water during transport, and it will be necessary to develop a method for refilling the bowl (e.g., using a long funnel). It is not necessary to add a food container into the design of crates used to ship Andean condors. To construct a stable water container within the crate, the following protocol can be used (Figure 6):

1. A hole should be drilled in the middle of the stainless steel bowl.
2. The bowl should be attached to the grate with 2 washers, a bolt and nut, and a large metal washer. Non-toxic plumber's putty can be placed between the washers and the bowl to waterproof the bowl.
3. The bowl should be attached to the grate as shown in the photos above in the location as shown.

Figure 6. Water bowl construction.
Photo credit: San Diego Zoo Global

Labeling: 'Live Animal' labels with up arrows should be attached to the crate on at least three sides. As a substitute for red arrow and live animal stickers provided by the airline, red paint or pen can be used to draw arrows and to write LIVE ANIMAL on three sides of the crate. Contact information and telephone numbers for the sending and receiving institutions should be securely attached to the crate during shipment.

Transport Equipment: Safe animal transport requires the use of appropriate conveyance and equipment that is in good working order. Safe transport also requires the assignment of an adequate number of appropriately trained personnel (by institution or contractor) who are equipped and prepared to handle contingencies and/or emergencies that may occur in the course of transport. Due to the size and weight of a crated condor, usually two people are necessary to move the bird.

International Transport of Andean Condors: The required documents needed for the transport/export of Andean condors out of the United States are as follows:

- CITES Export Permit
- Receiving institution CITES Import Permit (copy)
- USFWS Form 3-177 (can be downloaded from www.le.fws.gov/3-177-1.pdf)
- International Health Certificates – USDA and Country of Destination
- Commercial Invoice
- Shipper's Letter of Instruction
- Guarantee of Cost of Transportation
- IATA Guarantee
- Animal Data Transfer Form
- Diet Sheet
- Specimen Report

Exports for release programs in South America should be shipped via Miami, which is the U.S. Fish and Wildlife Service's designated port for these types of animal exports. Flights from Miami should go directly to the country of destination if possible.

The services of an import/export broker should be secured well in advance of any Andean condor shipment. The broker may book flights out of the U.S., and will electronically file the completed USFWS Form 3-177 and set inspection appointments with U.S. Fish and Wildlife Service. The following forms are required to be faxed or emailed to the broker and airline at least 48 hours prior to the date of shipment:

- CITES Export Permit
- USFWS Form 3-177
- International Health Certificates
- Commercial (Pro forma) Invoice

3.2 Transport Protocols

Transport protocols should be well defined and clear to all animal care staff. The transport equipment used is required to provide for the adequate containment, life support, comfort, temperature control, food/water, and safety of the animal(s). Each condor is required to be shipped in an individual container.

Food and Water: The provision of food and water to Andean condors during transport is required to adhere to IATA standards and guidelines (IATA 2009).

Bedding and Substrate: The provision of a wire floor is used during transport for long distances to decrease exposure to feces and is required to adhere to IATA standards and guidelines (IATA 2009).

Temperature, Light, and Sound: Each airline carrier has specific parameters with regard to accepting an Andean condor for transport. There are situations whereas a letter of acclimation to transport a condor outside of approved temperature ranges is negotiable with the airline carrier. This letter is required to be submitted by the exporting facility's veterinarian, and will need to be approved by the carrier in advance of the shipment.

Approaches to address light and noise stimuli should be based on IATA guidelines and standards (IATA 2009). The use of a visual barrier to minimize light and sound stimuli is described in section 3.1.

Animal Monitoring: Generally, airlines do not allow access to Andean condors during flights due to security concerns. However, in special circumstances zoos and aquariums can make arrangements with the appropriate authorities to inspect the condition of the condor during the shipment. Clearance for this activity will need to be arranged well in advance.

The shipping route for Andean condors should minimize the time that the bird is housed in the shipping container. On very rare occasions, condors have been kept in crates for 60 hours. This is not a standard practice, nor is it recommended. It is suggested the exterior noises be minimized in the transporting process.

Post-transport Release: Condors should be released into the holding facility or enclosure as soon as possible after reaching their destination.

For overland transportation condors are usually accessible to monitor their condition. However, there may be extended periods of time where condors are not accessible to monitor due to TSA security policies. Where possible, arrangements should be made to monitor condors in transport. A briefing should take place prior to the initiation of a capture to ensure that all persons involved understand and are prepared for their role in the process. Proper training is essential to reduce the risks inherent to any capture and subsequent transport.

Whenever possible, condors should be shifted into small pens prior to capture. In an ideal situation, the birds would be fed on a routine basis in a shift pen so that they are used to entering the area on a daily basis. An adequate number of trained personnel (based on the size of the pen) should then capture the bird with the use of nets. The nets used should be made of mesh with a tight weave so as to safely contain the head and to reduce the amount of tangling of the nails and feet. Care should be taken to quickly control the bird's head by grasping the back of the neck at the base of the skull. Once the bird's head is under control, the remainder of the bird can be removed from the net, and the bird can be placed in the carrier.

Chicks and young birds can be safely captured by tossing a large towel over them. Care should be taken to quickly control the head of larger youngsters to prevent injury to the handler.

Chapter 4. Social Environment

4.1 Group Structure and Size

Careful consideration should be given to ensure that animal group structures and sizes for Andean condors meet the social, physical, and psychological well-being of the animals, and facilitate species-appropriate behaviors.

Andean condors have been observed to roost in large communal groups in the wild. Various studies have recorded approximately 30 pairs in a particular roosting area (Ozier 1986). The recommended social grouping for Andean condors in zoos and aquariums is pairs of birds (1.1, 2.2, 3.3, etc.), with the preferable minimum group size being a single male/female pair (1.1). Where multiple birds are housed together, there should be multiple roosting/nesting sites available, as older, more dominant animals will typically choose the most preferable roost sites. In Andean condors, dominance is determined primarily by age and gender, with older males being the most dominant within a group.

For breeding pairs of Andean condors, chicks can remain with the adults until the next breeding season. Chicks should be removed from their parents before courtship displays begin. If possible, immature condors should be housed in social groups of two or more individuals.

Education Animals: Individually-housed condors are usually used in conservation and education programs. In these situations the social needs of the animal will need to be addressed through the relationship between the trainer and the condor.

4.2 Influence of Others and Conspecifics

Condors can be housed next to other condor species, but care should be given considering aggression can occur between the barriers. See Chapter 2, section 2.2 for more information on appropriate containment barriers.

Mixed-species Enclosures: At this time, Andean condors are not appropriate animals to be placed in a mixed-species enclosure. Placing them with other bird species is not recommended at this time, as condors have been known to raid nests of nearby bird species for eggs and young in the wild. Andean condors also have a propensity for aggression, exhibiting the highest number of incidents during their display and breeding seasons.

4.3 Introductions and Reintroductions

Managed care for and reproduction of animals housed in AZA-accredited institutions are dynamic processes. Condors born in or moved between and within institutions require introduction and sometimes reintroductions to other animals. It is important that all introductions are conducted in a manner that is safe for all animals and humans involved.

Andean condors should be housed side-by-side before a physical introduction is attempted, whenever possible. A visual portal should be incorporated in at least one of the barriers in adjacent enclosures so that the condors can observe each other. The wire mesh should be small enough to prevent the birds from inflicting injuries on each other. After a few days, or even up to a few months, a physical introduction can be considered.

It is recommended for condor introductions to conduct a “soft introduction.” Adjacent enclosures or exhibits which allow for “soft introductions” are preferred methods. Birds should have visual contact through wire or fences for a period of time (~1-7 days) before they are introduced to one another. The ability to separate birds during the first stages of introduction (for example, during feeding times) can also reduce aggression during introductions.

“Hard” or “cold” introductions (putting birds together in the exhibit without some “howdying”) has worked in some institutions, but is not ideal. Indications that introductions are going well include the birds roosting and/or eating in close proximity. Indications that introductions are not going well include constant aggression.

Chapter 5. Nutrition

5.1 Nutritional Requirements

A formal nutrition program is recommended to meet the behavioral and nutritional needs of all animals (AZA Accreditation Standard 2.6.2). Diets should be developed using the recommendations of institutional veterinarians and nutritionists, the AZA Raptor TAG and Andean Condor SSP, and the AZA Nutrition Advisory Group (www.nagonline.net/feeding_guidelines.htm). Diet formulation criteria should address the animal's nutritional needs, feeding ecology, as well as individual and natural histories to ensure that species-specific feeding patterns and behaviors are stimulated.

> **AZA Accreditation Standard**
>
> **(2.6.2)** A formal nutrition program is recommended to meet the behavioral and nutritional needs of all species and specimens within the collection.

Feeding Strategies: Andean condors are carrion consuming birds, and have been observed to feed on carcasses of domestic animals (e.g., cattle and horses) in Columbia (McGahan 1972). In Peru, condors have been observed feeding on feral burros, goats, and dead sea lions and sea birds that have washed up on the shore (McGahan 1972). Wiggins (1945) documented condors feeding on a calf in Ecuador. Gailey and Bolwig (1973) cite information provided by Lint (1959) and Koford (1953) that describes condors hunting and killing their own prey in some situations. In addition to killing birds and marmots, wild condors may also prey upon llamas, alpacas, and sheep (Gailey & Bolwig 1973).

Klasing (1998) provides an overview of the unique aspects of carnivorous bird digestive physiology and anatomy that are relevant to Andean condors. The highlights are listed below:

- A hooked tip of the beak to aid in holding and ripping prey.
- Minimal feathers on head, minimizing contamination during consumption of entrails.
- A very expandable esophagus and distinct crops.
- A larger proventriculus and gizzard to accommodate large meals high in protein.
- The gizzards of many carnivorous birds lack distinct pairs of thin and thick muscle, and the gizzard functions to massage and mix the contents rather than grind them.
- Relatively small pancreas.
- Short small intestine.
- Vultures have relatively longer intestinal length than other Falconiformes.
- Carnivorous birds have extensive lymphatic cells and nodes in the epithelium of the ceca and rectum suggesting active immunosurveillance.
- Autoenzymatic digestion and a slow rate of passage to digest food efficiently.
- Consumption and partial digestion of bone is important to provide adequate calcium.

Nutritional Requirements: There are no established nutrient requirements for raptors or vultures that are applicable to Andean condors. A combination of the requirements of a strict carnivore (e.g., domestic cat) and large poultry (e.g., turkey) could be used as models to develop target nutrient ranges for Andean condors (see Table 4 for cat and poultry target nutrient levels).

5.2 Diets

The formulation, preparation, and delivery of all diets must be of a quality and quantity suitable to meet the animal's psychological and behavioral needs (AZA Accreditation Standard 2.6.3). Food should be purchased from reliable, sustainable and well-managed sources. The nutritional analysis of the food provided to Andean condors should be regularly tested and recorded.

> **AZA Accreditation Standard**
>
> **(2.6.3)** Animal diets must be of a quality and quantity suitable for each animal's nutritional and psychological needs. Diet formulations and records of analysis of appropriate feed items should be maintained and may be examined by the Visiting Committee. Animal food, especially seafood products, should be purchased from reliable sources that are sustainable and/or well managed.

Sample Diet: Two sample diets for Andean condors are listed below in Table 3. While both diets utilize similar food items, one includes the provision of beef spleen. Spleen is high in minerals and some water-soluble vitamins. Indeed, most of the minerals and vitamins found in prey items are found in the organs, and organ meat is essential for proper nutrition. It is important when whole prey items are fed to Andean condors that the carcass is not eviscerated or deboned. Similarly, consumption of bone by Andean condors is needed for proper calcium nutrition. The storage of frozen prey for extended periods of time (>6 months) can result in a reduction in vitamin E. (Bernard & Allen 2002) To account for this decrease, prey items may be supplemented with vitamin E at a rate of 100 IU/kg fresh weight prior to feeding (Bernard & Allen 2002). When fish makes up more than 25% of the diet dry matter, the fish should also be supplemented with 25-30 mg of thiamin per kg fresh weight to replace the thiamin that was lost due to thiaminase activity in the fish (Bernard and Allen, 2002).

Vitamin E deficiencies have produced a decrease in fertility and egg hatchability, skeletal muscle and myocardial degeneration, and steatitis in mature birds (Calle et al. 1989). In embryos and chicks, vitamin E deficiency can produce encephalomalacia, exudative diathesis, and neuronal, cardiac and pipping muscle degeneration (Calle et al. 1989). If Andean condors do not consume a nutritionally balanced and formulated carnivore diet, additional mineral and vitamin supplementation may also be warranted using a commercial product that is designed to supplement slab meat without bones or whole prey. It is important to weigh the birds regularly and adjust the quantity of food as needed to prevent birds from becoming obese. Examples of diet items, weights, and feeding schedules for Andean condors are provided in Table 5A.

The diets provided in Table 3 can be used for maintenance and breeding, but when chicks are being parent reared, fast days should be eliminated so parents can feed chicks daily by adding rats and/or carnivore diet during the fast days. If females lay thin-shelled eggs, the diet can be supplemented with calcium carbonate to increase the total diet concentration to the upper recommended range.

Table 3: Two sample diets from AZA institutions for maintaining and breeding male and female Andean condors.

		Measure	Weight (g)	Schedule
Diet 1	Rabbit, large	1 whole	1300	Su
	Rabbit, large	½ whole	650	Tu
	Rat, adult	2 whole	630	Tu W
	Spleen, beef	¼ whole	980	W
	Trout, medium	1 whole	215	F
	Spleen, beef	½ whole	1360	F
	Carnivore Diet[1]	1 lb	454	F
Diet 2	Rabbit	1 whole	1000	Su
	Carnivore Diet[14]	3 lbs	1360	Tu
	Rat, adult	2 whole	630	W
	Trout, medium	4 whole	865	F

[1]Body weight ranges for females: mean 9.5 kg (8.0 – 11.4 kg) and for males: mean 10.9 (9.9 – 12.5).
[2]No additional supplements
[2]Fast days are provided on 3 days a week to simulate natural feeding ecology.
[1] Guaranteed analysis (as-fed): moisture 70%, protein 18%, fat 5%, crude fiber 2%, ash 3%, calcium 0.6%, phosphorus 0.3%.

The nutrient composition of the sample diets list in Table 3 is compared to Table 4, the known nutrient requirements of cats and turkeys, which are used as the model species for Andean condors until species-specific nutrient profiles are established for this species.

Table 4: Nutrient composition of Andean condor sample diets compared to target nutrient concentrations for turkey and cat nutrient requirement models

Nutrient Composition	Diet 1	Diet 2	Suggested range	Turkey[3]	Cat[4]	
				Laying hen	Maintenance	Growth
DM. %	27.61	30.4	---	---	---	---
CP, %	63.91	56.62	>20	15.56	20	22.5
Arginine, %	1.615	1.219	0.67-0.96	0.67	0.77	0.96
Lysine, %	1.99	1.39	0.67-0.85	0.67	0.34	0.85
Methionine, %	0.53	0.45	0.17-0.44	0.22	0.17	0.44
Meth & Cys, %	1.25	0.72	0.34 – 0.88	0.44	0.34	0.88
Fat, %	22.1	26.0	>10	1.2	9	9
Ca, %	1.82	2.27	0.8-2.5	2.50	0.29	0.80
P, %	1.62	1.59	0.39-0.72	0.39	0.26	0.72
Ca:P ratio	1.12	1.43	>1.0	6.41	1.12	1.11
K, %	1.22	1.01	0.4-0.67	0.67	0.52	0.4
Na, %	0.47	0.54	0.1-0.13	0.13	0.068	0.1
Mg, %	0.16	0.27	0.04-0.06	0.06	0.04	0.04
Fe, ppm	974	361	>80	67	80	80
Cu, ppm	25	23	>9	8.8	5	8.4
Mn, ppm	26	23	>67	67	4.8	4.8
Zn, ppm	165	156	>75	72	74	75
I, ppm	0.11	0.48	0.44	0.44	1.4	1.8
Se, ppm	0.86	0.80	0.3	0.22	0.3	0.3
Vit. A, IU/kg	39,946	34,381	5,000	5,000	3,333	3,333
Vit. D, IU/kg	153	638	224-1100	1100	281	224
Vit. E, IU/kg	70	170	25-30	25	38	38
Vit. C, ppm	678	458	---	---	---	---
Thiamin, ppm	2.0[5]	5.6[5]	>6	2.0	5.6	5.5
Riboflavin, ppm	6.8[5]	9.1[5]	>5	4.0	4.6	4.0
Metabolizable energy						
kcal/g	7.85	6.64	---	---	---	---
kcal/day	1826	1111	588-661[6]	---	---	---

[1]NRC 1994
[2]NRC 2006
[3]The addition of 1.1 g and 4.2 g of calcium carbonate daily would increase the total dietary calcium to 2.0% and 2.5%, respectively
[4] Calle et al. (1989) suggest that a vitamin E concentration of 220 - 330 IU/kg DM improves hatchability and chick vigor can stimulates reproduction.
[5]Nutrient content for prey items are not known.
[6]Based on a body weight range of 9.4-11kg and using the equation 115 x $(BW,kg)^{0.729}$ to estimate the amount of metabolizable energy (kcal) required for maintenance daily (Robbins 1983).

AZA accreditation standard

(2.6.1) Animal food preparations must meet all local, state/provincial, and federal regulations.

Food Preparation: Food preparation must be performed in accordance with all relevant federal, state, or local regulations (AZA Accreditation Standard 2.6.1). Meat processed on site must be processed following all USDA standards.

The AZA Nutrition Advisory Group (NAG) recognizes the feeding of animal carcass and whole body prey as a practice desired by some AZA institutions to stimulate activity and normal feeding behavior. Carcass refers to the body of an animal other than that of rodents, rabbits, invertebrates, or day old poultry. All institutions responsible for feeding carnivores in zoos and aquariums are required to be aware of and follow the USDA policy #25. Even though policy #25 states that it is for large felids, the NAG recommends this policy be applied to all carnivores. The NAG urges institutions that choose to carcass feed to acquire the carcass from USDA inspected facilities. The NAG also recognizes that many institutions are involved in the feeding of whole body prey that differs in composition and quality from animal carcass as defined by USDA. The NAG cautions institutions that choose to feed carcasses and whole body prey about numerous hazards (pathogenic and parasitic) that exist for collection carnivores (Harrison et al. 2006). Precautions are necessary to ensure the carcass and whole body prey is wholesome. In addition to USDA policy #25, the NAG strongly recommends institutions that choose to feed carcasses and whole body prey exercise caution and employ wholesome feeding practices including the acquisition of fresh killed carcass and whole body prey, and appropriate handling to ensure rapid cool down and minimal bacterial contamination of the meat. If the carcass is not that of a neonate collected at birth, the removal of head, hide and entrails is recommended to avoid possible exposure of collection animals to pathogenic bacteria or prion diseases. Finally, and most importantly, unless the carcass or whole body prey is that of a neonate collected at birth and fed fresh or is from a USDA inspected facility, the institution is urged to freeze the carcasses and prey items solid and properly defrost them prior to offering to an animal to minimize potential parasite exposure for collection animals. The NAG only condones carcass and whole body prey feeding as part of a feeding program that ensures the diet of the animal is nutritionally balanced and wholesome.

Browse: If browse plants are used within the animal's diet or for enrichment, all plants must be identified and assessed for safety. The responsibility for approval of plants and oversight of the program should be assigned to at least one qualified individual (AZA Accreditation Standard 2.6.4). The program should identify if the plants have been treated with any chemicals or near any point sources of pollution and if the plants are safe for the species. If condors have access to plants in and around their exhibits, there should be a staff member responsible for ensuring that toxic plants are not available.

AZA Accreditation Standard

(2.6.4) The institution should assign at least one person to oversee appropriate browse material for the collection.

5.3 Nutritional Evaluations

There are limited published data on blood or tissue mineral and vitamin concentrations for Andean condors. (Table 5). With respect to differences between free-ranging and zoo Andean condors and mineral nutrition, Toro et al. (1997) only evaluated calcium, phosphorus and magnesium with the free-ranging Andean condors having significantly lower magnesium than zoo condors. Serum mineral and plasma vitamin E concentrations of zoo-housed California condors (Table 6) can make a useful comparison to Andean Condor, especially when diets are very similar. The plasma vitamin E concentrations of zoo Andean and California condors are within the range of vitamin E concentrations documented by Mainka et al. (1992) and Calle et al. (1989) (see Table 7). It is interesting to note that the zoo-housed birds, in general, had greater plasma vitamin E concentrations than the free-ranging birds, which, in part may be due to the zoo birds receiving vitamin E supplementation.

Table 5: Serum mineral and plasma vitamin E concentrations form zoo-housed and free-ranging Andean Condors.

Nutrient	Zoo			Free-ranging			Reference
	N[a]	Mean ± SD[b]	Range	N	Mean ± SD[b]	Range	
Ca, mg/L	9	89 ± 4	83 – 94				Gee et al. 1981
	12	83 ± 16.8	57 - 110	19	83 ± 11.9	60 – 100	Toro et al. 1997
P, mg/L	9	22 ± 9	7 - 30				Gee et al. 1981
	12	41 ± 14.5	25 – 76	19	38 ± 11.1	21 – 56	Toro et al. 1997
Mg, mg/L	12	20 ± 4.7	13 – 27	19	15 ± 3.7	10 – 22	Toro et al. 1997
Na, meq/L	9	147 ± 3	140 – 151	-	-	-	Gee et al. 1981
K, meq/L	9	2.9 ± 0.4	2.4-3.8	-	-	-	Gee et al. 1981
Cl, meq/L	9	111 ± 2.0	108-114	-	-	-	Gee et al. 1981
Fe, mg/L	9	1.31 ± 0.36	0.68 – 1.71	-	-	-	Gee et al. 1981
Vitamin E, mg/L	2	38.1	38 – 38.2	-	-	-	Calle et al. 1989

[a]Number of individuals in sample size.
[b]Standard deviation.

