

III. THE ROLE OF ENVIRONMENTAL ENRICHMENT

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Introduction

A lot has changed from the time when animals were kept in zoos as pets, curiosities, entertainment and pleasure for the royalty. Today, zoos are dynamic environments and are driven by more complex needs. With the unprecedented rate of vanishing animal and plant species, our generation faces the greatest challenge ever to live up to the expectations of keeping harmony between Nature and Modern Life. The Phoenix Zoo considers its priority to evolve the materials and methods used in our practice to reach the highest level of care in management.

We had extended our purpose to:

1. Exhibition
2. Conservation
3. Animal rescue
4. Captive breeding
5. Rehabilitation and reintroduction
6. Public involvement

All of these components require managing animal behavior through Environmental Enrichment. Encouraging natural behavior is just as important when maintaining the animal's everyday life, as when we rescue them from their destroyed habitats. Captive animals have a small chance of survival when they are released and reintroduced to the wild unless they have kept their natural behaviors, such as ability to mate, to rear young, to hunt or forage, escape predators or have fear of man. If the animals maintain natural behaviors in captivity, they will be valuable for education and research programs, welcoming our visitors and volunteers to become involved in individual and group activities.

Until a couple of years ago, zoo enrichment programs were a novelty. Now they are becoming **accepted practice**. Zoos had been criticized and challenged to recognize whether their husbandry and exhibition employ only maintenance of their collections (Robert May-A giant in late Twentieth-century ecology, Nature, 1988). The need for effective enrichment programs has been established, both in terms of increasing the animal's well being and improving the educational value of zoo exhibits. It has started to be increasingly documented (Tipp, 1985; Carlstead, 1991; Shepherdson, 1991), a legal requirement for primate collections (USDA, 1991) and to appear in zoo studies (Shepherdson, 1993; Tudge, 1991; Carlstead 1991; Markowitz, 1982; Chamove, 1984; Anderson, 1984; Wilson, 1982; Smith, 1989; Maple, 1983; Michel, 1989; Boccia, 1989; Kastelein, & Wiepkema, 1989; Akers & Schildkraut, 1985; Gould & Bress, 1986)

Zoo professionals need to progress toward the goals of:

1. Land development, conducted at the individual animal and species level, rather than the ecosystem level (Ericson, 1979; Lubchenco, 1991).
2. Identify and mock an animal's characteristics with those of existing or planned environments.
3. Focus studies in zoo setting on improving conditions of confinement.
4. Develop strategies for the maintenance of behavioral competence in zoo animals slated for reintroduction (Seidensticker; Forthman, 1994).

Enrichment benefits not only the animals, but the general public as well. The presence of enrichment serves as a tool in explaining an animal's natural history. The medium for conveying this information can be standard graphics, personal interpretation, or interactive. Including enrichment into graphics can teach the public how enrichment is designed with an animal's specific natural history in mind. However it is difficult to get detailed information across to the general public via graphics. For many zoos, utilizing the keepers, interns, volunteers, docents and students are crucial to conducting research, participating on projects; generate enrichment ideas and implementing, evaluating and interpreting them. The forms of interactive educational programs and workshops channeling information are endless from keeper talks, behind the scene tours, train drives and zoo mobiles through junior keeper training, night camps, school programs, summer camps, programs for the talented and gifted kids, enrichment workshops and educating the educator programs. Collated information of this kind can be shared in valuable mediums such as enrichment and training newsletters, conferences and seminars.

2. Behavioral architecture

Over the last hundred years, zoos have shown great evolution designing exhibits from barren cages to “naturalistic enclosures”. It is time to step forward again and elevate our technique to the scientific level.

Exhibit design vs. Behavioral architecture

Exhibit Design

Many practical problems still encountered when trying to enrich existing zoo environments:

- a. The consequences of exhibit *design flows* ranging from the design of drains, that don't flow, or the inadequate use of natural substrates, to having no access for heavy machinery to replace structures. Landscaping is often minimal or absent and the exhibits suffer from lack of complexity. The widespread use of “afterthought” and “add-on” behavioral enrichment devices in new animal exhibits suggest the presence of critical flows in current exhibit design practices (Demlong; Derro 1993)
- b. Most of the staff work can be described as “*remedial enrichment*” (Coe, 1992), meaning that they are constantly making up for past mistakes.
- c. Exhibit designers are often disappointed when the animal demonstrates abnormal behavior after being introduced to their multi-million dollar, state of the art enclosure. From a *human perspective*, the enclosure is innovative and comforting, yet in most cases from the animal's point of view, it is only another insufficient cage. Animals do not understand the concept of expensive and hi-tech.
- d. Unfortunately, even naturalistic exhibits most of the time *do not meet the biological and behavioral needs* of captive species.
- e. Exhibits designs are generally concerned with *simulating nature for the entertainment of visitors and zoo workers*.

Behavioral Architecture

- a. Behavioral Architecture is the *true scientific level* of exhibit design and enrichment. Zoos need to depart from their current design practices that employ classical architects, draftsmen or seasonal construction tradesmen. Most of the time these people lack rudimentary animal experience or biological knowledge and therefore, have a difficult time understanding the importance of designing exhibits to stimulate species specific behaviors. Knowledge of a product or field should not be an option; it is a prerequisite of any profession. Why should the qualifications of exhibit designers be any different? (Demlong; Derro 1993)
- b. What zoos need are individuals, businesses and outside resources to provide *research assistance and specializing* in integrating behavioral stimulation at the concept of exhibit's design.
- c. Behavioral Architecture focuses on and *molds the exhibit around the animal's species-specific behavior*, historical behavior and biology, transferring that information into the new exhibit (Demlong; Derro 1993).
- d. Another cornerstone is that it *incorporates the frequency of space use and the frequency* of specific behaviors into the exhibit's design. For example: if a species is 80% arboreal, than 80% of the exhibit should encourage arboreal behaviors.

The Phoenix Zoo considers as its priority to create stimulating, quality captive environments built around the behaviors and biological needs of the species in its care. Our staff prioritizes the information and condenses into a feasible design. Quality exhibits are never finished, they always changing; they always should be stimulating and unpredictable. The Phoenix Zoo recognizing that these changes need to be kept updated and modified for the benefit of our animals. Visitors come to our zoo for just a few hours, but our animal charges live and die within their captive environments (Demlong; Derro 1993).

3. Behavioral enrichment

“The greatest possibility for improvement in our provision for captive primates lies in the invention and installation of apparatus which can be used for play or work.”

Robert Yerkes, 1925

A habitat where an animal lives is full of diverse, stimulating risk and choices. The organism must respond appropriately in order to survive and reproduce; it must change in response to environmental changes.

Captivity can affect drastically animal behavior (Morris, 1964). Confining an animal to a cage or enclosure reduces the complexity, and increases the predictability (DWCT Training Manual, 1999). It can induce different behavioral responses, such as boredom and stereotypes. Captive animals may show abnormal behaviors, which are uncommon or even absent in natural settings. In most cases, enclosures do not offer sufficient stimuli to occupy most of their activity time. Therefore, captive conditions must approximate the natural state to achieve the species natural level of fitness.

Hediger (1950) discussed the misconception that wild animals are “free” when in fact they are constrained by many behaviorally imposed barriers. In his opinion neither wild nor zoo animals are truly free. However, there is one major difference. One could argue that **an animal with the most choices has the most “freedom”**. In human societies, the most heinous crimes are punished by death- the complete absence of choice (Coe, John 1992).

Most zoo animals have very limited “freedom” because they have very limited choices. Regardless of an institution’s financial circumstances or its commitments to animal welfare, there is no way to recreate all natural behaviors for the animals in captivity. No matter how well an exhibit is designed, what may be pleasing or attractive to the human eye will not necessarily meet the behavioral needs of the exhibit animal. The fact that they have to interact with humans at all causes the animal to assume behaviors that may be deviant in comparison to their wild counterparts. **We make most of their choices**. It’s our homocentric bias to assume that we know what is best for them. For example, we put them on feeding schedules, altering such things as foraging time, their choice of foods, and their eating patterns. We move them around, introduce and separate them for other animals, medicate or euthanize them.

The goals of Behavioral Enrichment are to encourage the animals to use their natural abilities, promote species appropriate behavioral and mental activities, offering a sense of control by **allowing them to make choices** and have new experiences.

To some degree the housing and social settings of captive animals will always be inappropriate, causing aggression, boredom, physical and psychological illness. Zoos have an ethical and legal obligation to research into and provide for the needs of animals in their collections.