Table 6: Serum mineral and plasma vitamin E concentrations from zoo-housed Californian condors as a comparison for Andean condors (unpublished data).

Nutrient	**N[1]**	**Mean**	**SD**	**Range (low-high)**
Calcium, ppm	106	86.32	2.09	0.33-11
Copper, ppm	99	0.36	0.21	0.11-10
Iron, ppm	106	1.96	0.42	0.19-28.7
Magnesium, ppm	106	22.17	1.96	16.9-50
Phosphorus, ppm	106	57.14	19.27	4.2-211
Potassium, meq/L	106	6.66	3.90	1.9-155
Sodium, meq/L	106	152.62	36.39	1.76-414
Zinc, ppm	106	1.35	0.11	0.68-2.15
Vitamin E, ppm	2	13.5	---	11.6-14.7

[1] Number of individuals with at least one serum/plasma sample analyzed.

Table 7: Serum vitamin E concentrations of zoo and free-ranging injured raptors in southern Alberta (adapted from Mainka et al. 1992).

Species	**Zoo** Vitamin E, ppm[1]	N	**Free-ranging** Vitamin E, ppm[1]	N
Swainson's Hawk (*Buteo swainsoni*)	36.5 ± 2.2	5	2.4	1
Snowy owl (*Nyctea scandiaca*)	17.9 ± 2.5	4	9.1	1
Red-tailed hawk (*Buteo jamaicensis*)	31.0, 35.5	2	---	---
Harris' hawk (*Parabuteo unicinctus*)	17.8	1	---	---
Rough-legged hawk (*Buteo lagopus*)	32.8	1	15.3 ± 1.7	3
Turkey vulture (*Cathartes aura*)	9.4	1	-	---
Great horned owl (*Bubo virginianus*)	---	---	8.7, 10.3	2
Bald eagle (*Haliaeetus leucocephalus*)	---	---	3.5	1

[1] Values with ± sign represent mean ± standard error of the mean

Chapter 6. Veterinary Care

6.1 Veterinary Services

Veterinary services are a vital component of excellent animal care practices. A full-time staff veterinarian is recommended, however, in cases where this is not practical, a consulting/part-time veterinarian must be under contract to make at least two monthly inspections of the animal collection and to any emergencies (AZA Accreditation Standard 2.1.1). Veterinary coverage must also be available at all times so that any indications of disease, injury, or stress may be responded to in a timely manner (AZA Accreditation Standard 2.1.2). All AZA accredited institutions should adopt the guidelines for medical programs developed by the American Association of Zoo Veterinarians (AAZV) www.aazv.org/associations/6442files/zoo_aquarium_vet_med_guidelines.pdf.

> **AZA Accreditation Standard**
>
> **(2.1.1)** A full-time staff veterinarian is recommended. However, the Commission realizes that in some cases such is not practical. In those cases, a consulting/part-time veterinarian must be under contract to make at least two monthly inspections of the animal collection and respond as soon as possible to any emergencies. The Commission also recognizes that certain collections, because of their size and/or nature, may require different considerations in veterinary care.

> **AZA Accreditation Standard**
>
> **(2.1.2)** So that indications of disease, injury, or stress may be dealt with promptly, veterinary coverage must be available to the animal collection 24 hours a day, 7 days a week.

Veterinary Drugs: Protocols for the use and security of drugs used for veterinary purposes must be formally written and available to animal care staff (AZA Accreditation Standard 1.4.6). Procedures should include, but are not limited to: a list of persons authorized to administer animal drugs, situations in which they are to be utilized, location of animal drugs and those persons with access to them, and emergency procedures in the event of accidental human exposure.

> **AZA Accreditation Standard**
>
> **(1.4.6)** A staff member must be designated as being responsible for the institution's animal record-keeping system. That person must be charged with establishing and maintaining the institution's animal records, as well as with keeping all animal care staff members apprised of relevant laws and regulations regarding the institution's animal collection.

Animal Recordkeeping: Animal recordkeeping is an important element of animal care and ensures that information about individual animals and their treatment is always available. A designated staff member should be responsible for maintaining an animal record keeping system and for conveying relevant laws and regulations to the animal care staff (AZA Accreditation Standard 1.4.6). Recordkeeping must be accurate and documented on a daily basis (AZA Accreditation Standard 1.4.7). Complete and up-to-date animal records must be duplicated and retained in a fireproof container within the institution (AZA Accreditation Standard 1.4.5) as well as be duplicated and stored at a separate location (AZA Accreditation Standard 1.4.4).

> **AZA Accreditation Standard**
>
> **(1.4.7)** Animal records must be kept current, and data must be logged daily.

> **AZA Accreditation Standard**
>
> **(1.4.5)** At least one set of the institution's historical animal records must be stored and protected. Those records should include permits, titles, declaration forms, and other pertinent information.

> **AZA Accreditation Standard**
>
> **(1.4.4)** Animal records, whether in electronic or paper form, including health records, must be duplicated and stored in a separate location.

Pre-shipment recordkeeping: A hard copy and/or disc of the complete medical records for Andean condors should be sent to the receiving institution and reviewed (prior to shipment) – including results from all prior diagnostic testing. Specific areas of interest that should be specifically documented include:

- West Nile virus serologic status and/or vaccination status; housing history (e.g., inside versus outside)
- Reproductive history
- Individual history (e.g., conspecific relationships, aggression, etc.)
- Chronic medical problems, including osteoarthritis or pododermatitis
- Current diet
- Location and number of permanent identification (e.g., leg band, wing tag, and/or microchip)

6.2 Identification Methods

Ensuring that animals are identifiable increases the ability to care for individuals more effectively. Andean condors must be identifiable and have corresponding ID numbers (AZA Accreditation Standard 1.4.3).

AZA Accreditation Standard

(1.4.3) Animals must be identifiable, whenever practical, and have corresponding ID numbers. For animals maintained in colonies or other animals not considered readily identifiable, the institution must provide a statement explaining how record keeping is maintained.

Wing Tags: Wing tags constructed of vinyl material are one of the recommended means for identifying Andean condors in zoos and aquariums. Rolls of vinyl material can be purchased from 'Gallagher Awning and Tent' (809 Plaenert Drive, Madison, WI53713; 800-477-7286, www.gallagherawning.com). The material should be impregnated and not laminated. Multiple colors in rolls can be purchased, and the material can be cut into wing tags using a pattern; one roll lasts a long time (Figures 7 & 8).

Vinyl paint: Numbers can be painted on the vinyl wing tags using GV Series Gloss Vinyl Screen Ink, which is formulated for printing on vinyl surfaces where a high gloss finish is required (Nazdar: www.nazdar.com) (Figure 8). The ink dries to an extremely flexible film that may be vacuum formed. It is resistant under outdoor exposure. The paint can also be used for polycarbonate, or Plexiglas nameplates and identification panels. Q-tips or cotton swabs can be used to apply the paint to the wing tags.

Figure 7. Vinyl rolls for tags
Photo credit: San Diego Zoo Global

Figure 8. Painted wing tag
Photo credit: San Diego Zoo Global

Wing tag buttons: Blank or numbered Duflex™ Small Round Hog Tags can be used as part of the wing tags. Numbered tags in orange, red, white, and yellow have been used successfully (Figure 9). Orange tag item numbers are C08032(A)N for numbered tags and C08028N for blank tags (Nasco Farm & Ranch: www.enasco.com). A Duflex Applicator Tool (C17245N) can also be obtained from the same source.

Figure 9. Hog/wing tags
Photo credit: San Diego Zoo Global

<u>Leather punch and file</u>: The tip of the wing tag buttons should be filed down, as they are very sharp. A leather punch is needed to puncture the patagium. These items (Figure 10) should be available locally at a hardware store.

Figure 10. Leather punch, file, other wing tag materials
Photo credit: San Diego Zoo Global

Microchips/PIT Tags: Andean condors can also be identified using microchips or Passive Integrated Transponder (PIT) tags. The preferred location for microchip transponders is subcutaneously, on the dorsum, and interscapularly to allow easy reading of the transponder without the need to restrain the bird. The superficial left pectoral subcutaneous tissue is another acceptable area for inserting transponders, as this procedure is easier to perform while one person is restraining the bird. It is not recommended that condors be leg banded due to urohydrosis which they use as a cooling process.

Acquisition & Disposition: AZA member institutions must inventory their population at least annually and document all animal acquisitions and dispositions (AZA Accreditation Standard 1.4.1). Transaction forms help document that potential recipients or providers of the animals should adhere to the AZA Code of Professional Ethics, the AZA Acquisition/Disposition Policy (see Appendix B), and all relevant AZA and member policies, procedures and guidelines. In addition, transaction forms must insist on compliance with the applicable laws and regulations of local, state, federal and international authorities. All AZA-accredited institutions must abide by the AZA Acquisition and Disposition policy (Appendix B), and the long-term welfare of animals should be considered in all acquisition and disposition decisions. All species owned by an AZA institution must be listed on the inventory, including those animals on loan to and from the institution (AZA Accreditation Standard 1.4.2).

AZA Accreditation Standard

(1.4.1) An animal inventory must be compiled at least once a year and include data regarding acquisitions and dispositions in the animal collection.

AZA Accreditation Standard

(1.4.2) All species owned by the institution must be listed on the inventory, including those animals on loan to and from the institution. In both cases, notations should be made on the inventory

- The AZA Andean Condor SSP member institutions are obligated to follow the AZA Animal Acquisition and Disposition Policy that was approved by the Board of Directors in 2000.
- Institutional identification (ISIS number) should be assigned on the day of hatch and reported to the AZA Andean Condor SSP Coordinator and Studbook Keeper. Before fledging, a transponder and or a wing tag should be applied.

6.3 Transfer Examination and Diagnostic Testing Recommendations

The transfer of animals between AZA-accredited institutions or certified related facilities due to AZA SSP recommendations occurs often as part of a concerted effort to preserve these species. These transfers should be done as altruistically as possible and the costs associated with specific examination and diagnostic testing for determining the health of these animals should be considered.

AZA Accreditation Standard

(2.7.1) The institution must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals.

6.4 Quarantine

AZA institutions must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals (AZA Accreditation Standard 2.7.1). All quarantine, hospital, and isolation areas should be in compliance with AZA standards/guidelines (AZA Accreditation Standard 2.7.3; Appendix C). All quarantine procedures should be supervised by a veterinarian, formally written, and available to staff working with quarantined animals (AZA Accreditation Standard 2.7.2). If a specific quarantine facility is not present, then newly acquired animals should be kept separate from the established collection to prohibit physical contact, prevent disease transmission, and avoid aerosol and drainage contamination. If the receiving institution lacks appropriate facilities for quarantine, then pre-shipment quarantine at an AZA or AALAS accredited institution may be applicable. Any local, state, or federal quarantine regulations that are more stringent than AZA Standards and/or recommendations have precedence.

> **AZA Accreditation Standard**
>
> **(2.7.2)** Written, formal procedures for quarantine must be available and familiar to all staff working with quarantined animals.

> **AZA Accreditation Standard**
>
> **(2.7.3)** Quarantine, hospital, and isolation areas should be in compliance with standards or guidelines adopted by the AZA.

Quarantine Procedures: Quarantine durations for Andean condors are required to last a minimum of 30 days (unless otherwise directed by the staff veterinarian). Andean condors should be housed separately from all other collection animals during the quarantine period. If additional birds of the same order are introduced into quarantine areas containing Andean condor, the minimum quarantine period begins over again. However, the addition of animals of a different order to those already in quarantine will not require the re-initiation of the quarantine period.

During the 30-day quarantine, routine health monitoring procedures should be performed as listed in Table 8 in section 6.6 (see also Appendix C). Animals should be permanently identified during the quarantine period if not already identified (see section 6.2). Medical records for each animal should be accurately maintained and easily available during the quarantine period. Animals should be evaluated for ectoparasites and treated accordingly. Blood should be collected, analyzed and the sera banked in either a -70ºC freezer or a frost-free -20ºC freezer for retrospective evaluation. Fecal samples should be collected and analyzed for gastrointestinal parasites, and the animals should be treated accordingly. Vaccinations should be updated as appropriate, and if the vaccination history is not known, the animal should be treated as immunologically naive and given the appropriate series of vaccinations (see section 6.5). Release from quarantine should be contingent upon normal results from diagnostic testing and two negative fecal tests that are spaced a minimum of two weeks apart.

Zoonotic Diseases: AZA institutions must have zoonotic disease prevention procedures and training protocols established to minimize the risk of transferable diseases (AZA Accreditation Standard 11.1.2) with all animals, including those newly acquired in quarantine. Keepers should be designated to care only for quarantined animals if possible. If keepers must care for both quarantined and resident animals of the same class, they should care for the quarantined animals only after caring for the resident animals. Equipment used to feed, care for, and enrich animals in quarantine should be used only with these animals. If this is not possible, then all items must be appropriately disinfected, as designated by the veterinarian supervising quarantine before use with resident animals.

> **AZA Accreditation Standard**
>
> **(11.1.2)** Training and procedures must be in place regarding zoonotic diseases.

> **AZA Accreditation Standard**
>
> **(11.1.3)** A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.

A tuberculin testing and surveillance program must be established for animal care staff as appropriate to protect the health of both staff and animals (AZA Accreditation Standard 11.1.3). Depending on the disease and history of the animals, testing protocols for animals may vary from an initial quarantine test to yearly repetitions of diagnostic tests as determined by the veterinarian.

> **AZA Accreditation Standard**
>
> **(2.5.1)** Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.

Necropsy: Animals that die during the quarantine period should have a necropsy performed to determine the cause of death, and the subsequent disposal of the body must be done in accordance with any local or federal laws (AZA Accreditation Standard 2.5.1). Necropsies should include a detailed external and internal gross morphological examination and representative tissue samples from the body organs should be submitted for histopathological examination. Necropsy protocols for Andean condors can be found in Appendix F. A copy of the gross necropsy and histopathology reports should be sent to the AZA Andean Condor SSP Veterinary and Pathology Advisors. For information on egg necropsy protocols, see also Appendix F.

6.5 Preventive Medicine

AZA-accredited institutions should have an extensive veterinary program that must emphasize disease prevention (AZA Accreditation Standard 2.4.1). The American Association of Zoo Veterinarians (AAZV) has developed an outline of an effective preventative veterinary medicine program that should be implemented to ensure proactive veterinary care for all animals (www.aazv.org/associations/6442/files/zoo_aquarium_vet_med_guidelines.pdf).

> **AZA Accreditation Standard**
>
> **(2.4.1)** The veterinary care program must emphasize disease prevention.

> **AZA Accreditation Standard**
>
> **(11.1.2)** Training and procedures must be in place regarding zoonotic diseases.

As stated in the Chapter 6.4, AZA institutions must have zoonotic disease prevention procedures and training protocols established to minimize the risk of transferable diseases (AZA Accreditation Standard 11.1.2) with all animals. Keepers should be designated to care for only healthy resident animals, however if they need to care for both quarantined and resident animals of the same class, they should care for the resident animals before caring for the quarantined animals. Care should be taken to ensure that these keepers are "decontaminated" before caring for the healthy resident animals again. Equipment used to feed, care for, and enrich the healthy resident animals should only be used with those animals.

Routine Examinations: Regular health monitoring should be performed on Andean condors approximately every 2 years, opportunistically, or as needed based on the animal's age, health status, or other factors. Regular health monitoring should include the procedures listed in Table 8.

Lifetime Medical Management: Infant mortality in zoos and aquariums has been observed to be relatively low in Andean condors, with more than 80% of chicks surviving their first year. Demographic data suggest the lifespan of this species is greater than 70 years. However, the oldest individual in the zoo and aquarium population, at 74 years, entered with indeterminate age, and it is possible that life spans may exceed this range.

Program Animals: Animals that are taken off zoo/aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5).

Also stated in Chapter 6.4, a tuberculin testing and surveillance program must be established for animal care staff, as appropriate, to protect the health of both staff and animals (AZA Accreditation Standard 11.1.3). Depending on the disease and history of the birds, testing protocols may vary from an initial quarantine test, to annual repetitions of diagnostic tests as determined by the veterinarian. To prevent specific disease transmission, vaccinations should be updated as appropriate.

> **AZA Accreditation Standard**
>
> **(1.5.5)** For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.

> **AZA Accreditation Standard**
>
> **(11.1.3)** A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.

6.6 Capture, Restraint, and Immobilization

There will always be a need to capture, restrain, and/or immobilize Andean condors for normal or emergency husbandry procedures. All capture equipment must be in good working order and available to authorized and trained animal care staff at all times (AZA Accreditation Standard 2.3.1).

> **AZA Accreditation Standard**
>
> **(2.3.1)** Capture equipment must be in good working order and available to authorized, trained personnel at all times.

Capture and Restraint: Unlike other large raptors, where the talons must be carefully controlled during handling to avoid injuries, the Andean condor's beak represents the greatest risk of injury to animal caretakers. Andean condors have a very powerful bite that can rip through clothing (e.g., jeans) and into flesh. These birds also have very strong necks. These are important adaptations for Andean condors to enable them to eat tough dead carcasses in the wild. When training animal care staff to handle this species, instruction on how to handle this bird's head is very important. If a strong enough hold is not kept on their neck/head, the bird can easily slip out of a keeper's hands and quickly bite someone causing serious injuries.

Operant conditioning can be used to facilitate the daily management of this species. Andean condor enclosures should be designed with a holding area where the birds can be separated from the primary enclosure. Condors should be fed in this area, and therefore trained to enter on cue (e.g., food being placed inside the holding area), as this ensures that the birds can be more easily captured and restrained when needed. Training birds to enter holding areas can facilitate routine veterinary exams (e.g., pre-shipment, quarantine, annual, etc.). Utilizing a smaller holding area for trapping is less stressful to the birds, and lessens the chance of injury. Additionally, stress can also be minimized during a capture procedure if the light level in the holding area can be decreased.

Immobilization: The preferred anesthetic protocol for Andean condors is a mask induction with isoflurane gas followed by intubation. Endotracheal intubation may not always be necessary, but is recommended if veterinary/handling procedures are to be prolonged, if monitoring will be difficult (such as during surgery), or if the animal is very ill.

Table 8: AZA Andean Condor SSP preventive medicine guidelines for pre-shipment, quarantine, and routine physical examinations

Procedure	**Description**
Signalment	Age, sex, origin (specify if wild-caught; estimate age at capture), rearing (parent or hand), studbook number, and institution ISIS number
Review of medical and research records	Prior to any animal shipments, a hard copy and/or disc of the complete medical record should be sent to the receiving institution and reviewed prior to transport including results from all prior diagnostic testing. Specific areas of interest include: - West Nile virus serologic status and/or vaccination status; housing history (inside versus outside) - Reproductive history - Conspecific or cagemate aggression history - Chronic medical problems, including osteoarthritis or pododermatitis - Current diet - Location and number of permanent identification (e.g., microchip and/or wing tag)
Verify or place permanent identifier	The use of Trovan microchips are recommended for Andean condors. The preferred location is subcutaneously, on the dorsum, and interscapularly to allow easy reading without restraint. The superficial left pectoral subcutaneous tissue is also acceptable
Obtain body weight	---
Physical examination	- Plumage, skin, beak, choana, feet, and talon condition - Oral and cloacal exam - Ophthalmic and otic exam - Body condition and weight - Trans-coelomic palpation - Uropygial gland exam - Cardiac and pulmonary auscultation
Blood collection	Collection sites include the medial metatarsal vein, jugular vein, or ulnar vein - Complete blood count (CBC): white blood cell (WBC) counts over 30,000/UL should be repeated in 2 weeks. If still elevated, further diagnostic procedures should be considered. - Plasma (heparin) chemistry panel: minimally including aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatine phosphokinase (CPK), glucose, uric acid (UA), calcium, and phosphorus - Serum/plasma bank - Aspergillus panel (antibody, antigen, galactomannan) and protein electrophoresis is recommended but not required. - West Nile Virus (WNV) serology (for serosurvey and/or to monitor response post vaccination) (College of Veterinary Medicine, Cornell University. P.O. Box 5786 Ithaca, N.Y. 14852-5786. Phone: 607-253-3900)
Feces for enteric parasite screen	Direct and flotation tests (+/- sedimentation) recommended annually. During quarantine, 3 fecal samples should be collected for enteric parasite analysis at weekly intervals. Only one analysis is needed if the results arenegative. Birds that test positive should receive appropriate treatment. Two samples at weekly intervals (7 and 14 days) should be submitted post-treatment to confirm efficacy.
Ectoparasites should be collected for identification	The recommended treatment for ectoparasites is pyrethrin spray and/or Ivermectin 0.4ml/kg IM or PO
Radiographs	Whole body radiographs are recommended for Andean condors when feasible. If animals need to be sedated for radiographs to be taken, the benefits need to outweigh the risks of anesthesia. Radiographs should be considered if any abnormality is found from the physical exam and/or blood work.
Vaccinations	WNV vaccinations (Fort Dodge killed Equine product, or canapox-vectored vaccine by Merial) should be given annually at 1.0ml IM using the pectoral muscle. Initial WNV vaccination should be a series of 3 injections, 3 weeks apart, followed by annual boosters. If possible, blood should be collected at each vaccination and submitted for serology testing (PRNT).