It is both the management and the staff’s responsibility (as the animal’s primary caretaker) to attempt to decrease these problems!

Management is something that has always been part of the keeper’s job and therefore requires no extra input from them often perceives enrichment. On the other hand keepers may sometimes feel that they are being asked to perform an extra task with no assistance, compensation or recognition. Although the techniques of enrichment are simple, they do require being imaginative and have a flexible approach to husbandry. They also require a certain level of initiative to be taken by the staff, something they might not be accustomed to (Shepherdson, 1991).

“Isolated enrichment or training events do not constitute programs. As an example, providing veterinary care or adequate nutrition to captive animals is not done in haphazard way. Veterinary care and nutritional plans are integrated programs and there is an expectation at the director, curator, and the keeper levels that animals will be medicated and fed in a prescribed and consistent manner. A successful enrichment program is not only integrated into the daily management of animals, but a successful program is dependent upon three important components: solid framework; attitude and training; and perhaps most critically, leadership” (Disney’s Animal Kingdom, 2000).

The Management of the Phoenix Zoo maximally promotes Behavioral Enrichment by providing a successful, goal-oriented, **self-sustained program** that integrates into the daily management of the animals (Behavioral Enrichment Protocol). This is accomplished by:

1. Supplying staff with the information and materials to **help** with their work (Behavioral Management Coordinator; Training and Enrichment Resource Office).
2. Finding adequate incentives to **motivate** staff: fully incorporating behavioral enrichment into the keeper’s job description. Participation in the enrichment plan is closely related to one’s personal evaluation.

3. Individual involvement in the behavioral enrichment program that expands the diversity of responsibilities, provides more daily stimulation and therefore, **creates** more **opportunity** for professional growth. This in turn allows staff to feel as though they are contributing more to the overall goal or mission of the Phoenix Zoo.
4. **Recognizing** and **rewarding** the extra efforts (Personal Evaluation, Excellence Reward System).

A successful enrichment program not only prioritizes enrichment needs, resources, money and people power, but it makes such a program a priority itself.

4. Behavioral enrichment framework- SPIDER

The Phoenix Zoo's Behavioral Management Program is now relying on a new and solid framework:

1. **Setting goals** -What do we want to achieve with this enrichment?
 - A series of questions are used to gather information on natural history, individual history, and management constrains
 - Generate specific enrichment ideas.
 - Prioritize those ideas
2. **Planning** –How do we want to get to that goal?
 - Completing the approval process
 - Acquiring/ building enrichment items
3. **Implementing** - Who will do what by when?
 - Roles and responsibilities
 - Schedules
4. **Documenting**-How and want to document?
 - Keepers document animal's response to enrichment daily
 - Identify the animal and enrichment provided
 - Record the animal's response
 - Observe and record the animal's behavior
5. **Evaluating**- How to assess effectiveness?
 - Staff routinely discusses progress and looks for trends in the data
 - Trends that maybe detected- Frequency of delivery, animal's response, relative success
6. **Re-adjusting**
 - Based on the evaluation of trends in the data, the goals and plan can be re-adjusted and the process started over again

5. Setting goals

A). Behaviors to be enriched

What behaviors should we attempt to encourage or discourage?

In terms of encouraging specific behaviors, two things are necessary for a chosen behavior to be elicited: opportunity and motivation. Giving the opportunity is basically providing the necessities (nesting materials, water, leaf litter, browse etc.) of what the animal could need. However, if the appropriate motivation is not there, the animal will usually choose not to exhibit that behavior.

Example: A puzzle feeder might be provided to encourage foraging time, but if it's too close to the visitor walkway, the animal is unlikely to use it because of competing motivation; its motivation for foraging versus its motivation to stay away from the public.

Managing behaviors is not easy and predictable. Captivity can drastically affect an animal's behavior (Morris, 1964). Reduced complexity can induce different behavioral responses such as boredom or stereotypes. A distressed animal is unable to adaptively cope with external stressors. Isolation in social species and boredom that results from certain husbandry practices are considered by some to be more distressful than pain (Wolfe, 1987). Behavioral Enrichment techniques should be designed to stimulate responses and reduce the impact of captive stress without endangering the welfare of the animal (Van Wormer, 1999).

Managing captive conditions must be carefully planned in order to achieve specific goals and predict and avoid the possibility of negative effects. The intensity of the stimuli has to be increased gradually, avoiding over stimulation.

The following behaviors have higher frequencies in the animals and could be managed in captive conditions:

Non-social behaviors

- a. Anti-Predator behavior: A form of defensive behavior, which includes any activity that affords protection against predation (McFarland, 1987).
- b. Exploratory behavior: A form of appetitive behavior, which may or may not be aimed at a particular commodity or environmental situation (McFarland, 1987).
- c. Dust bathing: The individual pours dust substrate on its body (Ortega, 1999).
- d. Foraging: Refers to behavior associated with searching for, subduing, capturing and consuming food (McFarland, 1987).
- e. Grooming: An activity that encompasses all forms of care and attention to the body surface (McFarland, 1987).
- f. Individual avoiding to be perceived (Ortega, 1999).
- g. Locomotion: Voluntary movement, which displaces the whole body (McFarland, 1987).
- h. Climbing: Go up or over by effort, especially using the vertical furnishing of the enclosure (Ortega, 1999).
- i. Locomotion on ground: Movement on ground level (Ortega, 1999).
- j. Play: Behavior patterns that are not "in earnest". Play behavior, which occurs only in the higher vertebrates, has an important biological function: It helps the animal to become familiarized "with itself and with the world" (Grzimek, 1977).
- k. Predatory behavior: An animal of one species, the predator, hunts, kills and eats a member of another species, the prey (McFarland, 1987).
- l. Wallowing: The animal rolls about in mud (Ortega, 1999).

Social behaviors

- a. Communication: Transfer of information. General term for signals exchanged between animals. Depending on the sense of modality involved, we speak of visual, auditory, or chemical communication (Grzimek, 1977).
- b. Social grooming: Manipulation of the skin, hair or feathers of a conspecific. This is done mostly (but not exclusively) on parts of the body that the passive partner cannot reach for himself. Its initial function was probably mutual cleaning and the removal of parasites. In addition however, social grooming may also aid in pair bonding and group cohesion (Grzimek, 1977).
- c. Escape: Form of defensive behavior, which may occur as soon as a predator is detected (McFarland, 1987). It also can be performed to avoid aggression from a conspecific or other species (Ortega, 1999).

Abnormal behaviors

- a. Pacing: Repetitive ambulatory movement, transversing the same pathway at least twice (Mellen, Haye, Sheperdson, 1998).
- b. Head toss: So-called “weavers” swing their heads rhythmically. At the same time pawing alternately with their feet (Meyer-Holzapfel, 1968).
- c. Auto-mutilation: Some individuals turn a normal grooming behavior into an excessive cleaning behavior. This behavior, an exaggerated licking, gnawing and scratching at parts of the body, which may cause serious wounds (Meyer-Holzapfel, 1968).
- d. Abnormal aggressiveness: Explosion of aggressive behavior that can be directed to a conspecific or other another animal, including humans. Capture and restrained life of captivity may repress the impulse of self-defense. The thwarted drive than suddenly finds an outlet in an attack upon the first “adversary” at hand (Hediger, 1935).
- e. Apathy: Separation from a mate or companion to which an animal is strongly attached can evoke a state of apathy comparable to depression and mourning of man (Mayer-Holzapfel, 1968).
- f. Prolonged infantile behavior: Hand reared passerine birds show the gaping behavior for a longer time. Even, when they are quite able to peck food from the ground, they react by gaping upon the appearance of their human foster parents (Loren, 1931).
- g. Tameness: Reduction in escape tendency to zero (Grzimek, 1977).
- h. Overeating: Constant foraging caused by boredom, overfeeding or monopolizing other animal's food source (Ortega, 1999).
- i. Refusal of food: Food can be refused after stressful situations like capture, manipulation or after a change of quarters (Meyer-Holzapfel, 1968)
- j. Aberrant appetite: The tendency of animals eating objects that could affect their health (Ortega, 1999).

B). Obtaining information

Providing enrichment takes a combination of resources including desire, time and financial resources. Keepers are almost universally on desire, but short on time and money to do so.

Behavioral Enrichment Committee, working in cooperation with the keepers, has the responsibility for developing enrichment strategies for the animals. We also have developed a new position called the **Behavioral Management Coordinator**, to advise keepers in training and enrichment planning and problems. We also have a **Training and Enrichment Resource Office** with available publications and videotapes in training and enrichment and an **Enrichment Library** to provide enrichment items for daily use.

The management of the Phoenix Zoo also provides funds for behavioral enrichment and the keepers have the opportunity to organize fund-raiser events in their area. Our management works very hard to provide the time to perform sufficient enrichment for our collection. Each supervisor has to make a commitment to schedule their staff for a daily routine in a way that everybody is able to service their animals in the proper way, including behavioral management.

Behavioral Enrichment Committee

Current Behavioral Enrichment Committee Job descriptions effective of 05-02-07- Updated on 03-29-09

Behavioral Management Coordinator/Chair

Proposals

- Coordinates/keeps track of all enrichment and training forms/proposals
- Updates on status of above
- Final enrichment and training approval

Budget

- Develop necessary budget recommendations prior to annual budget processes
- Update B.E. budget monthly

Inter- department events

- Initiation and/or development and/or coordination of ideas that will motivate the process of creative ways to improve enrichment, activity and visitor viewing for the health and welfare of the animals while assisting in the achievement of overall institutional goals (i.e. workshop activities, promotions and marketing)
- Collaborate with Public Relations, Marketing and sales staff
- Special Event liaison between Living Collections and Programs Department dealing with enrichment days/activities

Inventory

- Responsible for coordinating quarterly inventory with B.E. representatives

Monthly meetings

- Conducts monthly meetings
- Creates agendas for meeting
- Will account for the needs of trails whose members are unable to make it to our meetings

Evaluation of B.E. Committee Representatives

Tracks BE committee reps assignments on Master B.E. Committee Assignment logs for yearly evaluations. Attendance and assignment performance is reported back to the managers quarterly for consideration in the representatives' overall job performance reviews.

B.E. and Training articles

In charge of approving B.E. and Training articles for L.C. Newsletter

Trail Representatives

- In charge of communicating all BE committee activities with their trail staff
- In charge of ensuring all enrichment proposals are being proposed, approved by management, filled out appropriately by staff including keeper evaluations
- In charge of ensuring all enrichment logs are being filled out appropriately by staff and signed off by managers
- Assists in all enrichment days/activities they are assigned to, including obtaining/building enrichment items
- Coordinates Behavioral Enrichment Articles in LC newsletter
- Coordinates Fecal of the Month
- Finds new sponsorships (Starbuck, Costco, etc.) and pick up site
- Assist the coordinator with quarterly inventory, developing enrichment sign out program and tracking the whereabouts of enrichment items on each trail
- In charge of cleaning and organizing the Behaviors Enrichment shed and updating the Behavioral Coordinator on inventory changes
- Helps Horticulture with harvesting produces, pinecones and other seasonal items that can be used for enrichment on zoo ground
- Helps L.C. secretary with ordering items approved at meetings
 - Elephant Area representative is responsible for writing supply order requests for budget submission. Order form will be approved by the Director of Husbandry and given to LC Admin. Assistant for purchasing.

Changes effective of 05-02-07

Hilda Tresz is the committee chair. Co-chair position was discontinued.

- As chair, Hilda will account for the needs of trails whose members are unable to make it to our meetings.
- Hilda will work with Director of Husbandry to incorporate the BE committee reps into the yearly evaluations.
- Elephant Area representative is responsible for writing supply order requests for budget submission. Order form will be approved by the Director of Husbandry and given to LC Administrative Assistant for purchasing.

The Committee would like to set aside a set amount of money (~\$2000) each year toward professional development. This could bring workshops and/or lecturers to our zoo for the benefit of all zoo employees and animal enrichment.

Changes effective of 11-07-07

New supply order form was developed by the coordinator. These forms need to be filled out prior to the B.E. meeting and accompanied by website links or any other picture information, prize, exact shipping cost and amount information. All B.E. requests have to be approved by the B.E. Committee during the B.E. meeting. Elephant Area representative is no longer responsible for writing supply order requests for budget submission.

Changes effective of 06-17-08

Winter in July B.E. Representatives job description

The B.E. rep helps Heather Buck communicate with LC. BE reps would help Programs to get the treat list/snow approved through different managers and help address any problems LC might be worried about. They also assist in getting the snow into proper areas, and helping communicate with the keepers when is their time to get their snow and frozen treats.

- As chair, Hilda will account for the needs of trails whose members are unable to make it to our meetings.
- Hilda will work with Stuart to incorporate the BE committee reps into the yearly evaluations. Our performance as members will be reported back to our managers for consideration in our overall job performance reviews.

The Committee would like to set aside a set amount of money (~\$2000) each year toward professional development. This could bring workshops and/or lecturers to our zoo for the benefit of all zoo employees and animal enrichment.

Changes effective of 2-05-09

Donations are picked up by B.E. reps from the volunteer office weekly.

Changes effective of 3-08-09

Hilda will pick donation items up from volunteer office due to staff shortage

Revised Behavioral Enrichment Committee Job descriptions effective of 08-11-06

LC Manager Representative

- Oversees functions of committee
- Final enrichment approval for budgetary consideration, purchases, and management
- Approval of training and enrichment articles
- Final budget approval, keeps track of budget/financial status
- Communicates with other LC managers on the current events of the committee

Behavioral Management Coordinator/Chair

Proposals

- Coordinates/keeps track of all enrichment and training forms/proposals
- Updates on status of above
- Final enrichment and training approval

Budget

- Develop necessary budget recommendations prior to annual budget processes
- Update B.E. budget monthly

Inter- department events

- Initiation and/or development and/or coordination of ideas that will motivate the process of creative ways to improve enrichment, activity and visitor viewing for the health and welfare of the animals while assisting in the achievement of overall institutional goals (i.e. workshop activities, promotions and marketing)
- Collaborate with Public Relations, Marketing and sales staff
- Special Event liaison between Living Collections and Programs Department dealing with enrichment days/activities

Inventory

- Responsible for quarterly inventory

Monthly meetings

- Conducts monthly meetings
- Creates agendas for meeting
- Will account for the needs of trails whose members are unable to make it to our meetings

Evaluation of B.E. Committee Representatives

- Will work with Director of Husbandry to incorporate the BE committee reps into the yearly evaluations. Our performance as members will be reported back to our managers for consideration in our overall job performance reviews.

B.E. and Training articles

In charge of approving B.E. and Training articles for L.C. Newsletter

Trail Representatives

- In charge of communicating all BE committee activities with their trail staff
- In charge of ensuring all enrichment/training proposals are being proposed, approved by management, filled out appropriately by staff including keeper evaluations
- In charge of ensuring all enrichment/training logs are being filled out appropriately by staff and signed off by managers
- Assists in all enrichment days/activities they are assigned to, including obtaining/building enrichment items
- Coordinates Behavioral Enrichment Articles in LC newsletter
- Coordinates Fecal of the Month
- Finds new sponsorships (Starbuck, Costco, etc.) and pick up site
- Assist the coordinator with quarterly inventory, developing enrichment sign out program and tracking the whereabouts of enrichment items on each trail
- In charge of cleaning and organizing the Behaviors Enrichment shed and updating the Behavioral Coordinator on inventory changes
- Helps Horticulture with harvesting produces, pinecones and other seasonal items that can be used for enrichment on zoo ground
- Helps L.C. secretary with ordering items approved at meetings
 - John Register is responsible for writing supply order requests for budget submission. Order form will be approved by Stuart Wells and given to LC Admin. Assistant for purchasing.

Programs Representative

- Coordinates with BE Committee on program activities, workshops and events.

Marketing/Membership Representative

- Coordinates with BE Committee and program staff regarding enrichment donations and requests.