6.7 Management of Diseases, Disorders, Injuries and/or Isolation

AZA-accredited institutions should have an extensive veterinary program that manages condor diseases, disorders, or injuries and has the ability to isolate these animals in a hospital setting for treatment if necessary. Staff should be trained for meeting the animal's dietary, husbandry, and enrichment needs, as well as in restraint techniques, and recognizing behavioral indicators animals may display when their health becomes compromised (AZA Accreditation Standard 2.4.2). Protocols should be established for reporting these observations to the veterinary department. Hospital facilities should have x-ray equipment or access to x-ray services (AZA Accreditation Standard 2.3.2), contain appropriate equipment and supplies on hand for treatment of diseases, disorders or injuries, and have staff available that are trained to address health issues, manage short and long term medical treatments, and control for zoonotic disease transmission.

> **AZA Accreditation Standard**
>
> **(2.4.2)** Keepers should be trained to recognize abnormal behavior and clinical symptoms of illness and have knowledge of the diets, husbandry (including enrichment items and strategies), and restraint procedures required for the animals under their care. However, keepers should not evaluate illnesses nor prescribe treatment.

> **AZA Accreditation Standard**
>
> **(2.3.2)** Hospital facilities should have x-ray equipment or have access to x-ray services.

Andean condors are very hardy and long-lived. They are also tolerant of frequent medical intervention when necessary. Common medical problems include trauma (e.g., soft tissue injury and fractures), pododermatitis, gout, and infectious diseases caused by fungal (e.g., aspergillosis), bacterial, viral (e.g., WNV), and parasitic (e.g., lice) organisms. Treatment of these diseases and disorders should be consistent with current standards of avian practice.

Animal Welfare Communication Protocols: AZA-accredited institutions must have a clear process for identifying and addressing animal welfare concerns within the institution (AZA Accreditation Standard 1.5.8), and should have an established Institutional Animal Welfare Committee or similar committee that can address these issues. This process should identify the protocols needed for animal care staff members to communicate animal welfare questions or concerns to their supervisors, their Institutional Animal Welfare Committee (or similar committee), or if necessary, to the AZA Animal Welfare Committee. Protocols should be in place to document the training of staff about animal welfare issues, identification of any animal welfare issues, coordination and implementation of appropriate responses to these issues, evaluation (and adjustment of these responses if necessary) of the outcome of these responses, and the dissemination of the knowledge gained from these issues. Given the wide variety of zoos and aquariums that house Andean condors, the AZA Raptor TAG and AZA Andean Condor SSP cannot provide specific recommendations for the best approaches to take to communicate animal welfare issues effectively within every institution. All animal caretakers that work with Andean condors should be aware of institutional protocols in place for them to identify, communicate, and hopefully address potential animal welfare issues that are associated with the care and management of these animals.

> **AZA Accreditation Standard**
>
> **(1.5.8)** The institution must develop a clear process for identifying and addressing animal welfare concerns within the institution.

Euthanasia and Necropsy: The AZA Raptor TAG does not currently have any specific recommended protocols for Andean condor euthanasia within zoos and aquariums. Veterinarians at each institution are encouraged to contact the AZA Andean Condor SSP veterinary advisors for more specific information or advice on the most effective, safe, and humane approaches to utilize. Each institution housing Andean condors should have a euthanasia protocol in place, developed by the veterinary team, in case euthanasia becomes necessary in a particular situation. The AZA Animal Welfare Committee also encourages each institution to develop a process to determine when elective euthanasia might be appropriate from a quality of life perspective, taking into account behavioral, health, social, nutritional, and animal caretaker perspectives. Examples of approaches used by institutions are available from the AZA Animal Welfare Committee.

Necropsies should be conducted on deceased animals to determine their cause of death and the subsequent disposal of the body must be done in accordance with any local, state, or federal laws (AZA Accreditation Standard 2.5.1). Necropsies should include a detailed external and internal gross morphological examination and representative tissue samples from the body organs should be submitted for histopathological examination. Necropsy protocols for Andean condors can be found in Appendix F. A copy of the gross necropsy and histopathology reports should be sent to the AZA Andean Condor SSP Veterinary and Pathology Advisors. For information on egg necropsy protocols, see also Appendix C.

AZA Accreditation Standard

(2.5.1) Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.

Chapter 7. Reproduction

7.1 Reproductive Physiology and Behavior

It is important to have a comprehensive understanding of the reproductive physiology and behaviors of Andean condors, as this knowledge facilitates all aspects of reproduction, artificial insemination, hatching, rearing, and even contraception efforts that AZA-accredited zoos and aquariums strive to achieve.

Sexual maturity and seasonality: Male and female Andean condors achieve adult plumage at 6-7 years. They have reproduced successfully as young as 7 years old, but most birds do not breed until they are in their teens. Males over the age of 50 years have not been documented to breed; females have not been documented to breed beyond the age of 41 years. Most of the birds in the AZA Andean Condor SSP breeding population were wild caught between the late 1950s and the early 1970s, and were of unknown age at the time of capture. The age of reproductive senescence has not yet been determined and additional research is needed.

Andean condors in the wild are gregarious during the non-breeding season, feeding and roosting communally, but are highly territorial when nesting. Males in particular vigorously defend the nesting area from intruders, including other condors, and potential competitors or predators.

In the wild, Andean condors breed seasonally but the season varies with latitude. In the North American zoo population, Andean condors typically breed from mid-winter through mid-summer, also depending on latitude, with birds at more southern latitude beginning earliest and having the longest breeding season. When eggs have been removed to induce multiple clutches for increased production, pairs in San Antonio and Miami have produced up to 4 eggs in a single season.

Courtship: Prior to observation of courtship displays, males may become increasingly aggressive toward females, sometimes inflicting bite wounds, usually around the head and neck, that may require medical attention. This increased aggression may be intensified over food and the pair may need to be separated during feeding to ensure the female is receiving adequate amounts and to avoid injuries. Facilities with smaller enclosures may see greater aggression between condors (Whitson & Whitson 1969).

The male typically initiates the ritualized courtship display, approaching the female with his body upright, his neck arched, inflated and more intensely colored red, his ventral body feathers extended outward and his wings fully open in a forward-curving arc. He walks stiffly, swaying from side to side. Initially he may make a hissing sound, similar to air brakes on a truck, followed by a deep, repetitive drumming sound that has been compared to a helicopter. If the female is interested, she will remain near him and may bite at his neck or wings, although not aggressively. Females may also engage in the wings-out courtship display, although typically not as elaborately or for as long as the male. When initiating copulation, the male may first raise his foot toward the female and make a few attempts before stepping up on her back. Displays and copulation may occur on perches or on the ground.

Reproduction: Eggs may be laid between March and June and fertility for established pairs is typically very high. If first eggs are removed or otherwise lost and it is still early in the breeding season, the female may lay a replacement egg approximately 30 days later. Of 255 hatches recorded in the AZA North American Studbook, 2.4% have occurred in March, 9.0% in April, 38.8% in May, 33.3% in June, 13.3% in July and 3.1% in August. Hatches have not been recorded in September through February in this population (Samour et al. 1984)

Andean condors are sequentially monogamous in the wild, often remaining with the same mate indefinitely. In zoos, introductions may be contentious and pair bonds may take years to form and mature. Males and females share both egg incubation and chick rearing duties roughly equally. For these reasons it is recommended that pairs remain together during both breeding and non-breeding seasons. In a few situations, one parent has been removed for medical or behavioral reasons during incubation or chick rearing, invariably with poor results and requiring human intervention.

Because condors are protective of their nesting territory and particularly of their nest site, it is best to avoid human intrusion into the nesting area to the extent possible. Birds confronted in the nestbox or who perceive such intrusion often exhibit displaced aggression towards their mates, eggs or chicks, sometimes resulting in loss of eggs or offspring. The periods of actual egg laying and hatching are the most sensitive (Bruning, D. F. 1981).

7.2 Artificial Insemination

The practical use of artificial insemination (AI) with animals was developed during the early 1900s to replicate desirable livestock characteristics to more progeny. Over the last decade or so, AZA-accredited zoos and aquariums have begun using AI processes more often with many of the animals residing in their care. AZA Studbooks are designed to help manage animal populations by providing detailed genetic and demographic analyses to promote genetic diversity with breeding pair decisions within and between our institutions. While these decisions are based upon sound biological reasoning, the efforts needed to ensure that transports and introductions are done properly to facilitate breeding between the animals are often quite complex, exhaustive, and expensive, and conception is not guaranteed.

AI has become an increasingly popular technology that is being used to meet the needs identified in the AZA Studbooks without having to re-locate animals. Males are trained to voluntarily produce semen samples and females are being trained for voluntary insemination and pregnancy monitoring procedures such as blood and urine hormone measurements and ultrasound evaluations. Techniques used to preserve and freeze semen has been achieved with a variety, but not all, taxa including Andean condors and could be investigated further if necessary.

Artificial insemination has been used extensively for avian species including cranes, falcons and a wide variety of domestic species that produce multiple-egg clutches. Insemination of the female begins after the first egg of her clutch is laid, ensuring that fresh sperm will be in the oviduct when ovulation of subsequent eggs occurs. However, because Andean condors invariably lay a single-egg clutch, artificial insemination is less likely to be a viable option for this species unless new methods of determining timing of ovulation are developed.

Andean condors in the AZA SSP population have been produced solely through natural copulation. Individuals that are not malimprinted on humans are most likely to breed successfully. Hormonal values during and outside of reproductive periods have not been used for reproductive management of Andean condors nor are they well-documented. However, gender-specific levels fecal steroid hormones were characterized in Andean condors to establish parameters for gender determination in California condors, a monomorphic species, before genetic methods were available.

7.3 Pregnancy and Egg-laying

The AZA Andean Condor SSP Coordinator should always be contacted whenever Andean condor eggs are laid. Recommendations for incubating and pulling eggs may change based on condor population seasonal performance. Communication with the AZA Andean Condor SSP Coordinator will facilitate foster placements of eggs or chicks when needed.

Egg-laying: The female may exhibit specific behavioral changes indicating that egg laying will occur within 2-4 days. She may be slightly off feed, but observed drinking water and foraging for small bones in the enclosure substrate. Her posture may change, with axis of her spine more horizontal than is typical when roosting. She will spend an increased amount of time in the nestbox, grooming the nest substrate but otherwise appearing lethargic. The male may also spend more time than usual in the nestbox. Condors rarely, if ever, spend the night in the nestbox unless incubating an egg or brooding a chick, but females may spend one or two nights in the nestbox prior to egg laying. Eggs are most often laid overnight or in the early morning hours.

Incubation and hatching: The incubation period is 58-62 days. Eggs from individual females tend to have less variation in the incubation period than the population. In other words, eggs from one female may consistently hatch at 58 days +/- 1 day, while another female's eggs might hatch at 62 days +/- 1 day (Wilkinson et al. 1988).

Male condors are typically eager to access and take over incubation of the newly laid egg. Again, this may be a contentious period, particularly with a relatively new pairing or a particularly aggressive male. Disturbance near the nest should be strictly avoided until the pair establishes a consistent, relaxed pattern of nest exchanges. When the egg is in the hatching process and immediately after the chick hatches, the male is also likely to show increased interest and may even push the female off in order to take over brooding of the chick.

Particularly with first-time parents, it is important to monitor the chick's vigor and determine whether parents are feeding successfully. Remote closed-circuit television monitoring is useful for this. If possible without undue disturbance to the parents, chicks may be examined and weighed daily for the first few days. This should not be attempted, however, unless it can be done when both parents are away from the nest and unaware of the intrusion.

In order to avoid disturbing the parents in the nest yet still facilitate keeper access to the egg or chick, it is useful to have an established feeding routine for the adults that conditions them to leave the nest to feed each day, preferably in a holding area in which they can be briefly secured.

7.4 Hatching Facilities

Wild condors nest in caves or on ledges in the face of steep cliffs. They do not build a structure or add any nesting material, but rather select a site with some loose substrate such as sand. Prior to egg laying and during incubation, both parents spend considerable time in a sternal position, manipulating this substrate with their bills, gathering and shaping it around themselves in a process termed "rim-building."

All condors housed in pairs should be provided with adequate nesting chambers/artificial caves with appropriate sand or soil substrate to stimulate pair bond formation and nesting. Pairs currently not recommended to breed should have eggs replaced with artificial eggs to encourage development of incubation experience by the pair. Condors have nested in nest boxes, rock caves, and on ledges with varying dimensions. The recommended size for enclosed nests in caves or boxes is minimum of approximately 1.8 m^3 (64 ft^3), and ranging from 0.9 m x 1.2 m x 1.2 m (3 ft x 4 ft x 4 ft) to 2.4 m x 2.4 m x 2.4 m (8 ft x 8 ft x 8 ft), with an opening for the birds to enter of 0.6 m x 0.6 m (2 ft x 2 ft) to 1 m x 2 m (3 ft x 6 ft). Condor nest boxes are most often constructed of heavy, outdoor grade plywood that is either painted or sealed. Thick plastic "wood" panels, such as Starboard® are proving to be more durable and easy to clean. It is also useful to have keeper access from outside the enclosure, including a full-sized door for annual maintenance as well as one or more small ports 10 cm x 25 cm (4 in x 10 in) for accessing eggs or neonates with minimal disruption. Small, one-way glass windows 10 cm x 25 cm (4 in x 10 in) and/or security door viewing devices are helpful for monitoring, but entail the risk of disturbing parents in the nest so closed-circuit television monitoring cameras are highly recommended.

The nesting substrate should be small and granular in nature (e.g., sand, decomposed granite, soil) and should be sufficiently deep (10-15 cm; 4-6 in) to prevent the egg from contacting the solid floor as the pair forms and maintains the nest. Pea gravel has been used successfully as a nest substrate for various raptor species but may present a risk of egg breakage with this large-bodied species that continuously rearranges the nest substrate. The nest substrate should be removed, the nestbox thoroughly cleaned and disinfected, and the substrate replaced annually during the non-breeding season. A portable steam cleaner is useful for cleaning.

In addition to the nestbox, an adjacent sheltered but open-fronted roost box is recommended, as is a perch placed near but not attached to the roost and nest. These structures allow for nest exchanges between incubating or brooding parents to take place outside the nesting chamber. Nest exchanges are occasionally contentious. When the arriving parent lands on the perch or roost rather than directly at the entrance to the nestbox, the incubating parent usually rises and exits to greet its mate away from the egg or chick.

Andean condor chicks typically fledge at 6-7 months of age. In the wild, they would follow their parents, gradually learning foraging strategies and gaining the confidence to feed in a large, hierarchical group. For this reason, wild condors typically nest no more often than in alternate years, and less frequently when food resources are scarce. In zoos, it is best to allow fledglings to remain with parents for at least 2 months post-fledging to allow the juvenile to develop some confidence. If the pair is recommended to breed the following year, it will be necessary to remove the juvenile prior to the onset of breeding behavior. Parents may attempt to drive the juvenile out or may tolerate its presence for 2 years or more, depending on the enclosure and the individual dispositions of the birds.

Earlier practices for rearing Andean condors for release to the wild included "crèching," nestling chicks in groups of 2-4 birds beginning at 2-3 months of age. Initially chicks were frightened of each other, but rapidly became very affiliative toward their crèche mates. The goal was to create cohesive release cohorts, and in this sense it was successful. The unintended result was that the young, impressionable birds became too desensitized to change in general and tended to be far less wary of new, potentially dangerous situations and more willing to approach areas of human activity. Chicks intended for wild release are now reared singly until after fledging when they are gradually introduced to other juveniles and, preferably, an adult mentor.

7.5 Assisted Rearing

Artificial Incubation: The AZA Andean Condor SSP Coordinator should always be contacted whenever Andean condor eggs are laid. Recommendations for incubating and pulling eggs may change based on seasonal population performance. Communication with the AZA Andean Condor SSP Coordinator will also facilitate foster placements of eggs or chicks when needed.

Although Andean condors are typically excellent parents given the right environment, artificial incubation of eggs and hand-rearing of chicks has been done extensively with this species. The Andean condor served as a model for developing both *in situ* and *ex situ* management techniques for application to the critically endangered California condor. More than 60 juveniles produced by the AZA SSP population have been released to the wild in South America.

Various facilities have successfully incubated Andean condor eggs at temperatures between 36.4˚C (97.5˚F) and 37.5˚C (99.5˚F) in forced air incubators, with 36.7˚C (98˚F) being most common and yielding optimum results. Eggs are typically started at 50-60% relative humidity, but this is adjusted during incubation to correct for optimum egg weight loss of 14% +/- 1% to pip. Eggs should be weighed daily and adjustments made early in incubation as the egg weight loss trend becomes increasingly difficult to change once established. Andean condor eggs may have difficulty losing sufficient weight even in a dry incubator and with the use of a room dehumidifier. Allowing eggs to remain under parental incubation for 10-14 days often helps establish a good egg weight loss trend. Eggs should be set on their sides so that they are turned around their long axes. Most incubators are set to turn eggs in opposite directions hourly, but turning every two hours works equally well. Many machines do not turn eggs through at least a 90˚ radius as is necessary for chorioallantoic membrane (CAM) completion, so it is important to also hand turn eggs 2-3 times daily through 180˚ in opposite directions regardless of the machine used.

As in any hatchery, a high level of sanitation should be maintained to prevent contamination of incubating eggs. Hands should be washed and exam gloves should be donned immediately prior to handling eggs. All water pans, wet bulbs and wicks should be replaced with freshly sterilized equipment and the hatchery cleaned twice weekly.

Candling and hatching: Andean condor eggs are some of the easiest to candle, much like white chicken eggs. Candling can be used to confirm fertility and to monitor the progress of the developing embryo and its extra-embryonic membranes. While it is not necessary to candle eggs daily once fertility is confirmed, it is useful to candle at least weekly and to mark the progression of the air cell. Once the hatching process has initiated, more frequent candling, usually every 2-4 hours, will help determine whether hatching is proceeding normally or whether and when intervention is indicated. Eggs that fail to show development on candling are best left in the incubator for 10-14 days to determine whether delayed development has occurred. Infertility cannot be determined by candling since very early dead embryos will not have blood development, so opening inviable eggs for necropsy is recommended to determine fertility and stage of mortality if applicable.

The hatching process begins about one week prior to hatching, with air cell draw down being the first observable change on candling. This results not from a true enlargement of the air cell but from a separation of the inner and outer shell membranes around the air cell edge, creating an irregular margin. The embryo's beak should be seen pushing under the air cell membrane 4-5 days prior to hatching and internal pip usually occurs about 4 days before hatch. This is usually confirmed by hearing and/or feeling vocalizations and/or by observing rhythmic respiration on candling. At this point, turning can be discontinued and the egg moved to the hatcher, which should be set ~0.3-0.5˚C (0.5-1˚F) lower than incubation temperature for best results. The embryo will externally pip approximately 3 days prior to hatch, but the pip-to-hatch interval can be quite variable. Normal self-hatching in artificially incubated California condor eggs has occurred from 45 to 96 hours after pip.

After external pip, the humidity should be increased to ≥80% relative humidity to prevent membrane drying. Placing the egg with the pip site downward in the hatcher also seems to help keep membranes moist. Monitoring of CAM vessel regression and embryonic vigor by candling will help determine if hatching is proceeding normally. After this lengthy rest, the embryo will break up the pip site, rotate and hatch by pushing the cap off the egg. It is advisable to allow umbilical vessels to dry before fully separating the chick from the shell to avoid tearing them too close to the body wall, which may result in hemorrhage or infection. The chick should be moved from the hatcher when it is maintaining sternal posture, is able to give a feeding response and preferably has defecated. The umbilical seal should be swabbed with a water-based antiseptic such as Betadine Solution®, Betadine Ointment® or dilute Nolvasan® 3-4 times daily for the first 3 days.

Eggs that do not follow the normal hatching process may require assistance. Radiographs are useful in determining whether an embryo is malpositioned. Further information on hatching assistance is provided in the guidelines below and in the book Hand-Rearing Birds (Kasielke 2007).

The brooder is typically set at 35.6-36.1˚C (96-97˚F) to start and the temperature lowered by ~0.5˚C (1˚F) daily until the chick can thermoregulate at room temperature at about 3 weeks of age. From 3-6 weeks, the chick may be housed in a rubber tub or half of a large air crate. The brooder and tub substrate is usually terrycloth towels that are rumpled into numerous folds to prevent leg splaying. At 6 weeks, the chick may be moved to an outdoor rearing chamber with supplemental radiant heat, such as an unused nestbox adjacent to adult birds. A sturdy wire mesh covering is place over the nestbox opening to allow the chick visual and auditory, but not physical, access to the adult(s) during the remainder of the rearing period (Dorrestein et al. 1980).