LC Administrative Assistant

- Representative and Marketing/Membership Representative
- Helps ordering approved enrichment items

Revised Behavioral Enrichment Committee Job descriptions effective of 08-07-06

Behavioral Management Coordinator

- Coordinates/keeps track of all enrichment and training forms/proposals
- Updates on status of above
- Develop necessary budget recommendations prior to annual budget processes
- Responsible for purchasing budgeted enrichment items
- Final enrichment and training approval
- Initiation and/or development and/or coordination of ideas that will motivate the process of creative ways to improve enrichment, activity and visitor viewing for the health and welfare of the animals while assisting in the achievement of overall institutional goals (i.e. workshop activities, promotions and marketing)
- Collaborate with Public Relations, Marketing, Programs and sales staff
- Responsible for quarterly inventory

LC Manager Representative

- Oversees functions of committee
- Final enrichment approval for budgetary consideration, purchases, and management,
- Final budget approval, keeps track of budget/financial status
- Communicates with other LC managers on the current events of the committee

Trail Representatives

- In charge of communicating all BE committee activities with their trail staff
 - In charge of ensuring all enrichment/training proposals are being proposed, approved by management, filled out appropriately by staff including keeper evaluations
 - In charge of ensuring all enrichment/training logs are being filled out appropriately by staff and signed off by managers
 - Assists in all enrichment days/activities they are assigned to, including obtaining/building enrichment items
- a. Carnivores/Primates
 - In charge of coordinating Behavioral Enrichment Articles in LC newsletter
 - b. Hoof stock/Birds
 - In charge of coordinating Fecal of the Month
 - c. Reptiles
 - In charge of coordinating finding new sponsorships (Starbuck, Costco, etc.) and pick up sites
 - d. Children's Zoo/Equine
 - In charge of developing enrichment sign out program and tracking the whereabouts of enrichment items on each trail
 - e. Animal Experiences
 - In charge of cleaning and organizing the Behaviors Enrichment shed and updating the Behavioral Coordinator on inventory changes .
 - f. Horticulture/Nutrition Services
 - In charge of harvesting produces, pinecones and other seasonal items that can be used for enrichment on zoo ground

Co-Chair –

- Orders items approved at meetings.
- Back-up Chair on assigned duties
- Assume Chair duties in the coming year.

Chair

- Conducts monthly meetings
- Works with LC mgr and BE coordinator on all management issues dealing with the committee
- Creates agendas for meeting
- Special Event liaison between Living Collections and Programs Department dealing with enrichment days/activities
- Mentor Co-Chair for upcoming year's duties.

Programs Representative

- Coordinates with BE Committee on program activities, workshops and events.

Marketing/Membership Representative

- Coordinates with BE Committee and program staff regarding enrichment donations and requests.

LC Administrative Assistant

- Attend scheduled BE meetings
- Record minutes and distribute to Team Living Collections, Programs
- Representative and Marketing/Membership Representative

Behavioral Enrichment Committee

Revised September 28, 2005

The Behavioral Enrichment is a voluntary committee of the Phoenix Zoo. All committee positions are elected by the previous year's members in January. The members will then choose a chair and/or co chair persons and elect the other officials. The Living Collections manager will provide a managerial oversight and the chair person will make sure the committee work is assigned and followed through.

The members are:

1. Chair person
2. Living Collections Manager
3. Behavioral Management Coordinator
4. Commissary representative
5. Keeper representative from each trail
6. Any person that has an interest from other departments

Duties:

- Final enrichment approval for budgetary consideration, purchases, and management.
- Manage monthly budget in accordance to approved budget amounts.
- Make necessary budget recommendations prior to annual budget processes.
- Revenue generation ideas in accordance with the approval of the Director of Animal Management and Development department.
- Communicating enrichment ideas and opportunities to the trails, supervisors and the rest of the zoo.
- Generating B.E proposals with trail members.
- Obtain/build enrichment items
- Implementation and 30 day evaluations of approved Behavioral Enrichment items.
- Initiation, development and coordination of ideas that will motivate the process of creative ways to improve enrichment, activity and visitor viewing for the health and welfare of the animals while assisting in the achievement of overall institutional goals (i.e. enrichment days, events, activities, promotions and marketing).

Behavioral Management Coordinator job description

The Behavioral Management Coordinator is responsible for:

- a. Creating recommendations for experiential learning opportunities that focus on the intimate engagement of the public.
- b. Documenting a comprehensive behavioral management program, including considerations of psychological enrichment, health and husbandry applications, and the management of behaviors for public presentations and engagement.
- c. Help identify the best integrations of behavioral management and health/husbandry application.
- d. Oversee the training, behavioral enrichment and behavioral management issues of all the animals in the living collections.
- e. Develop, document and complete a prioritized schedule of behavioral management projects.
- f. Specify performance standards and measures for staff engaged in behavioral management. Plan and conduct staff training and create a training certification program. Mentor staff as needed.
- g. Assist in the routine performance appraisal of staff in all areas.
- h. Assist and advise staff in development of volunteer resources related to Behavioral Management Programs and associated Public Programs.
- i. Provide assistance in strategic planning.
- j. Collaborate with Public Relations, Marketing, and sales staff to communicate the types of personal engagements readily available through visitation to the zoo.

Training and Enrichment Resource Office

The Training and Enrichment Resource Office constantly open to help staff research and develop enrichment and training ideas. There are numerous articles and videotapes available in both subjects. The articles cannot be taken out of the office, they need to be copied and the master copy must remain. The videotapes have to be viewed in the office and we have two sets of television and video equipment available. The enrichment articles are sorted by species and /or general terms (bats, bears, large cats, great apes); while the training articles are sorted by behaviors (blood draw, trunk wash, oral examination etc).

Note: The Behavioral Management coordinator was moved into the A.E. office and the resource office was discontinued in November 2005.

Enrichment Library (B.E. Shed)

The Enrichment Library is located at Deserts/Reptile Trail, next to the Baboon night house. The Living Collections Department stocks and maintains numerous behavioral enrichment items in the library. Keepers are in a sign in/out system, and are responsible for notification if an item has run out and needs to be re-ordered. Items in the library include; extracts, perfumes, puzzle feeders, and a variety of toys. When the toys are returned to the library, the keeper is responsible for disinfecting the item before it is placed back on the shelf, making it ready for the next keeper to use.

6. Planning for behavioral enrichment

In Goal-setting people reviewed the natural and individual history of the animal, the husbandry constraints and generate enrichment ideas.

The planning includes:

- Submitting these ideas to the appropriate staff members for approval
- Account for resources (staff, financial and time)
- Account for limitations (aesthetic or financial)
- Considering safety and health
- Institutional philosophy
- Acquiring/building enrichment items

08-02-06

New BE Event Request Forms: In order to correct some communication problems between different departments, a Special Event Request Form has been created which will require approval from managers, vets, commissary and trail for implementation.

Special Events Committees: Since special events are getting quite large a LC -Special Events Committee will be established for individual events. This will allow more keepers to participate outside of the BE Committee. There will be participants from each trail, once the event is over they will be disbanded and a new group will be formed for the next special event.

BEHAVIORAL ENRICHMENT EVENT REQUEST

Requestors Name:

Requesting Trail:

Date Requested:

Name of Event:

Date/Time of Event:

Collection animal (s) involved:

Item(s) being requested:

Description per animal (Include quantity/size/amount)

Diet Items Needed (Please add an * for those items not normally included in the diet)

Who will be responsible for making these items?

Estimated Cost?

Which department will be covering the cost?

Approved (please initial appropriate box, all staff must approve)

Trail:	LC mgr:	Husbandry mgr:	NS mgr:	Vet:
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Enrichment evaluation:

4/12/2009

06-22-06

Animal Piñata Protocol

Acceptable Materials

The general idea here is that if a two year old child might find it dangerous when eaten, so will an animal.

- Cardboard or thick paper boxes (there are many located behind gift shop)
 - All staples, tape, string, glue and glossy paper must be removed
 - To close box, either use paper mache mix or fold box flaps in
- Paper bags, butcher paper, newsprint, paper plates
 - Again, no tape or glossy paper
- Paper towel and toilet paper rolls, mailing tubes, wrapping paper tubes
- Paper mache mix
 - Mix flour, water and a small amount of salt (anti-fungal) to form a glue like paste
- Elmer's or Children's White Glue – children's non-toxic
- Tempera Paint - children's non-toxic
- Raffia string/ribbon – untreated or dyed

Non-Acceptable Materials (if it's not on the acceptable list, don't use it)

- Tape, string, any glue beyond children's white glue
- Crayons, sharpies and other coloring agents beyond tempera paint
- Plastic materials and glossy paper
- Staples

To make general animal body...

- Remove all tape and other materials of concern from box
- Re-form and close box. Use single layer of paper mache paste to cover logos or create a nice canvas for painting.

To add limbs or a head...

- Using a box cutter or exacto knife, you can also create a slot and notch system to attach smaller boxes or tubes onto the original box. This tends to be a bit more secure than using the glue or paste.

Adding fun features such as feet, spines, manes, ears, etc...

- The more detachable things on the box, the better in terms of animal enrichment. Adding on ears, tails and other features gives the animal all the more things to tear off.
- Have a spare piece of cardboard and use a box cutter to cut out your feature shape.
- Use the slot and notch system to attach to the main body. White glue or paper mache paste can also be used, but use clips to hold feature in place until the glue dries and then remove clip.

Fun Animal Ideas:

- A porcupine – think of all the spikes that can be torn off
- A sheep – with individual curls of paper glued on as wool
- Giraffe – Start saving the mailing tubes
- Dragonfly – mini box head with mailing tube as body and cardboard wings – lots of places to hide food!
- A moose – with mailing tube antlers with cardboard branches

Revised 08-20-08

Management meeting minutes

Date: 08-20-08

Attendees: Melinda, Kara, Heather, Hilda, Becky, Rebecca, Paula

Re: Behavioral enrichment proposals

From: Hilda Tresz

1. We will return using species proposals zoo wide for new submissions
2. In case of backtracking (when old proposals were lost), already approved, known and currently used enrichment can be proposed blanketly
3. No new enrichment proposals will be allowed until the entire zoo enrichment programs are caught up to standards (documented and evaluated)
4. B.E. representatives will :
 - Create new contra freeloading monthly schedules and transfer all approved enrichment onto the new format by November 1, 2008. It will allow us to see how many enrichment we use for a species and if anything still needs to be approved retro
 - Combine Blanket and Species B.E. Log Books together and produce one Log Book reflecting on the 6 USDA categories by species and not by blanket approvals by January 1, 2009
 - Will generate a new Log Book cataloging enrichment by species and not by items as well by March 1, 2009
5. Managers will provide time for B.E. representatives to accomplish their task

Current Behavioral Enrichment Approval Process

Revised Behavioral Enrichment Approval Process

July 21, 2008

Either blanket or species proposals will not be signed off by the Director of Animal Management.

Revised Behavioral Enrichment Approval Process

07-21-08

All enrichment ideas, whether it's related to food or non-food items, must be formally approved prior to implementation. **If the desired enrichment includes a food item, the keeper must first email their manager the request. The Living Collection Managers will bring all food related requests to the Trail diet meeting prior to electronic submission for discussion with the Commissary Manager and Veterinarians.** The type and specific amounts of food will be agreed upon at this meeting.

When filling out an online BE form, you can classify the BE item for the animal anywhere from Phylum to Species, depending on the circumstances.

Forms can be submitted at the level of Phylum, Class, Order, Family, Genus, or species by the keeper however, it is encouraged that everyone should try blanketing items as much as possible. The level of classification the item is approved for is subject to change per vet/manager/committee. For example, a keeper submits a form for Hylobatidae (gibbons) to have shredded paper, the committee and vets could say that is acceptable for all primates. Or a keeper could submit for all Carnivores to have bones, and the manager could say it is only appropriate for Canidae, etc.

If you're not sure where your animal falls under for classification, you can reference the following link: [..Classification Blanket approval 1.doc](#) that is also located in the right corner of the B.E. Form.

Step #1 Access the Master Copy of the Blanket Enrichment Proposal form

[..BLANKET ONLINE FORM \(B.E.\)final.doc](#)

Before typing on the form, use the "Save As" option to name the proposal and prevent altering the master copy.

Save it using the following format: **animal-enrichment-mmddy** (i.e. human-martini-010104 would be for using a martini for human enrichment proposed Jan 01, 2004). Save the file under: (Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions).

Step #2 Send an e-mail with the FILENAME of your submission to Behavioral Management Coordinator (Hilda Tresz) only. The coordinator will review the proposal and submit it to management.

Do not send the proposal as an attachment; send a link to the file. To insert the link: Go to the menu bar and click on Insert. Scroll down to Hyperlink. Find file under (Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions). Click on OK. Once the link is inserted, send the email.

Step #3 The LC Managers should make their comments directly on the form and save the document. It is requested that Managers respond to the proposals within 5 DAYS so that the process can continue in a timely fashion.

Step #4 The Behavioral Management Coordinator will check on new proposals every Monday to see whether they have been approved or not.

Step #5 If all pertinent parties approve the item, the Behavioral Management Coordinator will enter the new approved enrichment into the Master Blanket B.E. Log Book.

Step #6 If any party tables the item for discussion, the parties need to consult with the Director of Animal Management on how to make the behavioral enrichment request acceptable.

Behavioral Enrichment Approval Process

All enrichment ideas, whether it's related to food or non-food items must be approved by implementation. All enrichment requests must move through the approval process and will be approved for a single species or in some cases, for a single animal.

Step #1 Complete the Behavioral Enrichment Proposal form

Step #2 Consult the idea with Living Collections Manager and the Trail personnel to assure buy-in at all levels.

Step #3 Food related requests should be discussed at a Trail diet meeting prior to electronic submission.

Step #4 Submit the form for signatures and comments.

Step #5 If necessary, The Behavioral Management Coordinator will submit the proposal to Horticulture, Commissary and Operations.

Step #6 If all pertinent parties approve the item, then the submitter will be notified. If any party tables the item for discussion, the submitter will be requested to attend the next Behavioral Enrichment meeting to answer questions or consult on how to make the behavioral enrichment request acceptable.

Revised Behavioral Enrichment Approval Process 12-12-06

All enrichment ideas, whether it's related to food or non-food items, must be formally approved prior to implementation. **If the desired enrichment includes a food item, the keeper must first email their manager the request. The Living Collection Managers will bring all food related requests to the Trail diet meeting prior to electronic submission for discussion with the Commissary Manager and Veterinarians.** The type and specific amounts of food will be agreed upon at this meeting.

When filling out an online BE form, you can classify the BE item for the animal anywhere from Phylum to Species, depending on the circumstances.

Forms can be submitted at the level of Phylum, Class, Order, Family, Genus, or species by the keeper however, it is encouraged that everyone should try blanketing items as much as possible. The level of classification the item is approved for is subject to change per vet/manager/committee. For example, a keeper submits a form for Hylobatidae (gibbons) to have shredded paper, the committee and vets could say that is acceptable for all primates. Or a keeper could submit for all Carnivores to have bones, and the manager could say it is only appropriate for Canidae, etc.

If you're not sure where your animal falls under for classification, you can reference the following link: [..\Classification Blanket approval 1.doc](#) that is also located in the right corner of the B.E. Form.

Step #1 Access the Master Copy of the Blanket Enrichment Proposal form
[..\BLANKET ONLINE FORM \(B.E.\)final.doc](#)

Before typing on the form, use the "Save As" option to name the proposal and prevent altering the master copy.

Save it using the following format: **animal-enrichment-mmddy** (i.e. human-martini-010104 would be for using a martini for human enrichment proposed Jan 01, 2004). Save the file under: (Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions).

Step #2 Send an e-mail with the FILENAME of your submission to Behavioral Management Coordinator (Hilda Tresz) only. The coordinator will review the proposal and submit it to management.

Do not send the proposal as an attachment; send a link to the file. To insert the link: Go to the menu bar and click on Insert. Scroll down to Hyperlink. Find file under (Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions). Click on OK. Once the link is inserted, send the email.

Step #3 The LC Managers should make their comments directly on the form and save the document. It is requested that Managers respond to the proposals within 5 DAYS so that the process can continue in a timely fashion.

Revised Behavioral Enrichment Approval Process

March 28, 2005

The approval process has been re-evaluated to assure the greatest possible input in developing species appropriate behavioral enrichment projects. **It is the initiator's responsibility to follow the project through from submission to completion.** The Behavioral Management Coordinator and other supporting LC staff will provide assistance, guidance and support when needed.

The following changes have been made:

- Deadlines for implementations and evaluations were eliminated.
- Enrichment items will be approved by taxa and will not be trail-specific.
- Blanket approvals of items were agreed upon, with some exceptions to be handled by keepers and managers. Keepers will be held responsible for BE -any questions of individual appropriateness should be discussed with managers.
- The process will be online.
- The online form was simplified by:
 - Question #1B was combined with #2.
 - Drawing of diagram is no longer necessary.
 - A short evaluation will suffice on the online form under "Evaluation/keeper comments" and under #14 on the Daily Section Report (DSR).
 - Trail reviewers comments are no longer required.
 - Estimated cost/financial evaluation over \$5 was eliminated.
 - B.E Committee 30 day evaluations will no longer be required.

All enrichment ideas, whether it's related to food or non-food items, must be formally approved prior to implementation. Projects will usually be approved for a single species or in some cases, for a single, specific animal.

If the desired enrichment includes a food item, the keeper must first email their manager the request. The Living Collection Managers will bring all food related requests to the Trail diet meeting prior to electronic submission for discussion with the Commissary Manager and Veterinarians. The type and specific amounts of food will be agreed upon at this meeting.