Rearing: Varied hand-rearing diets have been used in different facilities, with the majority based on mice and rats, beginning with pinks and graduating quickly to adult feeder animals (Kasielke 2007). Chicks may need to be fed by spoon for the first 2-3 days but should be able to self-feed from a shallow cup or bowl after that. A typical protocol includes finely minced mouse pinks mixed 2:1 with distilled water for the first 3 days, gradually transitioning to chopped fuzzy mice by 6 days, chopped peeled adult mice by 9 days and chopped whole adult mice by 12 days. Introducing fur and bones at this early age aids with proper casting. At 5 weeks, whole rats that have been slit open are added and mice are fed whole beginning at 6 weeks. By 11-12 weeks, adult diet items are being gradually introduced. Note that neither calcium nor vitamin/mineral supplements are normally used in rearing condors. This has not proved necessary due to the very slow growth rate in this species. Older hand-rearing protocols utilized enzymes, probiotics and/or regurgitant from adult birds to assist chicks with digestion but this has since been proved unnecessary (Mazza et al. 1982). Chicks are initially fed every 2.5 hours, 7-8 times daily but this schedule is gradually reduced to 2 daily feedings by 2-3 weeks of age (Zwart & Louwman 1980).

An important consideration in rearing Andean condors is the avoidance of malimprintation on human care givers. Condors should be hand-reared in strict isolation from seeing or hearing humans. Condors that are hand-reared without isolation remain tractable as juveniles but invariably become very aggressive to most handlers once they reach sexual maturity. For this reason, it is advisable to rear even condors intended for education programs in isolation until at or near fledging. This is achieved by keeping the chick in the brooder, tub or chamber in a lighted area while keepers work from behind a curtain in a darkened blind. A life-like condor hand puppet is used as a social focus rather than a feeding implement. The opposite hand can be covered with a closed sleeve of black fabric to disguise the hand but allow enough dexterity to care for the chick. Chicks can be covered with a dark fabric drape to facilitate weighing and brooder cleaning. They may be weighed daily for the first few weeks, then opportunistically. Further information on isolation rearing of condors can be found below and in the book Hand-Rearing Birds (Kasielke 2007).

****The following information on the handling and incubation of condor eggs and rearing of chicks is adapted from a current and effective protocol and is supported by the Andean Condor SSP.**

Sanitation: Prior to retrieving eggs from the condors, several steps should be taken to ensure a clean, disinfected environment for the eggs. The walls and floors of the incubation facilities should be washed with Roccal-D (1oz/gallon of water) and rinsed with water. The same surfaces should then be washed with a solution of one part bleach to 10 parts water, and then rinsed with water again. Incubators can be disinfected using the same steps, but distilled water should be used to rinse after the disinfectant. It is recommended that distilled water be purchased in one-gallon containers to ensure quick usage and avoid contamination.

In addition to the disinfectant procedures described above, an ultraviolet sterilizer can be used in the room for approximately 20 minutes prior to eggs being brought to the incubator room. This sterilizer should not be used when there are already eggs in the incubators. Once the room and incubators have been sterilized, a footbath should be placed outside the entrance door, using Vircon (1.3oz/gallon of water). After feet have been dipped and the trailer is entered, plastic slip-on booties should be worn over freshly dipped shoes to keep the floors of the incubation facility sanitary. Lab coats should always be worn upon entering the trailer, and hands should be clean (washed with soap before entering the trailer).

Exam gloves should always be worn during the handling of eggs. If booties are worn outside of trailers they should be discarded and replaced. Lab coats should be washed, and gloves and booties replaced, weekly.

Incubator preparation: Incubators should be sterilized (as described above) after they have been checked over for proper operation, and when egg laying is near. All of the working parts of the incubator should be checked before the season begins. It is recommended that the machines be run for several weeks prior to egg season. This will insure that the turners and thermostat controls are all functioning properly, and that fan belts and motors are in good working order, before the machines are sterilized and eggs put in them. Once it is determined that the machines are in good running order, they can be left running. Temperature and turning cycles should be continually monitored during this time. Temperatures should be checked 4-5 times daily and recorded on data sheets.

If there is a known standard wet-bulb/relative humidity parameter for the egg that is to go in a particular machine, it can be set a couple of days ahead of receiving the egg. Condor eggs vary in humidity requirements, and it is best to go with the history of eggs from the pair of origin and then adjust as necessary.

Collection of eggs: Prior to collecting eggs for the incubator, it is advised to have a container with fine seed (e.g., finch mix) heated to approx. 35 °C (95 °F) for transporting the eggs from the nest box to the incubator. A portable brooder can also be used if it is set up ahead of time to attain the aforementioned temperature. At least two individuals should be present to pull eggs from Andean condor pairs. Some pairs can be aggressive at nest sites, and one person will need to hold the birds off while the other removes the egg. This process can be facilitated by bringing food items into the enclosure, and enticing the birds to leave the nest box voluntarily. The second person can also assist with gates and doors as the egg is transported to the incubation facility. The eggs should only be handled with exam gloves, and not with bare hands.

Examining and preparing eggs for incubation: Once the eggs are in the incubation facility, they should be closely examined. Any excess dirt/debris or fecal material should be lightly brushed off with a scrub pad. After the debris is brushed off the surface of the egg, the egg should be checked for cracks, thin spots, and any possible abnormalities inside the egg. This is accomplished by looking closely at the surface of the egg with the naked eye, and by candling. Any cracks or serious thin spots should be repaired using white glue such as Elmer's. Paraffin can also be used. While candling, the air cell should be located and outlined with a pencil, if it is present. Eggs pulled fresh may not have an air cell.

Once the egg has been examined and repaired, it should also be measured with calipers and weighed. If the egg is non-incubated and is considered fresh, the first day of incubation should be considered day zero. If the egg has had incubation within the first 24 hours, it should be considered day one, etc. A weight-loss table should be set up, showing daily weights based on the initial weight taken and figuring in a 14% weight loss by pip. A chart based on a 12% weight loss can also be used to ensure that the egg is staying in a "safe" weight loss range between the two parameters. A computer program can be used to calculate daily weight loss.

Just before the egg is placed in the incubator, it should be clearly identified (e.g., egg number and dam's in-house I.D) and labeled with arrows and numbers to keep track of the egg's position for manual turning (e.g., 1↑, 2, 3, 4↓). All markings should be made with a #2 pencil. The point of the pencil should be oblique to the surface of the egg, and pressing hard on the shell should be avoided.

Eggs in the incubator: Eggs should be placed in the incubator horizontally, with the air cell pointing left. The egg should fit snugly in the tray so that it will not move during automatic turning. It is suggested that the eggs be placed on a softer buffer material such as nylon netting rather than directly on the metal trays. The automatic turners should be set to turn the eggs every hour. In addition, the eggs should also be turned one-quarter turn every 12 hours in one direction until a complete rotation has occurred. Then the process should be repeated in the opposite direction. Incubation temperature for California condor eggs is 36.4-36.6 °C (97.5-98 °F). The humidity readings (either as relative humidity or wet-bulb temperature) will vary with individual eggs. This will be determined with weight loss progression, as mentioned above.

In some cases, eggs will not lose enough weight even when the incubators are completely dry. If this is noticed in eggs from certain pairs, it is suggested that eggs be left with the parents for approximately 10 days before moving to the incubator. This will "set" the egg on a proper weight-loss course for the duration of incubation. The water pans that are used as the humidity source in the incubators should be changed at least twice a week, as should wet-bulb reservoirs, wicking, ear syringes, and any containers used to fill water pans. These items should be sterilized before being used again. A dishwasher/sterilizer can be used for this purpose. Staff should check incubators routinely several times a day to take temperature reading for dry and wet-bulb averages, and to ensure that the turner is working properly, as well as other incubation functions. Record sheets to record parameters, egg-tray positions, and any problems that might be noted, should be available near the machines.

Weighing and candling: Eggs should be weighed and candled on a regular basis. Candling normally can be done daily, at least through the first 14 days. Within the first four days of candling, fertility should be determined. If this is not the case, the egg should be left in the incubator for 10-14 days before it is removed to ensure there has not been delayed initial development (which has been observed in rare cases). During mid-incubation, it is not necessary to candle every day. By late term, the frequency of candling should increase to cover the critical time of the air cell drop and the chick's progression toward entering the air cell. If these activities seem to be falling behind relative to incubation, and it is noted that there seems to be a lack of activity during candling, it is suggested that the eggs be radiographed to determine if the chick is malpositioned. Based on the results of the radiographs, plans can be made to intervene in the hatching of the chick, if necessary.

Weighing the eggs can be performed on a more regular basis to keep eggs on track for attaining the desired weight loss by pip. Humidity can be adjusted accordingly to speed up or slow down weight loss to attain the aforementioned 14% weight loss.

Weighing and candling should be done with care. During candling, eggs should be held with the air cell against the light for short periods of time, and the egg rotated back and forth on its longitudinal axis with a steady, gentle motion. Weighing should be done on a buffered platform scale to ensure the egg will not roll off. As always, care should be taken to avoid contaminating the egg by using exam gloves and lab coats.

Pipping and hatching: Once it has been determined that the chick is pushing on the air cell, the egg should be checked around the clock on an hourly basis to determine the hour of pip. The egg should be turned a half turn every hour, and it can be tapped and vocalized to in order to stimulate the chick to continue the hatching process. Once the chick has pipped the shell, its pip weight should be taken, and it should be removed from the incubator and taken to a hatcher. The type of hatcher may vary. At an AZA Accredited Institution, a custom-made incubator box with wafer-controlled thermostats for incubation temperature and backup is used. The incubator has been modified to be a still-air hatcher by installing a switch to shut off the circulation fan. The control temperature is maintained between 36.1-36.6 °C (97-98 °F), and the wet-bulb temperature is between 31.1-32.2 °C (88-90 °F).

As still-air hatchers have uneven temperatures throughout, it is important to "map" the control temperature for the egg at a specific point in the machine, and place the egg in that specific spot. The temperature should be measured at the top of the egg. The egg should be "corralled" so that it cannot roll away from its mapped spot as the chick is moving inside the egg. During this time, animal care staff members should be available around the clock to monitor the egg and hatcher. At minimum, checks should be performed hourly. Beginning at one hour from pip, the egg can be stimulated every other hour by vulture noises played to the chick through a stereo player with a speaker that has been pre-installed in the hatcher.

Activity levels can be monitored and scored on a rating from 0 to 3, with 0 meaning no activity at all, and 3 meaning violent rocking or rotation. These scores can be compared to the activity of previous chicks to see how their activity levels compare at the same hour from pip. This subjective analysis can be used to get an idea of a chick's vitality compared to that of previous chicks during the pip-to-hatch interval.

Optimally, condor chicks will hatch without any assistance. Once rotation begins, it can be several hours before the chick is entirely out of the shell. The tapping of the egg and playing of vulture noises, as mentioned above, are very helpful to stimulate the chick to get out of the shell at this time. Careful monitoring of the chick's vitality should be maintained. If for some reason the chick continues to rotate without breaking shell, it is important to intervene as quickly as possible because the chick could rotate under the shell and suffocate (see below). Once the chick has capped the shell and its head is free, it can be moved from the hatcher. At this time, the chick should be examined thoroughly to check for abnormalities, etc. There may be a few tiny blood vessels going into the seal, which can be tied off and cut just above the entry into the seal. The seal area should have any waste material removed from it with a sterile swab. Any albumen that may be stuck to the chick's body can also be removed at this time. Routine cultures should be taken of the seal, cloaca, and eggshell membranes. It is important that no antiseptic be used on these surfaces until after the cultures are taken. Nolvasan Solution diluted 1:4 with distilled water can be used to clean the area around the seal and other areas. The chick can then be placed in a brooder for rearing. It is recommended that Nolvasan Solution or similar antiseptic be applied to the seal area three times a day for the first 72 hours.

- Assisted hatches: In some circumstances, it may be necessary to help a chick out at hatch. This may be due to several causes, including incubation parameters (irregular weight loss) or malpositions. The protocol for California condors is to intervene at 72 hours from pip, unless extreme circumstances dictate otherwise. The 72-hour time period was chosen because it appeared to be a point at which it was safe to proceed with a breakout, knowing that the yolk sac would be fully retracted and the blood vessels shut down. When it has been determined that a breakout needs to be done, every effort should be made to set up equipment ahead of time and to keep the area where the breakout occurs sterile. Smocks, lab coats, surgical gloves, caps, and masks should be worn. If possible, setting the breakout room temperature to at least 32.2°C (90°F) will prevent the chick from getting chilled during the procedure. Once the breakout team (which should include a veterinarian as well as keepers experienced in breakouts) is assembled, the tools, such as hemostats, tweezers, scissors etc., can be unpacked. The egg can be removed from the incubator, and the breakout can begin. Usually, the shell is broken starting from the pip site, and the hole around the area of the air cell is enlarged. As the hole is enlarged, warm saline solution can be sprayed on the membranes to enhance the visibility of blood vessels that may be active. Once the cap on the air cell has been removed, the breakout team can proceed to work down to the small end of the egg. It is best to try to look down inside the egg as far as possible to locate possible active vessels. As the breakout progresses further down the egg, the head should be freed last. At this point, it is possible to look down between the legs of the chick to view the status of the yolk sac. Hopefully, it has been fully retracted. If not, it becomes a veterinary procedure. After the head is free and the shell is removed until roughly halfway down the side, it is with little effort that the chick can be removed from the shell by gently tipping the egg downward while supporting the chick's head and upper body. The egg waste and blood vessels leading into the seal should be supported in order to not pull down on the seal. Once the chick is free, it should be examined to ensure that there are no deformities and that the seal is closed. If all appears normal, then the protocol for post-hatch, as mentioned above, should be followed.
- Malpositions: Malpositions should be treated as individual cases, depending on the circumstances. Eggs should be radiographed whenever it is suspected that they are not progressing as they should during late term. Some of the conditions for malpositions may be more difficult to deal with than others. In these cases, it is best to consult with other institutions that have dealt with malpositions for advice, as well as to work closely with veterinary staff.

Hand-rearing Protocols: After hatching, chicks may progress at different rates. The following table (Table 9) provides feeding guidelines based on records over several seasons with the SSP.

Table 9: Andean condor chick hand-rearing feeding guidelines

Age	Notes
Day 1-3	- Do not feed until chick has passed a stool - Offer minced pinkies. Supplement pinkies with calcium carbonate ($CaCO_3$) - Start to introduce puppet and get chick to eat on its own by Day 3
Day 3-4	- Graduate from minced pinkies to chopped pinkies (supplement with $CaCO_3$)
Day 6-7	- Start feeding whole, tenderized pinkies (supplement with $CaCO_3$)
Day 7-8	- Graduate to skinned fuzzy torsos
Day 13-15	- Offer small to medium mouse torsos
Day 19-21	- Chicks should be thermoregulating. Turn off heat but leave isolettes running for ventilation
Day 20-24	- Offer mouse torsos with back fur
Day 27-29	- Offer whole, peeled mice (tails removed)
Day 30	- Move from isolette to outdoor “nest area” and start on adult diet - Chicks are fed an adult diet of “bite-sized” melt/spleen, carnivore meat, and one trout (slit ventrally) - Two days a week, chicks are offered 15-16 whole mice
Day 40-45	- Add one rat (slit ventrally) to adult diet.
2-3 months	- Fast* chick one day per week (Monday).
3-4 months	- Fast* chick two days per week (Monday & Thursday).
After fledge	- Fast* chick three days per week (Monday, Thursday, & Saturday) and add one adult condor diet to adult food tubs.

* Fast days may be subject to change

7.6 Controlled Reproduction

Permanent sterilization is not recommended for Andean condors as a means to control reproduction. To prevent successful breeding between pairs of birds, males and females can be physically separated during the breeding season, or fertile eggs removed (and replaced with dummy eggs) if they are laid. See Appendix I for egg euthanasia training forms.

Egg Embryo Euthanasia

Potential Reasons for euthanasia

- Unplanned or inadvertent egg-laying outside of requests from AZA, foreign zoo associations, consortiums to not propagate certain species or offspring from specific condors.
- SSP collection management (reduce potential for overpopulation within the collection or species being phased out of collection plan).
- Eggs produced by parents with a history of genetic defects or mutations.
- No other facilities are willing/able to receive a chick/bird.
- Lack of suitable space or other resources to hold the specimen on a long-term basis without creating hardship for other collection specimens.
- Part of an approved research protocol (SSP & IACUC).
- In case of infectious disease outbreak (Avian Influenza, Exotic Newcastle’s disease for example).

Method(s) of euthanasia

Eggs from collection birds of unknown incubation stage or incubation stage 50% or greater (guideline – candling reveals circulation complete at air cell)

- Contact AZA SSP Coordinator and appropriate supervisor to discuss euthanasia and determine time. Leave eggs in nest or incubator until ready to euthanize.
- Eggs should be transported directly to the site of euthanasia. During transport handle eggs as if incubation were to proceed (handle gently; do not leave at ambient temperature for extended periods). Entered into your zoo’s Egg Log or the Keeper Egg Records.
- Euthanize by exposure to 90 – 100% CO2 for at least 20 minutes.
- Only trained staff members are allowed to euthanize eggs (see Appendix I for training documentation form).

- Eggs from collection birds less than 50% incubation (neural tube not closed; less chance of embryo feeling pain or stress; candling reveals circulation not complete at air cell):
    - Contact appropriate supervisor to discuss euthanasia and method. Document in your zoo's records.
    - Euthanize by cooling (4 hours at 4.4 °C/40 °F) or freezing (1 hour).
    - Alternative; euthanize by exposure to 90 – 100% CO_2 for at least 20 minutes.
- Research Project eggs (approved by AZA Andean Condor SSP)
    - Whenever possible, euthanasia of eggs used for teaching or research should follow the above recommendations.
    - Exceptions may be made on a case-by-case basis if approved by the IACUC. For example, in situations where use of CO_2 is not practicable (BL3 lab, field), other methods such as chilling or decapitation may be allowed. It is recommended that chilling of late-term or unknown-term eggs be followed by freezing or decapitation to ensure death.

Disposal of euthanized eggs

- Eggs potentially exposed to pathogens – dispose according to your zoo's medical waste protocol (red bags).
- Upon mutual agreement of the curator and pathologist, necropsy of euthanized eggs may be performed in special cases.

Chapter 8. Behavior Management

8.1 Animal Training

Classical and operant conditioning techniques have been used to train animals for over a century. Classical conditioning is a form of associative learning demonstrated by Ivan Pavlov. Classical conditioning involves the presentation of a neutral stimulus that will be conditioned (CS) along with an unconditioned stimulus that evokes an innate, often reflexive, response (US). If the CS and the US are repeatedly paired, eventually the two stimuli become associated and the animal will begin to produce a conditioned behavioral response to the CS.

Operant conditioning uses the consequences of a behavior to modify the occurrence and form of that behavior. Reinforcement and punishment are the core tools of operant conditioning. Positive reinforcement occurs when a behavior is followed by a favorable stimulus to increase the frequency of that behavior. Negative reinforcement occurs when a behavior is followed by the removal of an aversive stimulus to also increase the frequency of that behavior. Positive punishment occurs when a behavior is followed by an aversive stimulus to decrease the frequency of that behavior. Negative punishment occurs when a behavior is followed by the removal of a favorable stimulus also to decrease the frequency of that behavior. AZA-accredited institutions are expected to utilize reinforcing conditioning techniques to facilitate husbandry procedures and behavioral research investigations.

An environment that allows for the rehearsal of aggression by Andean condors towards trainers should be avoided. The use of aversive and/or coercive training techniques and punishment are not recommended, and typically only encourage further aggression in this species. The housing and training plan should be designed to encourage good behavior and avoid putting the bird in a position where it can rehearse unwanted behaviors.

Education Animals: Free-flight behavior routines for Andean condors used as program animals should be customized for each individual bird based on physical and mental ability. Birds demonstrating aggression towards animal caretakers during training in the enclosure should be shifted into a separate enclosure, or trained to run into a crate for daily weights and cleaning/servicing of the enclosure. Imprinted condors that are aggressive in close contact to trainers can be trained for free-flight demonstrations by utilizing protected contact approaches; transport crates can be used to send and receive birds during their free-flight routines.

8.2 Environmental Enrichment

Environmental enrichment, also called behavioral enrichment, refers to the practice of providing a variety of stimuli to the animal's environment, or changing the environment itself to increase physical activity, stimulate cognition, and promote natural behaviors. Stimuli, including natural and artificial objects, scents, and sounds are presented in a safe way for the animals to interact with. Some suggestions include providing food in a variety of ways (i.e., frozen in ice or in a manner that requires an animal to solve simple puzzles to obtain it), using the presence or scent/sounds of other animals of the same or different species, and incorporating an animal training (husbandry or behavioral research) regime in the daily schedule.

> **AZA Accreditation Standard**
>
> **(1.6.1)** The institution must have a formal written enrichment program that promotes species-appropriate behavioral opportunities.

It is recommended that an enrichment program be based on current information in biology, and should include the following elements: goal-setting, planning and approval process, implementation, documentation/record-keeping, evaluation, and subsequent program refinement. Environmental enrichment programs should ensure that all environmental enrichment devices (EEDs) are safe and are presented on a variable schedule to prevent habituation. AZA-accredited institutions must have a formal written enrichment program that promotes species-appropriate behavioral opportunities (AZA Accreditation Standard 1.6.1).