Step #1 Access the Master Copy of the Behavioral Enrichment Proposal form

(Q:\Behavioral Management\Enrichment\BE Proposal online Form).

Before typing on the form, use the "Save As" option to name the proposal and prevent altering the master copy.

Save it using the following format: **animal-enrichment-mmddyy** (i.e. human-martini-010104 would be for using a martini for human enrichment proposed Jan 01, 2004). Save the file under:

(Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions).

Step #2 Send an e-mail with the FILENAME of your submission to the responsible Living Collections Manager, Behavioral Management Coordinator (Hilda Tresz), Veterinarian (Dr. Kathy Orr), and to the Commissary Manager (Melinda Frankus) if it is food related. Carbon copy (CC) the BE Committee and fellow trail keepers.

Do not send the proposal as an attachment; send a link to the file. To insert the link: Go to the menu bar and click on Insert. Scroll down to Hyperlink. Find file under (Q:\Behavioral Management\Enrichment\BE PROPOSALS\NEW submissions). Click on OK. Once the link is inserted, send the email.

Step #3 The LC Manager should make their comments directly on the form and save the document. Keepers need to follow through that Managers have signed the form before step #4. It is requested that Managers respond to the proposals within 5 DAYS so that the process can continue in a timely fashion.

Step #4 The Behavioral Management Coordinator will check on new proposals every Sunday to see whether they have been approved or not.

Step #5 If all pertinent parties approve the item, the Behavioral Management Coordinator will enter the new approved enrichment into the excel sheet.

Enrichment items can be checked by species and by items when the <Ctrl> key is held down and the <F> letter is typed. A Find window will pop up and either the animal or the enrichment item can be entered. When an animal is typed in, all approved items should come up on the screen. When an enrichment item is typed in, all species approved for that item should be listed.

The coordinator will mark if enrichment items have been implemented on the excel sheet.

Step #6 If any party tables the item for discussion, the parties need to consult with the Director of Animal Management (Pam McLaren) on how to make the behavioral enrichment request acceptable.

Step #7 Once the enrichment is implemented, **the initiator needs to document and evaluate the success of the project both on the DSR and on the online form.** The Behavioral Enrichment Trail Representatives are required to check once a month if enrichment items have been implemented/documented and/or evaluated.

While it is the initiator's responsibility to move the project forward, the Behavioral Management Coordinator will assist in this process by documenting the progress of all submissions on the Q drive (under Behavioral Management\BE Proposal log book).

Here are the guidelines for submitting BE forms. When filling out an online BE form, you can classify the BE item for the animal anywhere from Order to Species, depending on the circumstances. Forms can be submitted at the level of Order, Family, Genus, or Species by the keeper. The level of classification the item is approved for is subject to change per vet/manager/committee. For example, a keeper submits a form for Hylobatidae (gibbons) to have shredded paper, the committee and vets could say that is acceptable for all primates. Or a keeper could submit for all Carnivora to have bones, and the manager could say it is only appropriate for Canidae, etc.

If you're not sure where your animal falls under for classification, you can reference the following website : <http://animaldiversity.ummz.umich.edu> or go to the Q drive BehaviorManagement/Enrichment/BEpics there are subfolders for Aves/Mammalia/Reptilia that contain the breakdown in each Class for the animals we have at the Phoenix Zoo.

FOOD RELATED BEHAVIORAL ENRICHMENT PROTOCOL

In an effort to streamline the process for evaluating, approving and implementing food related behavioral enrichment (B.E.) proposals; the following protocol will be effective October 1, 2003.

Behavioral enrichment proposals that include food items are to be presented to the Nutrition Team at their bi-monthly meetings for approval prior to submitting to the Behavioral Enrichment Committee. This will allow each proposal to be evaluated based on the current diet components, the interactions with the current diet items, effect on nutritional value of the diet and nutritional analysis when necessary. Once approved at the nutritional level, the proposal will be forwarded to the Management team. This will ensure that new items are incorporated into the existing diet effectively and food items are documented on the diet sheets appropriately. The diets sheets currently include a separate section for B.E. items and training items. When a proposed feed item is approved for B.E., but has a significant effect on the base diet due to either volume or frequency, the item will be calculated into the regular diet for a nutritional analysis of the diet and not placed in the separate category. The reason is that the item becomes a dietary item, not a BE item. In these cases the request will be considered a diet change request and not a behavioral enrichment request. If the item does NOT have a significant effect on the base diet, the item will be considered a behavioral enrichment request and will be documented on the diet sheet under B.E. or Training, pending approval by the Behavioral Enrichment and Management Teams. This item will not need to be calculated into the nutritional analysis of the diet. As the Nutrition Team meets several times each month, we hope this process will improve the current process for food related proposals.

The following questions should be asked when setting goals for Behavioral Enrichment:

Natural History:

1. What is this species' wild habitat (e.g., desert, tropical rainforest, cover, moisture, concealment/camouflage options, temperature ranges, barriers from conspecifics)? (If specific information on a particular species is unknown, provide information on closely related species/genus/family.)
2. How does the animal in the wild behave in response to changes in temperature and weather? What temperature/humidity range does it experience in the wild?
3. What are some self-maintenance/comfort behaviors (e.g., preening, grooming, bathing, dust-bathing, wallowing, sunning, panting)? Is there a seasonal molt/shed?
4. When is it most active (diurnal, nocturnal, crepuscular)? Why (e.g., predator avoidance)? Does the activity pattern change seasonally?
5. Does the species in the wild inhabit primarily arboreal, terrestrial or aquatic environments or does it switch between them at times?
6. What are the main threats to the animal in the wild? What is it likely to be afraid of (e.g., conspecifics, humans)? What different types of predators does it have to look out for in the wild? Are there any anti-predator behaviors (e.g., broken-wing display)? Where and how does the animal seek refuge in the wild from fearful situations (e.g., loud noises like thunder)? What does fearful behaviors look like?
7. What are its primary sensory modalities (e.g., sight, smell, sound) for communicating with conspecifics, detecting predators and for finding food, mates, or other social partners?
8. What is the social structure of this species (e.g., solitary, dyads, "harem," colonial, leks, polyandry)? What is the average/typical group size?
9. What is the average distance between social group members and from neighboring conspecifics?
10. Describe the primary social behaviors of this species (e.g., aggression, courtship, affiliative, play).
11. Does the social structure change seasonally or throughout the animal's life (e.g., juvenile vs. adult, bachelor/groups)?
12. Does this species defend territories? Does it maintain a home range? What is the size of the home range/territory? Does this species migrate seasonally?
13. How does the animal advertise its home range or territory (e.g., scent marking, song)? How does the animal attract a mate (e.g., displays, scent marks)? Who displays?
14. Where does the animal raise young (nest location/type, den)? What materials does it use to build nests/prepare dens? Are both sexes involved in rearing young? Are the young precocial or altricial? How are the young fed?
15. How does the animal locomote through its habitat?
16. What is the animal's diet type (e.g., omnivore, carnivore, herbivore, nectivore, insectivore) in the wild? Does diet change seasonally? By age?
17. What does the animal feed on in the wild? What variety of food does it need to eat? What behaviors does it use to locate and procure the different types of food it needs? Does it use tools to obtain food? Store/cache food?
18. Where does the animal sleep or rest? Does that change seasonally?
19. Any other considerations?

Individual History:

1. Does this animal have any medical problems (e.g., arthritic, obese, diabetic, missing digits, wing damage, pinioned)?
2. Does this animal have any behavioral problems (e.g., fearful/aggressive to humans, stereotypy, feather plucking)?
3. Any other considerations (e.g., exhibit at previous institution, hand-raised)

Current Exhibit:

1. What is the size of the animal's enclosure (exhibit and holding area)? What are the containment barriers (e.g., chain link, moat)?
2. Can the animal use all components of its exhibit? Can it hide? For example, how many places could this animal be out of view of its cage mate?
3. How functional is the current exhibit? Does the exhibit facilitate/allow the animal to exhibit natural behaviors? How does the animal interact with exhibit elements?
4. Where and how is the animal's food (normal diet, enrichment, browse) provided? Does the animal have a preference for one feeding site over another?
5. Does the physical environment contain elements of novelty (e.g., weather changes, can furniture be changed easily)?
6. What are the animal's opportunities to feed/forage, breed and socialize in species-appropriate ways? Do/can/should animals interact with other species in exhibit?
7. Can the animal exhibit normal patterns of behavior? Are components of the physical environment available for this to occur?
8. Can the animal make choices about where and how it spends its time? Does the animal have control over acquisition of food? Access to hiding places? Protection from the elements?
9. Are there any hazards in this enclosure?