Enrichment programs should be integrated with veterinary care, nutrition, and animal training programs to maximize the effectiveness and quality of animal care provided. AZA-accredited institutions must have specific staff members assigned to oversee, implement, train, and coordinate interdepartmental enrichment programs (AZA Accreditation Standard 1.6.2). Enrichment should be recorded in animal records, including training sessions and shows which are forms of enrichment for Education birds. See Appendix J for a sample Andean Condor Enrichment Form.

Enrichment items that encourage foraging, ripping, and tearing behavior are beneficial for Andean condors. For example, cow femur bones can be used as food enrichment as they provide an opportunity for ripping and tearing. Food enrichment for condors can also include feeding whole carcasses that mimic what they would encounter in the wild (see Chapter 5, section 5.2 for additional information on carcass feeding considerations). This method is recommended for young condors being held in preparation for release into the wild.

AZA Accreditation Standard

(1.6.2) The institution must have a specific staff member(s) or committee assigned for enrichment program oversight, implementation, training, and interdepartmental coordination of enrichment efforts.

Non-food items can include browse plants, as long as they are non-toxic (see Chapter 5, section 5.2 for more information on browse). Branches with bark and leaves to strip can be provided, and pumpkins/gourds can be offered whole, or carved and hollowed out with meat food items inside. Any non plant/food items such as large rubber Kong toys and Boomer balls can be offered, but should be large and durable enough to prevent swallowing or partial ingestion. Non-food items should be carefully supervised. Any rubber or plastic item offered should be regularly inspected for wear and damage, and immediately removed from the enclosure if wear could cause risk of ingestion. Cardboard tubes, boxes and paper provide the opportunity for tearing and shredding behavior. Andean condors also make use of regular bathing opportunities, and large tubs can be provided with water to offer the birds with the opportunity to immerse themselves fully during bathing. An average weekly schedule might include flying daily in 1 show minimum, bath pan provided daily, and enrichment devices rotated out daily.

8.3 Staff and Animal Interactions

Animal training and environmental enrichment protocols and techniques should be based on interactions that promote safety for all involved. Utilizing falconry equipment, such as anklets, jesses or a leash is not recommended for Andean condors. Due to their ground dwelling tendencies and active behavioral repertoire, it is preferred that these birds are managed without the use of tethering equipment.

Andean condors can become imprinted on humans. It is recommended that chicks destined to become future breeding stock and release candidates be parent-reared whenever possible. Andean condors slated for release in the wild can develop dependency on humans if there is a direct association with human activities. Therefore, it is recommended that release candidates be sent to holding facilities that are not on public display once the chicks have fledged and are no longer dependent on their parents.

Program Animals: Andean condors can be successfully trained and utilized for conservation and education programs and free-flight demonstrations. Individuals used in these programs are typically hand-reared and imprinted on their human caretakers. Parent-reared birds can be utilized if properly socialized and desensitized to humans and the training environment. If birds are to be parent-reared, it is recommended that the birds are transitioned to a training environment at a young age, preferably before the age of fledging. All individual birds should be regularly assessed for suitability as program animals. Birds demonstrating high levels of stress or aggression should be re-evaluated for further involvement in the education and training program. It is recommended that condors utilized for educational programs be trained utilizing operant conditioning positive reinforcement training methods (see section 8.1).

Imprinted birds will typically bond strongly with a few individuals and can be aggressive towards others. These birds should only be free flown in public venues if the bird is under well-conditioned stimulus control and does not act overtly aggressive towards guests or bystanders.

It is recommended that birds frequently used in education programs be conditioned to enter and exit a transport box (i.e., crate) to allow for stress free and safe transport. The transport box should be large enough for the condor to stand up to full height and turn around comfortably. The crate should have adequate ventilation, but be designed to protect the feathers, feet, and face of the bird during transport. The bird should also be trained to stand on a scale or enter the crate for daily/regular weighing, especially when in training.

It is not recommended that trainers handle condors with the same methods as raptors such as eagles and hawks, which are held on a gloved arm. A hands-off method is better utilized with this species except with very strong trainer/bird relationships.

8.4 Staff Skills and Training

Staff members should be trained in all areas of animal behavior management. Funding should be provided for AZA continuing education courses, related meetings, conference participation, and other professional opportunities. A reference library appropriate to the size and complexity of the institution should be available to all staff and volunteers to provide them with accurate information on the behavioral needs of the animals with which they work.

Animal caretakers (including trainers and education staff involved in Andean condor programs) should have a complete understanding of the natural history, behavior, and biology of Andean condors, and of the needs of the individual animals. Animal caretakers involved in training should understand and have practical experience utilizing operant conditioning training techniques.

Chapter 9. Program Animals

9.1 Program Animal Policy

AZA recognizes many public education and, ultimately, conservation benefits from program animal presentations. AZA's Conservation Education Committee's Program Animal Position Statement (Appendix D) summarizes the value of program animal presentations.

For the purpose of this policy, a program animal is described as an animal presented either within or outside of its normal exhibit or holding area that is intended to have regular proximity to or physical contact with trainers, handlers, the public, or will be part of an ongoing conservation education/outreach program.

Program animal presentations bring a host of responsibilities, including the welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that give program animal presentations to develop an institutional program animal policy that clearly identifies and justifies those species and individuals approved as program animals and details their long-term management plan and educational program objectives.

AZA's accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, sound and environmental enrichment, access to veterinary care, nutrition, and other related standards (AZA Accreditation Standard 1.5.4). In addition, providing program animals with options to choose among a variety of conditions within their environment is essential to ensuring effective care, welfare, and management. Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, housing may be reduced in size compared to a primary enclosure as long as the animal's physical and psychological needs are being met during the program; upon return to the facility the animal should be returned to its species-appropriate housing as described above.

AZA Accreditation Standard

(1.5.4) A written policy on the use of live animals in programs should be on file. Animals in education programs must be maintained and cared for by trained staff, and housing conditions must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, social and environmental enrichment, access to veterinary care, nutrition, etc. Since some of these requirements can be met outside of the primary enclosure, for example, enclosures may be reduced in size provided that the animal's physical and psychological needs are being met.

Condors should be housed in a manner that allows for full range of movement, bathing, sunning, and choice of varied perching areas. Condors will spend time on high perching as well as the ground, and should have various perching levels available. Vultures in general prefer flat perching, such as stumps, shelving and rocks, but should also have a choice of round perching/logs as well. Condors are typically fastidious bathers and should have access to an adequately sized pool to bath in with fresh water. Condors spend much time sunning and should have full access to sun and shelter from inclement weather. Condors will track urates and fecal matter onto all perching surfaces so perching and substrate should be easy to access to clean and disinfect. Water pools/bath pans should be kept fresh and clean. Contact with non-collection, native birds through co-mingling in the enclosure or scavenging of diet items can expose collection birds to disease. Attempts should be made to eliminate or to limit direct contact exposure to native species through enclosure mesh and roofing. All keepers should wash hands before and after handling of birds or cleaning of enclosures. Food should not be consumed in the immediate area or bird enclosures.

Condors are highly social and interactive and require a high level of mental stimulation and interaction. Housing areas in a high traffic location typically offer increased mental stimulation and enrichment. The ability to view con-specifics and other species and handlers throughout the day allows for many hours of stimulation. Condors trained with Operant Conditioning techniques and offered the opportunity to free fly or otherwise participate in Educational Programs have the ability to get additional exercise and conditioning. Birds imprinted on humans may choose to interact with humans directly through tactile stimulation and will typically engage in courtship and breeding behavior when sexually mature. Human imprints require a significant amount of human interaction in lieu of interaction with con-specifics. Size of housing varies depending on the bird's opportunities for outside access to exercise, i.e., free flight in programs. Full time housing can be smaller than exhibit housing when birds are given frequent opportunity to fly and run outside of the enclosure. Enclosures smaller than 12 feet by 12 feet (or 150 square feet) are not recommended due to the size of the birds wingspan and need to move from perch to perch. Being conditioned to enter and exit travel kennels voluntarily allows for daily weight collection, transport for Educational programs/shows as well as for veterinary procedures. Birds can also be crated for daily enclosure and exhibit servicing if needed to allow for thorough cleaning/disinfecting of housing areas. With imprinted birds that have a strong relationship with the handler's, voluntary injections, beak trimming and physical examinations without restraint are possible.

Due to the social/gregarious nature of condors, an educational/show facility can meet the needs of these birds due to the high level of interaction and activity on a daily basis. Through Operant Conditioning training technique, the birds are given the choice to experience a high level of variability in the environment. Whether they have con-specifics in the area, like species (other vulture species), or other species altogether there is a high level of mental stimulation. Due to the all day monitoring of birds in educational facilities a wide variety of enrichment items can be offered and monitored for safety, interest and activity level. With imprinted individuals who have relationships with trainers/keepers daily physical interaction is also offered for enrichment. Participating in educational programs/shows allows for daily variability and stimulation in the environment.

9.2 Institutional Program Animal Plans

AZA's policy on the presentation of animals is as follows: AZA is dedicated to excellence in animal care and welfare, conservation, education, research, and the presentation of animals in ways that inspire respect for wildlife and nature. AZA's position is that animals should always be presented in adherence to the following core principles:

- Animal and human health, safety, and welfare are never compromised.
- Education and a meaningful conservation message are integral components of the presentation.
- The individual animals involved are consistently maintained in a manner that meets their social, physical, behavioral, and nutritional needs.

AZA-accredited institutions which have designated program animals are required to develop their own Institutional Program Animal Policy that articulates and evaluates the program benefits (see Appendix E for recommendations). Program animals should be consistently maintained in a manner that meets their social, physical, behavioral, and nutritional needs. Education and conservation messaging must be an integral component of any program animal demonstration (AZA Accreditation Standard 1.5.3).

AZA Accreditation Standard

(1.5.3) If animal demonstrations are a part of the institution's programs, an education and conservation message must be an integral component.

Program Animal Protocols: Animal care and education staff should be trained in program animal-specific handling protocols, conservation and education messaging techniques, and public interaction procedures. These staff members should be competent in recognizing stress or discomfort behaviors exhibited by the program animals and able to address any safety issues that arise. The AZA Andean Condor SSP recommends that education staff be familiar with the education messages found in Chapter 11 of this ACM.

Andean condors have been utilized in various types of programming including educational presentations and formal free flight bird shows. Due to the long lifespan of Andean condors, a lifetime commitment must be made to ensure that the staff training and environment is conducive to long term, successful management of the individual. Hand raised human imprinted birds can develop high levels of aggression at maturity to non-bonded trainers which can lead to management problems. Puppet raised and parent raised/socialized birds will typically have a higher likelihood of long term success. It is recommended that training programs have protected contact training techniques integrated into the program to allow for hands-off management when necessary. Falconry tethering equipment is not appropriate for condors. Condors are highly active foragers and should not be restricted in their movement with attached jesses or tethers. They should be free lofted and have freedom of movement when utilized in programs/shows. Only staff with considerable experience training condors should attempt to train an older bird with no previous exposure to a training environment. Experienced staff should monitor the behavior of an older bird through the training process to assess whether the training environment is appropriate and enriching to that bird or if the bird is exhibiting high levels of stress or aggression.

Facilities that maintain a collection of birds for educational programming provide daily attention and enrichment through training and servicing of the animals. A well developed program designs its facility and schedule to meet the needs of highly social animals like condors. These facilities have staff available 365 days a year, 8-10 hours a day, and provide each bird's needs on a daily basis. Birds utilized in programs are closely monitored daily, and food intake can be monitored for each individual bird. Trained birds can be weighed daily and separated from other birds when necessary to ensure consumption of diet items. A variety of food can be offered and consumption closely monitored and recorded. Birds that are free flown in programs have the opportunity to fly and exercise on a regular or daily basis and are encouraged to participate through Operant Conditioning.

Condors are large and powerful birds that can demonstrate a high level of aggression and inflict serious injury. When trained by experienced trainers utilizing Operant Conditioning in an environment where aversive stimuli are avoided, the frequency of aggression can be decreased or eliminated altogether. Due to their longevity and social nature, condors benefit from facilities with a permanent staff with a low turnover of employees. Condors have the ability to build very strong relationships with handlers and are less likely to build new relationships later in life. The social structure and hierarchy of wild condors is complex, and introducing new handlers to a condor repeatedly later in life will typically increase the level of aggression. Trainers should be experienced and well trained to identify various body posturing and behavior of condors, especially precursors to aggression. Condors should only be handled by experienced personnel. Operant Conditioning techniques should be utilized in all training programs. Aversive techniques and coercion techniques should not be utilized in the training of condors. If these techniques are used the frequency of aggression will likely increase as will the danger to staff and public. Additionally, techniques intended to dominate a condor should not be used and are likely to increase the frequency of aggression. It's recommended that condors should be trained to shift out of enclosures into a shift pen or crate for cleaning and servicing of the enclosure if volunteers, docents or less experienced staff are needed to complete these duties.

Condors should always be handled in a manner that creates a comfortable environment for the bird, with the choice to participate in the training program and activity or not to participate. Individual birds vary and some individuals are highly motivated by tactile reinforcement from trainers. Well socialized birds that have demonstrated a low level of aggressive tendencies, and that are under stimulus control through Operant Conditioning techniques, can be handled in areas close to the public. Birds that demonstrate aggression frequently should be assessed for the potential of aggression towards the public. The topography of the behavior should facilitate the free flight of the bird over or near the public with a safe end/landing point that encourages the bird to successfully complete the behavior without interacting with the public. It is not recommended to allow guest contact with this taxa, as there is the potential for injury based on the reach and bite strength of a condor.

Indicators that a condor is experiencing stress include flying at walls, running back and forth on the ground, climbing walls, feathers slicked down, neck elongated, mouth open hissing, displacement through biting at legs, feet and perching, and regurgitation of food. When these signs are observed all housing factors (i.e. their proximity to activity, their noise levels) should be accessed to determine their affects. If activity in the area is causing high levels of stress (i.e. a construction project), and the bird's physical reactions are likely to result in injury, then action should be taken to calm the bird through visual barriers, temporary re-location, or permanent relocation if desensitization is not possible or conducive to the situation. Thorough records should be kept documenting the behaviors.

Daily record keeping systems should include daily diet intake, weight, behavior, comments on training sessions and interactions, and steps taken in training sessions. Courtship and breeding behavior or abnormal behavior should also be noted. Any aggression should be detailed and highlighted. Medical notes and observations, as well as any medications dispensed, should also be recorded. Any aggressive incidents should be communicated to staff through records and reports when involving bites to trainers or aggression directed toward bystanders. Any developing patterns of aggressive behavior should be thoroughly discussed and assessed.

Any part time or seasonal staff should be assessed for level of experience when re-entering the work area. Level of experience and length of time out of the area will determine whether re-training is required before handling individuals in this taxon.

Program animals that are taken off zoo or aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5)

Animals leaving the facility for off site programming should be fully protected from interaction with non-collection animals. Representatives from the facility should contact the destination (news station, hotel, event center, school, etc.) before event/arrival to determine that no other animals will share the facility just prior to or during the scheduled event. Furniture such as bath pans, carpets and perching utilized for the presentation should be brought with the collection birds. All diet items should also be brought from the home facility. Disinfecting agents, water supplies (spray bottles for keeping animals cool), and hand sanitizer should be brought along. Guidelines should be in place outlining the event and the handling procedures. In the event that a program animal has come in to contact with non-collection bird(s) and there is a possibility of disease transmission, it is recommended that the bird serve up to a week long re-entry quarantine to allow for any testing or observation by veterinary staff to confirm the health of the bird.

AZA Accreditation Standard

(1.5.5) For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.

AZA Accreditation Standard

(10.3.3) All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.

AZA Accreditation Standard

(1.5.2) Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single specimens should be avoided unless biologically correct for the species involved.

AZA Accreditation Standard

(1.5.11) Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to.

Careful consideration must be given to the design and size of all program animal enclosures, including exhibit, off-exhibit holding, hospital, quarantine, and isolation areas, such that the physical, social, behavioral, and psychological needs of the species are met and species-appropriate behaviors are facilitated (AZA Accreditation Standards 10.3.3; 1.5.2).

Animal transportation must be conducted in a manner that is lawful, safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public (AZA Accreditation Standard 1.5.11).

Operant Conditioning training techniques should be utilized to condition birds to enter and exit the enclosure. Transport carriers should be large enough for the bird to stand at full height, and turn around comfortably, and be designed for ease of entry and exit. Any openings should be covered if needed to protect feathers from damage while still allowing adequate air circulation. Fans should be mounted on travel carriers in hot temperatures. Birds naive to a transport crate should be trained using approximations and desensitization with positive reinforcement. The bird should have the choice to enter and exit for reinforcement. When transporting a bird in a carrier, handlers should handle the crate with sensitivity and balance to prevent unnecessary jostling and discomfort to the bird. If the bird shows signs of discomfort while traveling, transport crates should be covered to give the bird a sheltered environment.

Custom made transport carriers of appropriate size or the "Giant" version of the Veri-Kennel should adequately contain the bird and prevent accidental release, and be inspected to ensure that no sharp edges or other potential hazards exist inside the crate. Birds that are trained to enter and exit transport carriers utilizing Operant Conditioning techniques can be transported for programs as well as crated for routine weighing, trips to the veterinarian, and while the enclosure is serviced. The bird should not be forced, chased or netted to enter the crate in lieu of training except in an emergency situation or evacuation.

Each bird is an individual. Some birds will choose to sit in the rain and others will choose to avoid rain altogether. Birds that live in excessively hot or cold environments and are acclimated to the temperature will have a wider range of tolerance. A bird's behavior should always be monitored in hot climates and accessed based on physical signs of heat related stress. If birds are flying, or otherwise engaged in programs during hot weather, they should be monitored and removed from programs when necessary. Fresh water should always be available, but handlers should be aware that birds will not necessarily utilize water elements to cool themselves when overheated. Hose spray, overhead mister systems or air-conditioned areas should be utilized if birds appear to be suffering from heat related stress. Housing areas should offer shelter from sun and inclement weather giving the bird the option of sun or shade as well as wind, rain or snow.

Each bird is an individual and may have a longer or shorter attention span or desire for interaction. With Operant Conditioning training techniques birds are given the choice to participate. It should be clear to the trainers that the bird is choosing to participate by giving them the ability to choose to approach trainers or retreat, exit the enclosure or by entering or exiting the transport crate. During programs, the demonstrations should be designed so that the bird can choose to exit at any time into a safe environment i.e. backstage, into a crate, back into the enclosure, etc. Condors are large birds, and long distance travel may involve being confined to a small space. On long journeys, the bird should have a larger enclosure available at the destination to allow for full wing extension, full range of movement, bathing and preening. All behavior should be documented in daily records and any aggression or avoidance behavior should be noted. If the bird is showing signs of stress or displacement, further travel or program involvement should be re-evaluated. As long as the bird is choosing to cooperate without being coerced, then the length of time will vary significantly from bird to bird. The bird’s threshold for program involvement should be determined based on behavior, and may have seasonal variations and vary depending on whether the bird is parent raised or imprinted on humans.

9.3 Program Evaluation

AZA-accredited institutions which have Institutional Program Animal Plan are required to evaluate the efficacy of the plan routinely (see Appendix E for recommendations). Education and conservation messaging content retention, animal health and well-being, guest responses, policy effectiveness, and accountability and ramifications of policy violations should be assessed and revised as needed.

It is recommended that presentation and handling guidelines and protocols should be re-evaluated annually or bi-annually. All staff should have access to these guidelines and be provided with updates as needed. All new staff should be signed off on receiving and reading the standards and protocols during orientation and before commencing work in the area.

Protocols should be clear and expectations consistent for all staff. Incidents should be reported to management and any violations of protocols should be dealt with through verbal and/or written disciplinary measures. Repeated violation of protocols that have the potential for or result in the endangerment of animals, staff or public health and/or safety should be dealt with by management through verbal and/or written documentation and punitive measures taken when necessary.

Significant feedback can be gained through formal and informal surveying of shows and educational programs. Surveys should be designed to measure the impact of educational messaging, the benefits of utilizing live animals for programs, and gather useful information on the audience and demographics.

Standards of care can be measured through physical condition and behavior of collection birds. Physical condition of feet, feathers, and vitality should be assessed, as well as overall behavior through daily record keeping, and daily, monthly, and annual physical inspection.

Exit surveys are a valuable tool and can be designed to gather data on level of entertainment and educational value, impact of messaging, and revisitism. Content of programs should always be up to date and accurate and messages consistent. Guests should leave with an understanding of the animal’s natural history, its relationship to humans, and a feeling of respect and responsibility towards the natural world and global conservation.

Chapter 10. Research

10.1 Known Methodologies

AZA believes that contemporary animal management, husbandry, veterinary care and conservation practices should be based in science, and that a commitment to scientific research, both basic and applied, is a trademark of the modern zoological park and aquarium. AZA-accredited institutions have the invaluable opportunity, and are expected to, conduct or facilitate research both in *in situ* and *ex situ* settings to advance scientific knowledge of the animals in our care and enhance the conservation of wild populations. This knowledge might be achieved by participating in AZA Taxon Advisory Group or Species Survival Plan® Program sponsored research, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials (AZA Accreditation Standard 5.3).

AZA Accreditation Standard

(5.3) Institutions should maximize the generation of scientific knowledge gained from the animal collection. This might be achieved by participating in AZA TAG/SSP sponsored research when applicable, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials.