Old hard copy

Behavioral Enrichment Proposal Form

Initiator: Fill out the form completely, please.

Special concerns and comments:

FOR BEHAVIORAL
MANAGEMENT COMMITTEE
USE ONLY:

APPROVED _____

DISAPPROVED _____

PENDING _____

30 DAYS EVAL. _____

NAME _____

90 DAYS EVAL. _____

Date:

Submitted By:

Species:

Location:

- 1) a. Briefly describe the proposed project (If food items, please note if food is normal daily diet or additional items).
- b. Justify enrichment (i.e., is other enrichment available, is animal housed alone or in a group, are psychologically aberrant behaviors evident, etc.).

2) Briefly describe the natural behavior being targeted or enhanced or the behavior you wish to modify or redirect (e.g. reduce pacing).

3) If applicable, draw a simple diagram of the project. Note key components.

4) Frequency (number of uses (per day, week, month) _____

5) Estimated materials list and cost. Include labor to build. (E.g. \$5 for material and 1 hour keeper time).

6) Financial Evaluation (required if requesting reimbursement of more than \$5):

Number of specimens affected _____

Operating cost _____

Frequency _____

Message (is there anything specific about the enrichment that educates the public, other than the general enrichment message, i.e., enrichment may encourage tool usage, or demonstrate unusual animal abilities, etc.)

Trail Reviewers Comments:

Trail Keeper's input (no signature required)

Behavioral Enrichment Proposal Reviewer's Comments

Living Collections Manager

Veterinarian

Behavioral Management Coordinator

Additional Comments:

When finished please return to Behavioral Management Coordinator. Coordinator will return it to keeper in 30 days.

Evaluation

Summary of keeper's evaluation:

30 day evaluation by the Behavioral Enrichment Committee:

90 day evaluation by the Behavioral Management Coordinator and the Living Collections Supervisor:

Rating scale: Indirect

1. No evidence of interaction
2. Minimal evidence of interaction
3. Moderate evidence of interaction
4. Substantial evidence of interaction
5. Significant evidence of interaction

Direct

- a. Actively avoids enrichment item
- b. Interacts inappropriately
- c. Interacts tentatively
- d. Interacts appropriately, but not with intended goal
- e. Interacts appropriately with goal behavior

BE Proposal Form		
Applicant Information		
Name:		
Date:		
Species:	Choose Category Exceptions:	
Location:		
<div style="display: flex; justify-content: space-between;"> Approved Disapproved Pending Implemented </div>		
Proposal Information		
Briefly describe & justify the proposed project (If food items, note if food is normal daily diet or additional items). Include the frequency (per day/week/month, etc.), and the natural behavior being targeted, enhanced, modified or redirected.		
Estimated materials list and cost. Include labor to build. (e.g. \$5 for material and 1 hour keeper time).		
BE Committee Comments		
LC Manager		
Behavioral Management Coordinator		
Veterinarian		
Commissary		
Keeper Comments/Evaluation		

Enrichment Schedule

Trail _____ Species _____

Type of Enrichment group:							
Items approved:							
Behavior to be enriched:							
Comments:							

Example:

Approved Enrichment

Trail: Carnivore-Primate

Species: African Wild Dog

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Type of Enrichment group:	Foraging	5 senses	Manipulanda	Foraging	Structure/Substrate	Manipulanda	5 Senses
Items to be used:	Milk bones Pig Ears Kibble Honey Condiments Insects Blood balls Chunk meat Carcass (horse) Whole pray: Rabbit Pigeon Peanut butter Ice treats	Spices Herbs Extracts Perfume Lures Urine Fecal Nature sounds	Paper products Piñatas Boomer toys Feathers Logs Bowling pins Kegs/Barrels Pine cones Browse Insect feeders Puzzle feeders Snake sheds	Pig Ears Kibble Honey Condiments Insects Blood balls Chunk meat Carcass (horse) Whole pray: Rabbit Pigeon Peanut butter Ice treats	Add new sand Rake mounds Changing furniture Paper Dry leaves Hay Straw New Logs	Paper products Piñatas Boomer toys Feathers Logs Bowling pins Kegs/Barrels Pine cones Browse Insect feeders Puzzle feeders	Spices Herbs Extracts Perfume Lures Urine Fecal
Comments:							

Type of enrichment groups: Foraging, Social enrichment, Manipulanda, Structure and substrate, Stimulating the five senses, Training

g. Safety issues

Make sure the enrichment item:

- Does not pose any danger to the animal. The animal cannot get tangled, trapped and caught in it; choke on it and the item cannot fall on the top of the animal.
- Cannot be used as a weapon.
- Will not cause gut impaction.
- Will not damage the exhibit.
- Cannot be thrown outside of the exhibit or at the visitors.
- Will not traumatize the animal.
- Cannot help the animal to escape.
- Cannot lead to aggression.

When building an object, make sure to:

- Use screws and non toxic glue instead of nails
- Round off corners and sand objects generously.
- Only use non-toxic paints.
- Use natural materials.
- Cardboard boxes must be free of staples or plastic tapes.
- Paper bags must be free of strings, plastic or inner liners.
- Make sure that any animal parts (e.g. hides) or excretions (e.g. urine, feces) have been approved by the veterinarians before being used as enrichment.

h. Animal enrichment guidelines

2. The Behavioral Enrichment Committee must approve all items.
3. Always radio the appropriate personnel at least half an hour before presentation to confirm presentation and enrichment items.
4. Have back up items all the time.
5. Always inspect the area for your and your animal's safety.
6. Try to think of items other than food. Often times other items can be more interesting and may encourage unique and unexpected behaviors.
7. Do not overwhelm the animals with too many enrichment items at one session.
8. Do not repeat items too frequently, it will lose its value.
9. If there is more than one animal on exhibit, always offer sufficient items to help prevent aggressive behavior between the animals.
10. Items should be removed after a day or two.
11. Keep daily records, regardless of the "success" of the enrichment.
12. Unless instructed to do so by your supervisor, do not purchase or bring in your own enrichment items.

7. Implementing

Once the enrichment is approved, it can begin to be implemented by using a calendar that will a). Plan delivery, and b). Records the date and time of actual enrichment delivery.

The implementation of enrichment should be scheduled. This method ensures that all team members are aware of what items/methods are to be employed on what days and with what animals. Furthermore, scheduling assists with the logistical organization such as animals procedures, cleaning, maintenance, etc.

Scheduling should be:

- Flexible
- Varied
- Easy to update
- Easy to follow

All Trails are required to post a weekly or monthly enrichment schedule in their night house areas.

8. Documenting

Documenting enrichment can seem like a daunting task. Staff often claims that there is no time to document enrichment. But, by using the veterinary care or nutrition analogy, we always document medications received and record diet given. On a similar scale, documenting behavioral enrichment is an integral part of our program. It shows that enrichment was implemented on a particular date, and it helps identifying the animal's response to it.

At the Phoenix Zoo enrichment is documented at several different levels:

Daily Section Report- All noteworthy enrichment ideas are to be noted daily under #14 when:

- Presented the first time
- Enrichment was unsafe
- Unusual behavior observed
- Item was removed

Weekly Behavioral Enrichment Log- Every trail should have a Weekly Behavioral Enrichment Log in their night house area for every species that receives enrichment. The enrichment logs are evaluated weekly by the Operation Supervisors and by the Behavioral Management Coordinator.

The enrichment logs are documenting in two ways:

Indirect observation rating scale

1. No evidence of interaction
2. Minimal evidence of interaction
3. Moderate evidence of interaction
4. Substantial evidence of interaction
5. Significant evidence of interaction

Direct observation rating scale

- a. Actively avoids enrichment
- b. Interacts inappropriately
- c. Interacts tentatively
- d. Interacts appropriately, but not with intended goal
- e. Interacts appropriately with goal behavior

Photos and videos- Photos and videos are one of the most efficient, objective and easy way to document enrichment. They help to provide consistency, easy to track, share and evaluate.

**2005
B.E. Proposal Log Book**

All approved enrichment items were combined into an excel sheet for easier review. The log book contains the following data:

B.E. Proposal	Trail	Trail keeper	Approval date	Implementation date	Evaluation date	Miscellaneous
---------------	-------	--------------	---------------	---------------------	-----------------	---------------

The proposals are color coded:

Green = approved, implemented and evaluated	Black = approved and implemented	Red = Disapproved or discontinued	Brown = Data was entered after 2002
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03-13-07

Blanket B.E. proposal log book

The Blanket proposal log book contains all blanketed enrichment items by classifications such as phylum, class, order and family.