Research Methodologies and Goals: Research investigations, whether observational, behavioral, physiological, or genetically based, should have a clear scientific purpose with the reasonable expectation that they will increase our understanding of the species being investigated and may provide results which benefit the health or welfare of animals in wild populations. Many AZA-accredited institutions incorporate superior positive reinforcement training programs into their routine schedules to facilitate sensory, cognitive, and physiological research investigations and these types of programs are strongly encouraged by the AZA.

Research Policy: AZA-accredited institutions are required to have a clearly written research policy that identifies the types of research being conducted, methods used, staff involved, evaluations of the projects, the animals included, and guidelines for the reporting or publication of any findings (AZA Accreditation Standard 5.2). Institutions must designate a qualified individual designated to oversee and direct its research program (AZA Accreditation Standard 5.1). If institutions are not able to conduct in-house research investigations, they are strongly encouraged to provide financial, personnel, logistical, and other support for priority research and conservation initiatives identified by Taxon Advisory Groups or Species Survival Plan® Programs.

AZA Accreditation Standard

(5.2) Institutions must have a written policy that outlines the type of research that it conducts, methods, staff involvement, evaluations, animals to be involved, and guidelines for publication of findings.

AZA Accreditation Standard

(5.1) Research activities must be under the direction of a person qualified to make informed decisions regarding research.

10.2 Future Research Needs

The AZA Andean Condor Care Manual is a dynamic document that will need to be updated as new information is acquired. Knowledge gaps have been identified throughout the Manual and are included in this section to promote future research investigations. Knowledge gained from areas will maximize AZA-accredited institutions' capacity for excellence in animal care and welfare, as well as enhance conservation initiatives for the species. Research topics for the future include:

Chapter 1. Ambient Environment

Section 1.4. Sound and Vibration: Assessing the effects of sound and vibration on Andean condors

Chapter 7. Reproduction

Section 7.1. Reproductive Physiology and Behavior**:** Determining the age of reproductive senescence.

Section 7.5. Assisted Rearing: Developing a telemeter egg that would monitor temperature, humidity and rotation intervals.

Chapter 10. Research

Section 10.1. Known methodologies: Monitoring post release condors in South America and measuring their habitat utilization in the wild.

Chapter 11. Education Information

11.1 AZA Andean Condor SSP Key Conservation Education Messages

Andean condors play a role in a healthy, well balanced environment.

- Andean condors are nature's recyclers. They are scavengers that eat dead animals.
- Andean condors prevent the spread of disease, such as anthrax and botulism, by eating carcasses. Andean condors are immune to the affects of the toxic bacteria.

Andean condors face many challenges in the wild.

- Andean condors are listed as Endangered by the United States Fish and Wildlife Service and Threatened by International Union for Conservation of Nature.
- Debris and garbage left in the environment can be consumed indirectly as Andean condors scavenge carcasses.
- Carcasses laced with poison meant for predators thought to be pests, or specifically intended for Andean condors due to a perceived fear/threat of the birds is negatively impacting the population. Vultures in Africa and Asia face this same threat.
- Toxic industrial chemicals and pesticides in the environment can become concentrated as they move up the food chain, causing reproductive and other problems for Andean condors that eat contaminated animals. Asian vultures are negatively impacted by the veterinary drug called diclofenac.
- Andean condors have died due to the ingestion of lead shot found in carcasses.
- Andean condors are illegally hunted for the use of body parts in traditional medicines and their perceived threat to livestock.
- Habitat and prey base is decreasing due to increased human population.

Scientists are dedicated to learning more about wild Andean condors in order to conserve them.

- Scientists work in zoos and the wild studying Andean condors, providing data on natural history, distribution, ecology and population status crucial to conservation planning efforts.
- High-tech equipment such as remote cameras, satellite and radio telemetry, diagnostics, laboratory testing of DNA and hormones, and powerful data analysis software assist researchers in learning more about Andean condors in the wild.
- Andean condor research has been used to help save both the Andean and California condors.
- Zoological reproduction, management and release programs are helping wild populations.
- Many organizations, such as the United States Fish and Wildlife Service, AZA Facilities, United States and South American government agencies, NGOs and foreign zoo associations, work together to breed and release birds into the wild.
- Scientists work to raise awareness with local communities and gain their support for Andean condor conservation in the wild.

AZA facilities provide high quality care for Andean condors physical and behavioral well being.

- AZA facilities employ trained professionals to provide care for Andean condors, utilizing the best practices in the industry to maintain high standards of husbandry, nutrition and health care.
- AZA facilities develop behavioral enrichment programs to provide stimulation for the birds and to provide the opportunity for the birds to make choices in their environment.
- AZA facilities utilize training to enhance management practices, and provide meaningful guest experiences (shows).

You can help Andean condors.

- Support Andean condor organizations through your zoo.
- Protect Andean condors and their habitats by keeping the environment free of trash and chemical toxins.
- Support conservation legislation.
- Visit an AZA-accredited facility. Part of your admission costs helps their conservation efforts.

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Appendix A: Accreditation Standards by Chapter

The following specific standards of care relevant to Andean condors are taken from the AZA Accreditation Standards and Related Policies (AZA 2009) and are referenced fully within the chapters of this animal care manual:

General Information

(1.1.1) The institution must comply with all relevant local, state, and federal wildlife laws and regulations. It is understood that, in some cases, AZA accreditation standards are more stringent than existing laws and regulations. In these cases the AZA standard must be met.

Chapter 1

(1.5.4) The animal collection must be protected from weather detrimental to their health.
(10.2.1) Critical life-support systems for the animal collection, including but not limited to plumbing, heating, cooling, aeration, and filtration, must be equipped with a warning mechanism, and emergency backup systems must be available. All mechanical equipment should be under a preventative maintenance program as evidenced through a record-keeping system. Special equipment should be maintained under a maintenance agreement, or a training record should show that staff members are trained for specified maintenance of special equipment.
(1.5.9) The institution must have a regular program of monitoring water quality for collections of fish, pinnipeds, cetaceans, and other aquatic animals. A written record must be maintained to document long-term water quality results and chemical additions.

Chapter 2

(1.5.2) Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single specimens should be avoided unless biologically correct for the species involved.
(10.3.3) All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.
(11.3.3) Special attention must be given to free-ranging animals so that no undue threat is posed to the animal collection, free-ranging animals, or the visiting public. Animals maintained where they will be in contact with the visiting public must be carefully selected, monitored, and treated humanely at all times.
(11.3.1) All animal exhibits and holding areas must be secured to prevent unintentional animal egress.
(11.3.6) Guardrails/barriers must be constructed in all areas where the visiting public could have contact with other than handleable animals.
(11.2.3) All emergency procedures must be written and provided to staff and, where appropriate, to volunteers. Appropriate emergency procedures must be readily available for reference in the event of an actual emergency. These procedures should deal with four basic types of emergencies: fire, weather/environment; injury to staff or a visitor; animal escape.
(11.6.2) Security personnel, whether staff of the institution, or a provided and/or contracted service, must be trained to handle all emergencies in full accordance with the policies and procedures of the institution. In some cases, it is recognized that Security personnel may be in charge of the respective emergency (i.e., shooting teams).
(11.2.4) The institution must have a communication system that can be quickly accessed in case of an emergency.
(11.2.5) A written protocol should be developed involving local police or other emergency agencies and include response times to emergencies.
(11.5.3) Institutions maintaining potentially dangerous animals (sharks, whales, tigers, bears, etc.) must have appropriate safety procedures in place to prevent attacks and injuries by these animals. Appropriate response procedures must also be in place to deal with an attack resulting in an injury. These procedures must be practiced routinely per the emergency drill requirements contained in these standards. Whenever injuries result from these incidents, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident.

Chapter 3

(1.5.11) Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to.

Chapter 5

(2.6.2) A formal nutrition program is recommended to meet the behavioral and nutritional needs of all species and specimens within the collection.
(2.6.3) Animal diets must be of a quality and quantity suitable for each animal's nutritional and psychological needs. Diet formulations and records of analysis of appropriate feed items should be maintained and may be examined by the Visiting Committee. Animal food, especially seafood products, should be purchased from reliable sources that are sustainable and/or well managed.
2.6.1) Animal food preparations must meet all local, state/provincial, and federal regulations.
(2.6.4) The institution should assign at least one person to oversee appropriate browse material for the collection.

Chapter 6

(2.1.1) A full-time staff veterinarian is recommended. However, the Commission realizes that in some cases such is not practical. In those cases, a consulting/part-time veterinarian must be under contract to make at least twice monthly inspections of the animal collection and respond as soon as possible to any emergencies. The Commission also recognizes that certain collections, because of their size and/or nature, may require different considerations in veterinary care.
(2.1.2) So that indications of disease, injury, or stress may be dealt with promptly, veterinary coverage must be available to the animal collection 24 hours a day, 7 days a week.
(2.2.1) Written, formal procedures must be available to the animal care staff for the use of animal drugs for veterinary purposes and appropriate security of the drugs must be provided.
(1.4.6) A staff member must be designated as being responsible for the institution's animal record-keeping system. That person must be charged with establishing and maintaining the institution's animal records, as well as with keeping all animal care staff members apprised of relevant laws and regulations regarding the institution's animal collection.
(1.4.7) Animal records must be kept current, and data must be logged daily.
(1.4.5) At least one set of the institution's historical animal records must be stored and protected. Those records should include permits, titles, declaration forms, and other pertinent information.
(1.4.4) Animal records, whether in electronic or paper form, including health records, must be duplicated and stored in a separate location.
(1.4.3) Animals must be identifiable, whenever practical, and have corresponding ID numbers. For animals maintained in colonies or other animals not considered readily identifiable, the institution must provide a statement explaining how record keeping is maintained.
(1.4.1) An animal inventory must be compiled at least once a year and include data regarding acquisitions and dispositions in the animal collection.
(1.4.2) All species owned by the institution must be listed on the inventory, including those animals on loan to and from the institution. In both cases, notations should be made on the inventory.
(2.7.1) The institution must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals.
(2.7.3) Quarantine, hospital, and isolation areas should be in compliance with standards or guidelines adopted by the AZA.
(2.7.2) Written, formal procedures for quarantine must be available and familiar to all staff working with quarantined animals.
(11.1.2) Training and procedures must be in place regarding zoonotic diseases.
(11.1.3) A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.
(2.5.1) Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.
(2.4.1) The veterinary care program must emphasize disease prevention.
(1.5.5) For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.

(2.3.1) Capture equipment must be in good working order and available to authorized, trained personnel at all times.
(2.4.2) Keepers should be trained to recognize abnormal behavior and clinical symptoms of illness and have knowledge of the diets, husbandry (including enrichment items and strategies), and restraint procedures required for the animals under their care. However, keepers should not evaluate illnesses nor prescribe treatment.
(2.3.2) Hospital facilities should have x-ray equipment or have access to x-ray services.
(1.5.8) The institution must develop a clear process for identifying and addressing animal welfare concerns within the institution.

Chapter 8
(1.6.1) The institution must have a formal written enrichment program that promotes species-appropriate behavioral opportunities.
(1.6.2) The institution must have a specific staff member(s) or committee assigned for enrichment program oversight, implementation, training, and interdepartmental coordination of enrichment efforts.

Chapter 9
(5.3) A written policy on the use of live animals in programs should be on file. Animals in education programs must be maintained and cared for by trained staff, and housing conditions must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, social and environmental enrichment, access to veterinary care, nutrition, etc. Since some of these requirements can be met outside of the primary enclosure, for example, enclosures may be reduced in size provided that the animal's physical and psychological needs are being met.
(1.5.3) If animal demonstrations are a part of the institution's programs, an education and conservation message must be an integral component.

Chapter 10
(5.3) Institutions should maximize the generation of scientific knowledge gained from the animal collection. This might be achieved by participating in AZA TAG/SSP sponsored research when applicable, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials.
(5.2) Institutions must have a written policy that outlines the type of research that it conducts, methods, staff involvement, evaluations, animals to be involved, and guidelines for publication of findings.
(5.1) Research activities must be under the direction of a person qualified to make informed decisions regarding research.

Appendix B : Acquisition/Disposition Policy

I. Introduction**:** The Association of Zoos and Aquariums (AZA) was established, among other reasons, to foster continued improvement in the zoological park and aquarium profession. One of its most important roles is to provide a forum for debate and consensus building among its members, the intent of which is to attain high ethical standards, especially those related to animal care and professional conduct. The stringent requirements for AZA accreditation and high standards of professional conduct are unmatched by similar organizations and also far surpass the United States Department of Agriculture's Animal and Plant Health Inspection Service's requirements for licensed animal exhibitors. AZA member facilities must abide by a Code of Professional Ethics - a set of standards that guide all aspects of animal management and welfare. As a matter of priority, AZA institutions should acquire animals from other AZA institutions and dispose of animals to other AZA institutions.

AZA accredited zoological parks and aquariums cannot fulfill their important missions of conservation, education and science without living animals. Responsible management of living animal populations necessitates that some individuals be acquired and that others be removed from the collection at certain times. Acquisition of animals can occur through propagation, trade, donation, loan, purchase, capture, or rescue. Animals used as animal feed are not accessioned into the collection.

Disposition occurs when an animal leaves the collection for any reason. Reasons for disposition vary widely, but include cooperative population management (genetic or demographic management), reintroduction, behavioral incompatibility, sexual maturation, animal health concerns, loan or transfer, or death.

The AZA Acquisition/Disposition Policy (A/D) was created to help (1) guide and support member institutions in their animal acquisition and disposition decisions, and (2) ensure that all additions and removals are compatible with the Association's stated commitment to "save and protect the wonders of the living natural world." More specifically, the AZA A/D Policy is intended to:

- Ensure that the welfare of individual animals and conservation of populations, species and ecosystems are carefully considered during acquisition and disposition activities;
- Maintain a proper standard of conduct for AZA members during acquisition and disposition activities;
- Ensure that animals from AZA member institutions are not transferred to individuals or organizations that lack the appropriate expertise or facilities to care for them.
- Support the goal of AZA’s cooperatively managed populations and associated programs, including Species Survival Plans (SSPs), Population Management Plans (PMPs), and Taxon Advisory Groups (TAGs).

The AZA Acquisition/Disposition Policy will serve as the default policy for AZA member institutions. Institutions may develop their own A/D Policy in order to address specific local concerns. Any institutional policy must incorporate and not conflict with the AZA acquisition and disposition standards.

Violations of the AZA Acquisition/Disposition Policy will be dealt with in accordance with the AZA Code of Professional Ethics. Violations can result in an institution's or individual's expulsion from membership in the AZA.

II. Group or Colony-based Identification**:** For some colonial, group-living, or prolific species, such as certain insects, aquatic invertebrates, schooling fish, rodents, and bats, it is often impossible or highly impractical to identify individual specimens. These species are therefore maintained, acquisitioned, and disposed of as a group or colony. Therefore, when this A/D Policy refers to animals or specimens, it is in reference to both individuals and groups/colonies.

III. Germplasm**:** Acquisition and disposition of germplasm should follow the same guidelines outlined in this document if its intended use is to create live animal(s). Ownership of germplasm and any resulting animals should be clearly defined. Institutions acquiring or dispositioning germplasm or any animal parts or samples should consider not only its current use, but also future possible uses as new technologies become available.

IV(a). General Acquisitions**:** Animals are to be acquisitioned into an AZA member institution’s collection if the following conditions are met:

1. Acquisitions must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. The Director or Chief Executive Officer of the institution is charged with the final authority and responsibility for the monitoring and implementation of all acquisitions.
3. Acquisitions must be consistent with the mission of the institution, as reflected in its Institutional Collection Plan, by addressing its exhibition/education, conservation, and/or scientific goals.
4. Animals that are acquired for the collection, permanently or temporarily, must be listed on institutional records. All records should follow the Standards for Data Entry and Maintenance of North American Zoo and Aquarium Animal Records Databases®.
5. Animals may be acquired temporarily for reasons such as, holding for governmental agencies, rescue and/or rehabilitation, or special exhibits. Animals should only be accepted if they will not jeopardize the health, care or maintenance of the animals in the permanent collection or the animal being acquired.
6. The institution must have the necessary resources to support and provide for the professional care and management of a species, so that the physical and social needs of both specimen and species are met.
7. Attempts by members to circumvent AZA conservation programs in the acquisition of SSP animals are detrimental to the Association and its conservation programs. Such action may be detrimental to the species involved and is a violation of the Association's Code of Professional Ethics. All AZA members must work through the SSP program in efforts to acquire SSP species and adhere to the AZA Full Participation policy.
8. Animals are only to be acquired from sources that are known to operate legally and conduct their business in a manner that reflects and/or supports the spirit and intent of the AZA Code of Professional Ethics as well as this policy. Any convictions of state, federal, or international wildlife laws should be reviewed, as well as any previous dealings with other AZA accredited institutions.
9. When acquiring specimens managed by a PMP, institutions should consult with the PMP manager.
10. Institutions should consult AZA Wildlife Conservation and Management Committee (WCMC)-approved Regional Collection Plans (RCPs) when making acquisition decisions.

IV(b). Acquisitions from the Wild**:** The maintenance of wild animal populations for education and wildlife conservation purposes is a unique responsibility of AZA member zoos and aquariums. To accomplish these goals, it may be necessary to acquire wild-caught specimens. Before acquiring animals from the wild, institutions are encouraged to examine sources including other AZA institutions or regional zoological associations.

When acquiring animals from the wild, careful consideration must be taken to evaluate the long-term impacts on the wild population. Any capture of free-ranging animals should be done in accordance with all local, state, federal, and international wildlife laws and regulations and not be detrimental to the long-term viability of the species or the wild or zoological population(s). In crisis situations, when the survival of a population is at risk, rescue decisions are to be made on a case-by-case basis.

V(a). Disposition Requirements – living animals**:** Successful conservation and animal management efforts rely on the cooperation of many entities, both within and outside of AZA. While preference is given to placing animals within AZA member institutions, it is important to foster a cooperative culture among those who share the primary mission of AZA accredited facilities. The AZA draws a strong distinction between the mission, stated or otherwise, of non-AZA member organizations and the mission of professionally managed zoological parks and aquariums accredited by the AZA.

An accredited AZA member balances public display, recreation, and entertainment with demonstrated efforts in education, conservation, and science. While some non-AZA member organizations may meet minimum daily standards of animal care for wildlife, the AZA recognizes that this, by itself, is insufficient to warrant either AZA membership or participation in AZA's cooperative animal management programs. When an animal is sent to a non-member of AZA, it is imperative that the member be confident that the animal will be cared for properly.

Animals may only be disposed of from an AZA member institution's collection if the following conditions are met:

1. Dispositions must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. The Director or Chief Executive Officer of the institution is charged with the final authority and responsibility for the monitoring and implementation of all dispositions.
3. Any disposition must abide by the Mandatory Standards and General Advisories of the AZA Code of Professional Ethics. Specifically, "a member shall make every effort to assure that all animals in his/her collection and under his/her care are disposed of in a manner which meets the current disposition standards of the Association and do not find their way into the hands of those not qualified to care for them properly."
4. Non-domesticated animals shall not be disposed of at animal auctions. Additionally, animals shall not be disposed of to any organization or individual that may use or sell the animal at an animal auction. In transactions with AZA non-members, the recipient must ensure in writing that neither the animal nor its offspring will be disposed of at a wild animal auction or to an individual or organization that allows the hunting of the animal.
5. Animals shall not be disposed of to organizations or individuals that allow the hunting of these animals or their offspring. This does not apply to individuals or organizations which allow the hunting of only free-ranging game species (indigenous to North America) and established long-introduced species such as, but not limited to, white-tailed deer, quail, rabbit, waterfowl, boar, ring-necked pheasant, chukar, partridge, and trout. AZA distinguishes hunting/fishing for sport from culling for sustainable population management and wildlife conservation purposes.
6. Attempts by members to circumvent AZA conservation programs in the disposition of SSP animals are detrimental to the Association and its conservation programs. Such action may be detrimental to the species involved and is a violation of the Association's Code of Professional Ethics. All AZA members must work through the SSP program in efforts to deacquisition SSP species and adhere to the AZA Full Participation policy.
7. Domesticated animals are to be disposed of in a manner consistent with acceptable farm practices and subject to all relevant laws and regulations.
8. Live specimens may be released within native ranges, subject to all relevant laws and regulations. Releases may be a part of a recovery program and any release must be compatible with the AZA Guidelines for Reintroduction of Animals Born or Held in Captivity, dated June 3, 1992.
9. Detailed disposition records of all living or dead specimens must be maintained. Where applicable, proper animal identification techniques should be utilized.
10. It is the obligation of every loaning institution to monitor, at least annually, the conditions of any loaned specimens and the ability of the recipient to provide proper care. If the conditions and care of animals are in violation of the loan agreement, it is the obligation of the loaning institution to recall the animal. Furthermore, an institution's loaning policy must not be in conflict with this A/D Policy.
11. If live specimens are euthanized, it must be done in accordance with the established policy of the institution and the Report of the American Veterinary Medical Association Panel on Euthanasia (Journal of the American Veterinary Medical Association 218 (5): 669-696, 2001).
12. In dispositions to non-AZA members, the non-AZA member's mission (stated or implied) must not be in conflict with the mission of AZA, or with this A/D Policy.
13. In dispositions to non-AZA member facilities that are open to the public, the non-AZA member must balance public display, recreation, and entertainment with demonstrated efforts in conservation, education, and science.
14. In dispositions to non-AZA members, the AZA members must be convinced that the recipient has the expertise, records management practices, financial stability, facilities, and resources required to properly care for and maintain the animals and their offspring. It is recommended that this documentation be kept in the permanent record of the animals at the AZA member institution.
15. If living animals are sent to a non-AZA member research institution, the institution must be registered under the Animal Welfare Act by the U.S. Department of Agriculture Animal and Plant Health Inspection Service. For international transactions, the receiving facility should be registered by that country's equivalent body with enforcement over animal welfare.
16. No animal disposition should occur if it would create a health or safety risk (to the animal or humans) or have a negative impact on the conservation of the species.

17. Inherently dangerous wild animals or invasive species should not be dispositioned to the pet trade or those unqualified to care for them.
18. Under no circumstances should any primates be dispositioned to a private individual or to the pet trade.
19. Fish and aquatic invertebrate species that meet ANY of the following are inappropriate to be disposed of to private individuals or the pet trade:
    a. species that grow too large to be housed in a 72-inch long, 180 gallon aquarium (the largest tank commonly sold in retail stores)
    b. species that require extraordinary life support equipment to maintain an appropriate zoological environment (e.g., cold water fish and invertebrates)
    c. species deemed invasive (e.g., snakeheads)
    d. species capable of inflicting a serious bite or venomous sting (e.g., piranha, lion fish, blue-ringed octopus)
    e. species of wildlife conservation concern
20. When dispositioning specimens managed by a PMP, institutions should consult with the PMP manager.
21. Institutions should consult WCMC-approved RCPs when making disposition decisions.

V(b). Disposition Requirements – dead specimens**:** Dead specimens (including animal parts and samples) are only to be disposed of from an AZA member institution's collection if the following conditions are met:

1. Dispositions of dead specimens must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. Maximum utilization is to be made of the remains, which could include use in educational programs or exhibits.
3. Consideration is given to scientific projects that provide data for species management and/or conservation.
4. Records (including ownership information) are to be kept on all dispositions, including animal body parts, when possible.
5. SSP and TAG necropsy protocols are to be accommodated insofar as possible.

VI. Transaction Forms**:** AZA member institutions will develop transaction forms to record animal acquisitions and dispositions. These forms will require the potential recipient or provider to adhere to the AZA Code of Professional Ethics, the AZA Acquisition/Disposition Policy, and all relevant AZA and member policies, procedures and guidelines. In addition, transaction forms must insist on compliance with the applicable laws and regulations of local, state, federal and international authorities.

Appendix C: Recommended Quarantine Procedures

Quarantine Facility**:** A separate quarantine facility, with the ability to accommodate mammals, birds, reptiles, amphibians, and fish should exist. If a specific quarantine facility is not present, then newly acquired animals should be isolated from the established collection in such a manner as to prohibit physical contact, to prevent disease transmission, and to avoid aerosol and drainage contamination.

Such separation should be obligatory for primates, small mammals, birds, and reptiles, and attempted wherever possible with larger mammals such as large ungulates and carnivores, marine mammals, and cetaceans. If the receiving institution lacks appropriate facilities for isolation of large primates, pre-shipment quarantine at an AZA or AALAS accredited institution may be applied to the receiving institutions protocol. In such a case, shipment must take place in isolation from other primates. More stringent local, state, or federal regulations take precedence over these recommendations.

Quarantine Length**:** Quarantine for all species should be under the supervision of a veterinarian and consist of a minimum of 30 days (unless otherwise directed by the staff veterinarian). Mammals: If during the 30-day quarantine period, additional mammals of the same order are introduced into a designated quarantine area, the 30-day period must begin over again. However, the addition of mammals of a different order to those already in quarantine will not have an adverse impact on the originally quarantined mammals. Birds, Reptiles, Amphibians, or Fish: The 30-day quarantine period must be closed for each of the above Classes. Therefore, the addition of any new birds into a bird quarantine area requires that the 30-day quarantine period begin again on the date of the addition of the new birds. The same applies for reptiles, amphibians, or fish.

Quarantine Personnel**:** A keeper should be designated to care only for quarantined animals or a keeper should attend quarantined animals only after fulfilling responsibilities for resident species. Equipment used to feed and clean animals in quarantine should be used only with these animals. If this is not possible, then equipment must be cleaned with an appropriate disinfectant (as designated by the veterinarian supervising quarantine) before use with post-quarantine animals.

Institutions must take precautions to minimize the risk of exposure of animal care personnel to zoonotic diseases that may be present in newly acquired animals. These precautions should include the use of disinfectant foot baths, wearing of appropriate protective clothing and masks in some cases, and minimizing physical exposure in some species; e.g., primates, by the use of chemical rather than physical restraint. A tuberculin testing/surveillance program must be established for zoo/aquarium employees in order to ensure the health of both the employees and the animal collection.

Quarantine Protocol**:** During this period, certain prophylactic measures should be instituted. Individual fecal samples or representative samples from large numbers of individuals housed in a limited area (e.g., birds of the same species in an aviary or frogs in a terrarium) should be collected at least twice and examined for gastrointestinal parasites. Treatment should be prescribed by the attending veterinarian. Ideally, release from quarantine should be dependent on obtaining two negative fecal results spaced a minimum of two weeks apart either initially or after parasiticide treatment. In addition, all animals should be evaluated for ectoparasites and treated accordingly.

Vaccinations should be updated as appropriate for each species. If the animal arrives without a vaccination history, it should be treated as an immunologically naive animal and given an appropriate series of vaccinations. Whenever possible, blood should be collected and sera banked. Either a -94°F (-70ºC) frost-free freezer or a -4°F (-20ºC) freezer that is not frost-free should be available to save sera. Such sera could provide an important resource for retrospective disease evaluation.

The quarantine period also represents an opportunity to, where possible, permanently identify all unmarked animals when anesthetized or restrained (e.g., tattoo, ear notch, ear tag, etc.). Also, whenever animals are restrained or immobilized, a complete physical, including a dental examination, should be performed.

Complete medical records should be maintained and available for all animals during the quarantine period. Animals that die during quarantine should have a necropsy performed under the supervision of a veterinarian and representative tissues submitted for histopathologic examination.

Quarantine Procedures**:** The following are recommendations and suggestions for appropriate quarantine procedures for Andean condors:

Bird:
Required:
1. Direct and floatation fecal exam
2. Evaluate for ectoparasites
3. Appropriate serological tests for psittacosis, and if positive, confirmed by culture.

Strongly Recommended:
1. CBC/sera profile
2. Fecal culture for *Salmonella sp*.
3. Fecal gram stain

Appendix D: Program Animal Policy and Position Statement

Program Animal Policy

Originally approved by the AZA Board of Directors – 2003

Updated and approved by the Board – July 2008 & June 2011

The Association of Zoos & Aquariums (AZA) recognizes many benefits for public education and, ultimately, for conservation in program animal presentations. AZA's Conservation Education Committee's *Program Animal Position Statement* summarizes the value of program animal presentations (see pages 42-44).

For the purpose of this policy, a Program Animal is defined as "an animal whose role includes handling and/or training by staff or volunteers for interaction with the public and in support of institutional education and conservation goals". Some animals are designated as Program Animals on a full-time basis, while others are designated as such only occasionally. Program Animal-related Accreditation Standards are applicable to all animals during the times that they are designated as Program Animals.

There are three main categories of Program Animal interactions:

1. On Grounds with the Program Animal Inside the Exhibit/Enclosure:
   - i. Public access outside the exhibit/enclosure. Public may interact with animals from outside the exhibit/enclosure (e.g., giraffe feeding, touch tanks).
   - ii. Public access inside the exhibit/enclosure. Public may interact with animals from inside the exhibit/enclosure (e.g., lorikeet feedings, 'swim with' programs, camel/pony rides).
2. On Grounds with the Program Animal Outside the Exhibit/Enclosure:
   - i. Minimal handling and training techniques are used to present Program Animals to the public. Public has minimal or no opportunity to directly interact with Program Animals when they are outside the exhibit/enclosure (e.g., raptors on the glove, reptiles held "presentation style").
   - ii. Moderate handling and training techniques are used to present Program Animals to the public. Public may be in close proximity to, or have direct contact with, Program Animals when they're outside the exhibit/enclosure (e.g., media, fund raising, photo, and/or touch opportunities).
   - iii. Significant handling and training techniques are used to present Program Animals to the public. Public may have direct contact with Program Animals or simply observe the in-depth presentations when they're outside the exhibit/enclosure (e.g., wildlife education shows).
3. Off Grounds:
   - i. Handling and training techniques are used to present Program Animals to the public outside of the zoo/aquarium grounds. Public may have minimal contact or be in close proximity to and have direct contact with Program Animals (e.g., animals transported to schools, media, fund raising events).

These categories assist staff and accreditation inspectors in determining when animals are designated as Program Animals and the periods during which the Program Animal-related Accreditation Standards are applicable. In addition, these Program Animal categories establish a framework for understanding increasing degrees of an animal's involvement in Program Animal activities.

Program animal presentations bring a host of responsibilities, including the safety and welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that make program animal presentations to develop an institutional program animal policy that clearly identifies and justifies those species and individuals approved as program animals and details their long-term management plan and educational program objectives.

AZA's accreditation standards require that education and conservation messages must be an integral component of all program animal presentations. In addition, the accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, appropriate environmental enrichment, access to veterinary care, nutrition, and other related standards. In addition, providing program animals with options to choose among a variety of conditions within their environment is *essential to ensuring effective care, welfare, and management. Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, free-flight birds may receive appropriate exercise during regular programs, reducing the need for additional exercise. However, the institution must ensure that in such cases, the animals participate in programs on a basis sufficient to meet these needs or provide for their needs in their home enclosures; upon return to the facility the animal should be returned to its species-appropriate housing as described above.*

Program Animal Position Statement

Last revision 1/28/03
Re-authorized by the Board June 2011

The Conservation Education Committee (CEC) of the Association of Zoos and Aquariums supports the appropriate use of program animals as an important and powerful educational tool that provides a variety of benefits to zoo and aquarium educators seeking to convey cognitive and affective (emotional) messages about conservation, wildlife and animal welfare.

Utilizing these animals allows educators to strongly engage audiences. As discussed below, the use of program animals has been demonstrated to result in lengthened learning periods, increased knowledge acquisition and retention, enhanced environmental attitudes, and the creation of positive perceptions concerning zoo and aquarium animals.

Audience Engagement

Zoos and aquariums are ideal venues for developing emotional ties to wildlife and fostering an appreciation for the natural world. However, developing and delivering effective educational messages in the free-choice learning environments of zoos and aquariums is a difficult task.

Zoo and aquarium educators are constantly challenged to develop methods for engaging and teaching visitors who often view a trip to the zoo as a social or recreational experience (Morgan and Hodgkinson, 1999). The use of program animals can provide the compelling experience necessary to attract and maintain personal connections with visitors of all motivations, thus preparing them for learning and reflection on their own relationships with nature.

Program animals are powerful catalysts for learning for a variety of reasons. They are generally active, easily viewed, and usually presented in close proximity to the public. These factors have proven to contribute to increasing the length of time that people spend watching animals in zoo exhibits (Bitgood, Patterson and Benefield, 1986, 1988; Wolf and Tymitz, 1981).

In addition, the provocative nature of a handled animal likely plays an important role in captivating a visitor. In two studies (Povey, 2002; Povey and Rios, 2001), visitors viewed animals three and four times longer while they were being presented in demonstrations outside of their enclosure with an educator than while they were on exhibit. Clearly, the use of program animals in shows or informal presentations can be effective in lengthening the potential time period for learning and overall impact.

Program animals also provide the opportunity to personalize the learning experience, tailoring the teaching session to what interests the visitors. Traditional graphics offer little opportunity for this level of personalization of information delivery and are frequently not read by visitors (Churchman, 1985; Johnston, 1998). For example, Povey (2001) found that only 25% of visitors to an animal exhibit read the accompanying graphic; whereas, 45% of visitors watching the same animal handled in an educational presentation asked at least one question and some asked as many as seven questions. Having an animal accompany the educator allowed the visitors to make specific inquiries about topics in which they were interested.

Knowledge Acquisition

Improving our visitors' knowledge and understanding regarding wildlife and wildlife conservation is a fundamental goal for many zoo educators using program animals. A growing body of evidence supports the validity of using program animals to enhance delivery of these cognitive messages as well.

- MacMillen (1994) found that the use of live animals in a zoomobile outreach program significantly enhanced cognitive learning in a vertebrate classification unit for sixth grade students.

- Sherwood and his colleagues (1989) compared the use of live horseshoe crabs and sea stars to the use of dried specimens in an aquarium education program and demonstrated that students made the greatest cognitive gains when exposed to programs utilizing the live animals.
- Povey and Rios (2002) noted that in response to an open-ended survey question ("Before I saw this animal, I never realized that . . . "), visitors watching a presentation utilizing a program animal provided 69% cognitive responses (i.e., something they learned) versus 9% made by visitors viewing the same animal in its exhibit (who primarily responded with observations).
- Povey (2002) recorded a marked difference in learning between visitors observing animals on exhibit versus being handled during informal presentations. Visitors to demonstrations utilizing a raven and radiated tortoises were able to answer questions correctly at a rate as much as eleven times higher than visitors to the exhibits.

Enhanced Environmental Attitudes

Program animals have been clearly demonstrated to increase affective learning and attitudinal change.

- Studies by Yerke and Burns (1991) and Davison and her colleagues (1993) evaluated the effect live animal shows had on visitor attitudes. Both found their shows successfully influenced attitudes about conservation and stewardship.
- Yerke and Burns (1993) also evaluated a live bird outreach program presented to Oregon fifth-graders and recorded a significant increase in students' environmental attitudes after the presentations.
- Sherwood and his colleagues (1989) found that students who handled live invertebrates in an education program demonstrated both short and long-term attitudinal changes as compared to those who only had exposure to dried specimens.
- Povey and Rios (2002) examined the role program animals play in helping visitors develop positive feelings about the care and well-being of zoo animals.
- As observed by Wolf and Tymitz (1981), zoo visitors are deeply concerned with the welfare of zoo animals and desire evidence that they receive personalized care.

Conclusion

Creating positive impressions of aquarium and zoo animals, and wildlife in general, is crucial to the fundamental mission of zoological institutions. Although additional research will help us delve further into this area, the existing research supports the conclusion that program animals are an important tool for conveying both cognitive and affective messages regarding animals and the need to conserve wildlife and wild places.

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Appendix E: Developing an Institutional Program Animal Policy

Last revision 2003
Re-authorized by the Board June 2011

Rationale

Membership in AZA requires that an institution meet the AZA Accreditation Standards collectively developed by our professional colleagues. Standards guide all aspects of an institution's operations; however, the accreditation commission has asserted that ensuring that member institutions demonstrate the highest standards of animal care is a top priority. Another fundamental AZA criterion for membership is that education be affirmed as core to an institution's mission. All accredited public institutions are expected to develop a written education plan and to regularly evaluate program effectiveness.

The inclusion of animals (native, exotic and domestic) in educational presentations, when done correctly, is a powerful tool. CEC's **Program Animal Position Statement** describes the research underpinning the appropriate use of program animals as an important and powerful educational tool that provides a variety of benefits to zoo and aquarium educators seeking to convey cognitive and affective messages about conservation and wildlife.

Ongoing research, such as AZA's Multi-Institutional Research Project (MIRP) and research conducted by individual AZA institutions will help zoo educators to determine whether the use of program animals conveys intended and/or conflicting messages and to modify and improve programs accordingly and to ensure that all program animals have the best possible welfare.

When utilizing program animals our responsibility is to meet both our high standards of animal care and our educational goals. Additionally, as animal management professionals, we must critically address both the species' conservation needs and the welfare of the individual animal. Because "wild creatures differ endlessly," in their forms, needs, behavior, limitations and abilities (Conway, 1995), AZA, through its Animal Welfare Committee, has recently given the responsibility to develop taxon- and species-specific animal welfare standards and guidelines to the Taxon Advisory Groups (TAG) and Species Survival Plan® Program (SSP). Experts within each TAG or SSP, along with their education advisors, are charged with assessing all aspects of the taxons' and/or species' biological and social needs and developing

Animal Care Manuals (ACMs) that include specifications concerning their use as program animals.
However, even the most exacting standards cannot address the individual choices faced by each AZA institution. Therefore, each institution is required to develop a program animal policy that articulates and evaluates program benefits. The following recommendations are offered to assist each institution in formulating its own Institutional Program Animal Policy, which incorporates the AZA Program Animal Policy and addresses the following matters.

The Policy Development Process

Within each institution, key stakeholders should be included in the development of that institution's policy, including, but not limited to representatives from:

- the Education Department
- the Animal Husbandry Department
- the Veterinary and Animal Health Department
- the Conservation & Science Department
- the Behavioral Husbandry Department
- any animal show staff (if in a separate department)
- departments that frequently request special program animal situations (e.g., special events, development, marketing, zoo or aquarium society, administration)

Additionally, staff from all levels of the organization should be involved in this development (e.g., curators, keepers, education managers, interpreters, volunteer coordinators).

To develop a comprehensive Program Animal Policy, we recommend that the following components be included:

I. Philosophy

In general, the position of the AZA is that the use of animals in up close and personal settings, including animal contact, can be extremely positive and powerful, as long as:

1. The use and setting is appropriate.
2. Animal and human welfare is considered at all times.
3. The animal is used in a respectful, safe manner and in a manner that does not misrepresent or degrade the animal.
4. A meaningful conservation message is an integral component. Read the AZA Board-approved Conservation Messages.
5. Suitable species and individual specimens are used.

Institutional program animal policies should include a philosophical statement addressing the above, and should relate the use of program animals to the institution's overall mission statement.

II. Appropriate Settings

The Program Animal Policy should include a listing of all settings both on and off site, where program animal use is permitted. This will clearly vary among institutions. Each institution's policy should include a comprehensive list of settings specific to that institution. Some institutions may have separate policies for each setting; others may address the various settings within the same policy. Examples of settings include:

I. On-site programming
   A. Informal and non-registrants:
      1. On-grounds programming with animals being brought out (demonstrations, lectures, parties, special events, and media)
      2. Children's zoos and contact yards
      3. Behind-the-scenes open houses
      4. Shows
      5. Touch pools
   B. Formal (registration involved) and controlled settings
      1. School group programs
      2. Summer Camps
      3. Overnights
      4. Birthday Parties
      5. Animal rides
      6. Public animal feeding programs

II. Offsite and Outreach
   1. PR events (TV, radio)
   2. Fundraising events
   3. Field programs involving the public
   4. School visits
   5. Library visits
   6. Nursing Home visits (therapy)
   7. Hospital visits
   8. Senior Centers
   9. Civic Group events

In some cases, policies will differ from setting to setting (e.g., on-site and off-site use with media). These settings should be addressed separately, and should reflect specific animal health issues, assessment of distress in these situations, limitations, and restrictions.

III. Compliance with Regulations

All AZA institutions housing mammals are regulated by the USDA's Animal Welfare Act. Other federal regulations, such as the Marine Mammal Protection Act, may apply. Additionally, many states, and some cities, have regulations that apply to animal contact situations. Similarly, all accredited institutions are bound by the AZA Code of Professional Ethics. It is expected that the Institution Program Animal Policy address compliance with appropriate regulations and AZA Accreditation Standards.

IV. Collection Planning

All AZA accredited institutions should have a collection planning process in place. Program animals are part of an institution's overall collection and must be included in the overall collection planning process. The AZA Guide to Accreditation contains specific requirements for the institution collection plan. For more information about collection planning in general, please see the Collection Management pages in the Members Only section.

The following recommendations apply to program animals:

1. Listing of approved program animals (to be periodically amended as collection changes). Justification of each species should be based upon criteria such as:
   - Temperament and suitability for program use
   - Husbandry requirements
   - Husbandry expertise
   - Veterinary issues and concerns
   - Ease and means of acquisition / disposition according to the AZA code of ethics
   - Educational value and intended conservation message
   - Conservation Status
   - Compliance with TAG and SSP guidelines and policies
2. General guidelines as to how each species (and, where necessary, for each individual) will be presented to the public, and in what settings
3. The collection planning section should reference the institution's acquisition and disposition policies.

V. Conservation Education Message

As noted in the AZA Accreditation Standards, if animal demonstrations are part of an institution's programs, an educational and conservation message must be an integral component. The Program Animal Policy should address the specific messages related to the use of program animals, as well as the need to be cautious about hidden or conflicting messages (e.g., "petting" an animal while stating verbally that it makes a poor pet). This section may include or reference the AZA Conservation Messages.

Although education value and messages should be part of the general collection planning process, this aspect is so critical to the use of program animals that it deserves additional attention. In addition, it is highly recommended to encourage the use of biofacts in addition to or in place of the live animals. Whenever possible, evaluation of the effectiveness of presenting program animals should be built into education programs.

VI. Human Health and Safety

The safety of our staff and the public is one of the greatest concerns in working with program animals. Although extremely valuable as educational and affective experiences, contact with animals poses certain risks to the handler and the public. Therefore, the human health and safety section of the policy should address:

1. Minimization of the possibility of disease transfer from non-human animals to humans, and vice-versa (e.g., handwashing stations, no touch policies, use of hand sanitizer)
2. Safety issues related to handlers' personal attire and behavior (e.g., discourage or prohibit use of long earrings, perfume and cologne, not eating or drinking around animals, smoking etc.)

AZA's Animal Contact Policy provides guidelines in this area; these guidelines were incorporated into accreditation standards in 1998.

VII. Animal Health and Welfare

Animal health and welfare are the highest priority of AZA accredited institutions. As a result, the Institutional Program Animal Policy should make a strong statement on the importance of animal welfare. The policy should address:

1. General housing, husbandry, and animal health concerns (e.g. that the housing and husbandry for program animals meets or exceeds general AZA standards and that the physical, social and psychological needs of the individual animal, such as adequate rest periods, provision of enrichment, visual cover, contact with conspecifics as appropriate, etc., are accommodated).
2. Where ever possible provide a choice for animal program participation, e.g., retreat areas for touch tanks or contact yards, evaluation of willingness/readiness to participate by handler, etc.)

3. The empowerment of handlers to make decisions related to animal health and welfare; such as withdrawing animals from a situation if safety or health is in danger of being compromised.
4. Requirements for supervision of contact areas and touch tanks by trained staff and volunteers.
5. Frequent evaluation of human / animal interactions to assess safety, health, welfare, etc.
6. Ensure that the level of health care for the program animals is consistent with that of other animals in the collection.
7. Whenever possible have a "cradle to grave" plan for each program animal to ensure that the animal can be taken care of properly when not used as a program animal anymore.
8. If lengthy "down" times in program animal use occur, staff should ensure that animals accustomed to regular human interactions can still maintain such contact and receive the same level of care when not used in programs.

VIII. Taxon Specific Protocols

We encourage institutions to provide taxonomically specific protocols, either at the genus or species level, or the specimen, or individual, level. Some taxon-specific guidelines may affect the use of program animals. To develop these, institutions refer to the Conservation Programs Database.

Taxon and species -specific protocols should address:

1. How to remove the individual animal from and return it to its permanent enclosure, including suggestions for operant conditioning training.
2. How to crate and transport animals.
3. Signs of stress, stress factors, distress and discomfort behaviors.

Situation specific handling protocols (e.g., whether or not animal is allowed to be touched by the public, and how to handle in such situations)

1. Guidelines for disinfecting surfaces, transport carriers, enclosures, etc. using environmentally safe chemicals and cleaners where possible.
2. Animal facts and conservation information.
3. Limitations and restrictions regarding ambient temperatures and or weather conditions.
4. Time limitations (including animal rotation and rest periods, as appropriate, duration of time each animal can participate, and restrictions on travel distances).
5. The numbers of trained personnel required to ensure the health and welfare of the animals, handlers and public.
6. The level of training and experience required for handling this species
7. Taxon/species-specific guidelines on animal health.
8. The use of hand lotions by program participants that might touch the animals

IX. Logistics: Managing the Program

The Institutional Policy should address a number of logistical issues related to program animals, including:

1. Where and how the program animal collection will be housed, including any quarantine and separation for animals used off-site.
2. Procedures for requesting animals, including the approval process and decision making process.
3. Accurate documentation and availability of records, including procedures for documenting animal usage, animal behavior, and any other concerns that arise.

X. Staff Training

Thorough training for all handling staff (keepers, educators, and volunteers, and docents) is clearly critical. Staff training is such a large issue that many institutions may have separate training protocols and procedures. Specific training protocols can be included in the Institutional Program Animal Policy or reference can be made that a separate training protocol exists.

It is recommended that the training section of the policy address:

1. Personnel authorized to handle and present animals.
2. Handling protocol during quarantine.
3. The process for training, qualifying and assessing handlers including who is authorized to train handlers.
4. The frequency of required re-training sessions for handlers.
5. Personnel authorized to train animals and training protocols.

6. The process for addressing substandard performance and noncompliance with established procedures.
7. Medical testing and vaccinations required for handlers (e.g., TB testing, tetanus shots, rabies vaccinations, routine fecal cultures, physical exams, etc.).
8. Training content (e.g., taxonomically specific protocols, natural history, relevant conservation education messages, presentation techniques, interpretive techniques, etc.).
9. Protocols to reduce disease transmission (e.g., zoonotic disease transmission, proper hygiene and hand washing requirements, as noted in AZA's Animal Contact Policy).
10. Procedures for reporting injuries to the animals, handling personnel or public.
11. Visitor management (e.g., ensuring visitors interact appropriately with animals, do not eat or drink around the animal, etc.).

XI. Review of Institutional Policies

All policies should be reviewed regularly. Accountability and ramifications of policy violations should be addressed as well (e.g., retraining, revocation of handling privileges, etc.). Institutional policies should address how frequently the Program Animal Policy will be reviewed and revised, and how accountability will be maintained.

XII. TAG and SSP Recommendations

Following development of taxon-specific recommendations from each TAG and SSP, the institution policy should include a statement regarding compliance with these recommendations. If the institution chooses not to follow these specific recommendations, a brief statement providing rationale is recommended.

Appendix F: AZA Andean Condor SSP Egg, Chick, & Adult Bird Necropsy Protocols

Egg Necropsy:

1. Refrigerate the egg if there will be a delay before necropsy (delays should be avoided since autolysis proceeds rapidly). Do not freeze eggs or embryos.
2. Record all relevant historical information, weights, and measurements on the necropsy form.
3. Describe eggshell characteristics (e.g., shape, shell thickness, presence of cracks, degree of fecal staining, external calcium deposits, etc.). Measure eggshell thickness in several places with calipers.
4. Open the egg by carefully removing the shell overlying the aircell. This can be accomplished with a pair of sharp-blunt scissors, or by gently cracking the shell and removing fragments with forceps.
5. Examine the aircell membrane for integrity, thickenings, hemorrhages, etc.
6. For infertile eggs and early stage embryos, dump the egg contents into a clean container and obtain a swab of yolk for bacterial culture.
7. For larger embryos, remove enough eggshell to expose the embryo. Note the position of the head relative to other body parts, and in relation to the aircell. The normal position for embryos ready to pip is head under the right wing, with the tip of the beak pointing up toward the air cell. If the yolk sac is still external (has not retracted into the body cavity), puncture the wall with sterile scissors or a scalpel and obtain a culture as the yolk spills out. Save the yolk sac for histopathology.
8. Stage the embryo using Hamburger and Hamilton's Normal Stages of the Chick. Note any external abnormalities, such as musculoskeletal abnormalities, abnormal skin color, skin hemorrhages, edema, dryness, residual albumen, etc. Photograph any abnormalities. Record the degree of internalization (retraction) of the yolk sac. Examine the pipping muscle at the back of the neck for edema or hemorrhages. Note the contents of the mouth, nares, and gizzard.
9. Open the coelomic cavity by making a ventral midline incision with a scalpel or scissors, being careful to avoid tearing the yolk sac if it is internalized. If the yolk sac is internal, proceed now with yolk sac cultures. Save the yolk sac for histopathology along with the embryo and membranes.
10. Immerse the entire embryo, with yolk sac and membranes, in 10% neutral-buffered formalin. The volume of formalin MUST be 10 times the total volume of the tissues. After 24-48 hours, the volume of formalin may be greatly reduced for shipping. For shipping small embryos, it is best to wrap them in formalin-soaked gauze and place them in a leak-proof, crush-proof container (early embryos will disintegrate if left floating in liquid formalin during airplane flight, due to high frequency vibrations).

Chick and Adult Necropsy:

External Examination:

1. Weigh the bird as soon as possible after death. Refrigerate the body if there will be a delay between death and necropsy (do not freeze).
2. For chicks, note condition of the umbilicus or seal (is it dry, completely closed, etc)
3. Note any musculoskeletal abnormalities, collect any ectoparasites in alcohol, look for evidence of trauma, pododermatitis (bumblefoot), proliferative skin lesions, etc. If possible, take a whole body x-ray.
4. Examine body orifices for patency, exudates, fecal staining around cloaca, etc.
5. Make an evaluation of nutritional condition based on fat stores and relative muscle mass.

Internal Examination:

1. Make a ventral midline skin incision from the mandible to the cloaca with a sharp scalpel or scissors, being careful to avoid rupturing the yolk sac in nestlings.
    a. If the yolk sac ruptures, immediately obtain a yolk culture as the yolk spills out and prepare smears for cytology.
    b. Note the size of the yolk sac and, if sufficient yolk remains, obtain separate swabs for culture and cytology.
    c. In nestlings, examine the internal aspect of the umbilicus (inside surface of the abdominal wall) for nodular lesions (umbilical abscesses).
2. Remove the keel to expose the thoracic organs. Note any accumulations of fluid or exudate in the body cavity and obtain a swab for bacterial culture if appropriate.

3. Blood smears and cultures: Using a small syringe with a 22-20 gauge needle, obtain a blood sample via direct cardiac puncture and prepare at least two blood smears for hemoparasite screening (only a few drops of blood are needed.) If enough blood was obtained, cultures should be submitted on young birds to rule out septicemia.
    a. If no blood can be obtained from the heart, remove one lung, cut it in half longitudinally, and prepare the blood smears by rubbing the cut surface of the lung directly on the slides. Be sure to save the lung for histopathology after making the smears.
4. Collect the thyroids (with parathyroids), thymus, and spleen for histopathology.
    a. Determine gender by examining the gonads prior to removal.
5. Remove the internal organs and examine each systematically; obtain samples for histopathology using the following tissue list as a guide. Save samples of all lesions.
    a. Note especially the quantity and nature of the ingesta throughout the GI tract.
    b. The bursa of Fabricius lies dorsal to the cloaca, close to the cloacal orifice (vent). Make sure the bursa does not remain attached to the body when the GI tract is removed.

Tissue Checklist

All of the following tissues may be placed together in a single container of 10% neutral buffered formalin. The volume of formalin should be 10 times the volume of all tissues collected. The tissues should be no thicker than 0.5 cm to ensure proper fixation. For small nestlings, the entire carcass can be fixed in formalin without removing organs.

- Skin
- Spleen
- Muscle (pectoral and thigh)
- Kidney
- Sciatic nerve (with thigh muscle)
- Gonad (with kidney)
- Tongue
- Oviduct
- Esophagus
- Adrenal (with kidney/gonad)
- Crop
- Thyroid/Parathyroid
- Proventriculus
- Thymus
- Gizzard
- Trachea
- Duodenum
- Lung
- Jejunum
- Heart
- Cecum (if present)
- Aorta
- Colon
- Pituitary
- Cloaca w/ Bursa of Fabricius
- Eye
- Liver w/ gallbladder
- Brain
- Pancreas
- Femoral bone marrow
- Tibiotarsal bone

Where appropriate, freeze portions of the following in separate plastic bags (at least 10 g of each tissue if large enough):

- Liver
- Brain
- Spleen
- Heart
- Lung
- Skeletal muscle
- Gizzard content
- Kidney

These tissues can be valuable for ancillary diagnostics. They may be discarded after a definitive diagnosis is established, but if possible, should be saved for future research purposes.

Appendix G: Andean Condor Ethogram and Behavior Codes

Behavior Category	Code	Description
Locomotion / Exercise		
Locomotion/Exercise	199	All forms of locomotion or exercise, including bipedal locomotion, flight, turning in place, wing lifting, opening or flapping.
Exploration / Manipulation / Play		
Self-play	299	Any form of self-play, including exploration, frolicking, dirt sifting, etc.
Maintenance		
Maintenance	399	All maintenance behaviours, including scratch, shake, stretch, wing lift, cough, etc., that do not involve another bird.
Feeding		
Eat	410	Ingestion/swallowing of food or non-food items. Includes eating of regurgitated food if done in a non-social context
Parental Care		
Nest Manicure	538	Any stereotyped, deliberate, and repetitive rearranging of the substrate, wall or ceiling of the nest area. It may include digging with beak into the substrate to form a hole or trough; or dirt sifting or rim building where dirt and stones are dribbled from the beak along the body, or over breast and wings
Enter Nest, Nonsocial	560	Bird enters nest chamber alone
Inside Nest, Nonsocial	561	Bird is alone in nest chamber. Use when bird is in nest chamber alone at start of interval
Leave Nest, Nonsocial	562	Leaves nest chamber when no bird is inside or has been for the previous minute
Enter Nest, Social	564	Bird enters nest chamber while others are present. Note ID of all present
Inside Nest, Social	565	Bird is in nest chamber with others. Use when focal and others are in nest chamber at start of interval.
Leave Nest, Other Inside	566	Leaves nest chamber and others inside. Note IDs of those left behind
Follow Into Nest	568	Bird enters nest chamber within 1 minute of another bird's entry. Note IDs
Follow Out Of Nest	570	Bird leaves nest chamber within 1 minute of another bird's departure. Note IDs
Social – Sexual Affiliative		
Approach	162	The birds come within reach (one wingspan) of each other. No obvious interaction need follow
Leave	163	The birds move out of reach of each other. May follow a Body Avoid (845), but is superseded by 850 (Bipedal Avoid) or 860 (Flight Avoid)
Bow and Cross Heads	164	Upon approach, the birds bow to each other, and cross heads and necks. Scapular feathers are not raised
Follow	165	Bipedal locomotion within 1.5 m (5 ft) of other bird, following the second bird
Proximity (Prox)	166	Both birds are within 1 wing-width of each other (either could touch the other one), and not engaged in any other behaviors
In Contact	615	Two birds lie, sit, or stand touching, but do not engage in other activity. Includes passive or accidental contact continuing for 10 seconds or more. Score for both birds
Allopreen/Allorub	624	One bird preens, nibbles, or rubs another (including tags) with head, beak, or neck. Attempts at preening, etc. are also scored, but aggressive preening is scored as Rough Allopreen (741)

Behavior Category	Code	Description
Insert Beak	628	One bird inserts part or all of its beak, including the tip, into the beak of another bird. Score only for bird inserting beak
Display Proximate	630	While the other bird is within proximity, the displaying bird's axis is nearly vertical, wings drop open from the shoulders showing a valentine shape to the linings, and head is lowered, then moved side to side. The bird turns left and right in a 30-360° or greater arc, vibrating its tail, and emitting a low frequency rapidly vibrating sound. Scaps are not raised. Score when wings are out and head down, and stop when wings are less than ¼ extended
Display Near	631	Display (630) occurs while the other bird is not prox, but within 4. 6 m (15 ft)
Display Distant	632	Display (630) occurs while more than 4. 6 m (15 ft) apart
Incomplete Display	650	Only a portion of the full Wings Out/Head Down Proximate Display (630) posture is exhibited. Either head is not lowered, or wings aren't fully extended. Duration ends when wings open to more than ¼ open, or when head is raised
Inc Display Near	651	Incomplete display (650) occurs while the other bird is out of proximity, but within 4. 6 m (15 ft)
Inc Display Distant	652	Incomplete display (650) occurs while the birds are more than 4. 6 m (15 ft) apart
Squat	670	Mountee lowers body, inviting partner to mount
Attempt Mount	677	Mount is incomplete, often only 1 foot on back, for any reason. May occur during Wings Out/Head Down display
Mount	678	One bird stands on the back of another with both feet or straddles stick or other object. May occur during Wings Out/Head Down display
Attempt Copulation	680	Bird moves rear quarters side to side so as to obtain cloacal contact. Follow Mount (678) or Attempt Mount (677). May include inappropriate mountees, or incorrect alignment for copulation. Score only for mounter
Resist Copulation	682	Mountee resists mounter's copulation by moving away, blocking tail movement, or being aggressive. Score only for mountee
Incomplete Copulation	684	Mount does not proceed to copulation due to external interruption or resistance by mountee. Score for both. May follow Resist Copulation (682)
Copulation	685	Mount ends in cloacal contact and ejaculation. May include a moaning sound. Score for both birds. May follow Resist Copulation (682)
Probable Sexual/Affil Behavior	697	Score for all birds in close proximity that appear to be interacting in an affiliative manner that cannot be clearly distinguished. Score only once per interaction
<u>Social - Aggressive</u>		
Rough Allopreen	741	One bird roughly preens, nibbles, or rubs another bird. Includes rapid, widespread scissoring of another bird's feathers in swiping passes and roughly running the beak along the underside of another's wing in the humerus/wrist region. Has the appearance of preening, but seems aggressive
Mutual Rough Allopreen	742	Both birds roughly preen, nibble, or rub each other. Includes rapid, widespread scissoring of another bird's feathers in swiping passes and roughly running the beak along the underside of another's wing in the humerus/wrist region. Has the appearance of preening, but seems aggressive

Threat Display	794	Any threatening display that does not include physical contact or attempted physical contact. Includes raising scapular feathers, head down threat, head up threat, etc.
Behavior Category	**Code**	**Description**
Social - Submissive		
Wing-Beg	840	Bird pumps head up and down, holding wings out to the side while flapping them. May be directed at condor, person, or sounds
Head or Body Avoid	845	Bird leans head or body away from another, or may turn or take a step or two away. Movement must be no more than 1.5 m (5 ft), otherwise score as Bipedal Avoid (850) or Flight Avoid (860)
Bipedal Avoid	850	Bird steps quickly away or flees another bird, moving more than 5' away. If movement is less than 1.5 m (5 ft), score as Head or Body Avoid (845)
Flight Avoid	860	Bird flies away from another bird, moving more than 1.5 m (5 ft) away. If movement is less than 1.5 m (5 ft), score as Head or Body Avoid (845)
Various States		
Stationary Alert	900	Bird is quiet except for head or neck movements, including scanning. Score regardless of posture, as long as the bird is still
Head Not Visible - Body Moving	910	Bird's head is not visible, but body is, and movements indicate that it is awake
Stat Non-alert	950	Bird is still and eyes are closed, or open and close slowly
Out of Sight – Nearby	990	Bird is present, but cannot be seen
Head Not Visible - Body Still	995	Bird's head is not visible, but body is, and movements fail to indicate if it is awake or asleep

Appendix H: AZA Andean Condor 2010 SSP Management Committee and Advisors

Members/advisors	Institution	Role
Michael Mace	San Diego Zoo's Wild Animal Park	SSP Coordinator
Susie Kasielke	Los Angeles Zoo and Botanical Gardens	Vice-Chair
Darcy Henthorn	Oklahoma City Zoological Park	Secretary
Management Committee		
John Azua	Denver Zoological Gardens	
David Oehler	Cincinnati Zoo and Botanical Garden	
Mike Taylor	White Oak Conservation Center	
Advisors		
M. Barrera **/** F. Ciri	Corpoboyaca	Colombia Releases
German Corredor	Zoologico Cali	Colombia Zoos
Maria Rosa Cuesta	Bioandina	Venezuela Releases
Maria Rosa Cuesta	Venezuelan Zoo Association	Venezuela Zoos
Luis Jacome	Jardin Zoologico de la Ciudad	Argentina Releases
Luis Jacome	Jardin Zoologico de la Ciudad	Argentina Zoos
Dr. Nadine Lamberski	San Diego Zoo's Wild Animal Park	Veterinarian
Dr. Bruce Rideout	Zoological Society of San Diego	Pathologist
Dr. Michael Schlegel	Zoological Society of San Diego	Nutrition
Dr. Jamie Ivy	Zoological Society of San Diego	Population Biologist
Susie Kasielke	Los Angeles Zoo and Botanical Gardens	Studbook keeper
Yadira Galindo	Zoological Society of San Diego	Public Relations
Chriss Kmiecik	Cleveland Metroparks Zoo	Education

Appendix I: Sample Egg Euthanasia Training Form

It is the responsibility of each zoo working with Andean condors to instruct and keep a record of their staff's training on file.

I understand that it is the guideline to euthanize embryos for any of the reasons stated in the Guidelines for Euthanasia of Avian Eggs and Embryos.

To accomplish this task, eggs are put into a "ziplock" plastic bag. I understand that human inhalation should be minimized and that CO2 should be used in a well-ventilated area. With regulator properly attached to CO2 tank, turn valve on ~90 and then adjust flow rate knob to 6 -8 liters/minute, holding the tube in the bag at arm's length away from face. When bag is full, turn off gas, remove hose and seal plastic bag. Leave eggs in bag for at least twenty minutes before removing. Either store eggs in bird department's designated refrigerator or take to necropsy's refrigerator.

By signing this form, I am acknowledging that I have received this training.

______________________	______________________
Employee – Print Name	Employee – Signature
______________________	______________________
Trainer – Print Name	Trainer – Signature
	______________________
	Date

Appendix J: Enrichment Request Form

Submitted By: Date:

Work Area: Phone:

Species this enrichment is requested for: **Andean condor**

Location:

On or off Exhibit ? Off exhibit, not breeding

What behavior is this enrichment meant to encourage?

Enrichment Description:

Resource Info.(product name, cost, vendor?)
On site browse farms

Has this been used at other institutions? Response?

APPROVALS

Area Supervisor: Behavior Department
___ Approved ____ Approved with changes* ____Not approved

Name________________Signature:_______________________ Date:_____

Veterinary:
___ Approved ____ Approved with changes* ____Not approved

Name: ________________ Signature:_______________________ Date:__

Nutrition (if food item):
___ Approved ____ Approved with changes* ____Not approved

Name: ________________ Signature:______________________ Date:_

Curator:
___ Approved ____ Approved with changes* ____Not approved

Name: ________________ Signature: ______________________ Date:_