ENRICHMENT	CATEGORY	SUBMITTER	APPROVAL DATE
1 Paper products	Primates	Hilda Tresz	
2 Paper products	Carnivores	Hilda Tresz	1/9/2007
3 Paper products	Birds	Hilda Tresz	1/9/2007
4 Paper products	Reptiles	Hilda Tresz	1/9/2007
6 Paper products	Ungulates	Hilda Tresz	1/9/2007
7 Paper products	Xenarthra	Hilda Tresz	1/9/2007
8 Paper products	Lagomorpha	Hilda Tresz	1/9/2007
9 Paper products	Hyracoidea	Hilda Tresz	1/9/2007
10 Paper products	Chiroptera	Hilda Tresz	1/9/2007
11 Paper products	Rodentia	Hilda Tresz	1/9/2007
12 Paper products	Diprotodontia	Hilda Tresz	1/9/2007
13 Barrels/Kegs	Xenarthra	Hilda Tresz	1/9/2007
14 Barrels/Kegs	Carnivores	Hilda Tresz	12-Mar-07
15 Barrels/Kegs	Ungulates	Hilda Tresz	12-Mar-07
16 Barrels/Kegs	Primates	Hilda Tresz	12-Mar-07

17	Barrels/Kegs	Lagomorpha	Hilda Tresz	12-Mar-07
18	Barrels/Kegs	Hyracoidea	Hilda Tresz	12-Mar-07
20	Barrels/Kegs	Rodentia	Hilda Tresz	12-Mar-07
21	Barrels/Kegs	Diprotodontia	Hilda Tresz	12-Mar-07
26	Pasta	Primates	Niki Ciezki	12-Mar-07
27	Pasta	Psittaciformes	Niki Ciezki	1-Feb-07

Weekly Enrichment Log

_____ Week of _____ Trail _____ Species _____

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Type of Enrichment group:							
Item used:							
Keeper's initial:							
Rating:							

L.C. Manager _____ Date _____ Behav. Man. Coordinator _____ Date _____

Or Veterinarian _____ Date _____

Type of Enrichment Group:

1. Foraging
2. Social Enrichment item
3. Manipulanda
4. Structure and Substrate
5. Stimulating the Five Senses with
6. Training

Rating scales:

- | | |
|--|--|
| <p><u>Indirect</u></p> <p>A. No evidence of interaction</p> <p>B. Minimal evidence of interaction</p> <p>C. Moderate evidence of interaction</p> <p>D. Substantial evidence of interaction</p> <p>E. Significant evidence of interaction</p> | <p><u>Direct</u></p> <p>a. Actively avoids enrichment</p> <p>b. Interacts inappropriately</p> <p>c. Interacts tentatively</p> <p>d. Interacts appropriately, but not intended goal</p> <p>e. Interacts appropriately with goal</p> |
|--|--|

behavior

Weekly Enrichment Log

Week of _____ Trail _____ Species _____

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Type of Enrichment group:							
Item used:							
Keeper's initial:							
Rating:							

L.C.. Manager _____ Date _____ Behav. Man. Coordinator _____ Date _____

Or Veterinarian _____ Date _____

9. Evaluation process

Quantitative and qualitative documentation of changes in animal behavior and activities over time is critical. Evaluation is critical in order to:

- Know that behavior improvements have occurred.
- Provide a framework for enriched animal management and husbandry, evaluation allows one to be consistent and objective across individuals/species and provides a basis for revision and improvement.
- Provide justification for procurement of resources.

Evaluation includes:

- Reviewing documentations and assessing the effectiveness of enrichment and training.
- Taking the information collected each day and looking at what happens over time.
- Looking for trends or patterns in the information over time by asking questions about animal's responses over time.

Questions to ask:

- How long should an enrichment item to be used?
- Does enrichment use enhance visibility of animals for visitors?
- Which item is most preferred by the animal?
- Does the animal need more enrichment?
- Does the enrichment targets the correct behavior?
- How long does the enrichment initiative hold the animal's interest?
- When should the enrichment be removed?
- Does the enrichment need to be modified?
- Is the enrichment easy to apply?
- Plus many more specific questions....

After the keeper implemented his/her enrichment idea:

- The keeper must make a **note on the DSR of the starting date of all new enrichment**. This note should only reflect the starting date; the keeper does not have to record any evaluation on the DSR, yet unless injury or sickness occurs due to the enrichment. Any adverse reactions to new behavioral enrichment have to be recorded on the DSR, should be brought to the attention of the Operations Supervisor and the enrichment should be stopped immediately until the enrichment can be reviewed.
- The initiating keeper has to **contact the assigned Behavioral Enrichment Committee member**, to let the person know that the enrichment has been implemented and set a date for the 30 days evaluation with the person. The keeper can check who the assigned person is on the right-hand corner of the B.E. Proposal Form.
- After that the keeper has to **observe the enrichment for a month** and **evaluate the enrichment on the original B.E. Proposal Form** under the “summary of keeper’s evaluation”.
- At the end of the month, **on about the 30th day the assigned member of the Behavioral Enrichment Committee will come** and observe the enrichment on his/her own, consult with the keeper about it, read the keeper’s evaluation and finally **evaluate it and give his/her suggestions and comments. The evaluation has to be done on the original proposal form!**
- After both of the evaluations are complete, the keeper needs to give the original B.E. Proposal Form (with the two evaluation recorded on it) to the Behavioral Management Coordinator.
- At the end of this process the Behavioral Management Coordinator and the Living Collections Manager will meet and conduct the **90 days evaluation** and decide whether the enrichment will stay in practice or be discontinued. This decision will be based on considering the previous evaluations and all the time, energy, manpower, cost and resources being used to provide the enrichment. **The original form with the three evaluations on it will be kept in the Resource Office** in the Master B.E. Book and the keepers can take a copy of it to their area for their own records keeping.
- After 90 days the enrichment will be considered as a routine and will not require further evaluation.
- If the new enrichment idea doesn’t get implemented in:
 - 30 days- the Behavioral Management Coordinator will notify the Director of Animal Management.
 - 60 days- The management will not accept further proposals for the species until the old ones are all evaluated.
 - 120 days for whatever reason, it will be void and the keeper has to resubmit it again.
- Exceptions may be made due to resource availability and must be communicated to the Living Collections Manager and the Behavioral Management Coordinator in advance.

For new enrichment for the non-human primates keeper documentation and evaluation still needs to be recorded on the weekly enrichment logs with the rating scale, but in the end all information needs to be summarized and recorded on the B.E. Proposal Form. We are still experimenting with the weekly enrichment log which will be evaluated in October.

Weekly Enrichment Log

Week of _____ Trail _____ Species _____

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Enrichment group:							
Item used:							
Keeper's initial:							
Rating:							

Enrichment Group:

Rating scales:

- | | | |
|-------------------------------------|--|-------------------------------------|
| 1. Foraging | <u>Indirect</u> | <u>Direct</u> |
| 2. Social Enrichment item | A. No evidence of interaction | a. Actively avoids enrichment |
| 3. Manipulanda | B. Minimal evidence of interaction | b. Interacts inappropriately |
| 4. Structure and Substrate | C. Moderate evidence of interaction | c. Interacts tentatively |
| 5. Stimulating the Five Senses with | D. Substantial evidence of interaction | d. Interacts appropriately, but not |
| 6. Training | E. Significant evidence of interaction | intended goal |
| | | e. Interacts appropriately with |
| | | goal |
| | | behavior |

Week of _____ Trail _____ Species _____

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Type of Enrichment group:							
Item used:							
Keeper's initial:							
Rating:							

L.C Manager or Lead keeper _____ Date _____ Behavioral Management Coordinator _____ Date _____

06-07-07- None-primate enrichment evaluation form

Date:					Evaluator:	
Enrichment last evaluated on:			Overall recommendation for this form of enrichment:		Continue	Not continue
Species:				Material ID#		
				Species ID#		
					(table on back side)	
Name of Enrichment:						
1. Primary behavior targeted by enrichment (check only one):						
<input type="checkbox"/>	Foraging	<input type="checkbox"/>	Five senses			
<input type="checkbox"/>	Manipulative	<input type="checkbox"/>	Social			
<input type="checkbox"/>	Structure/Substrate	<input type="checkbox"/>	Training			
2. Did item enhanced visitor experience?						
<input type="checkbox"/>	No	<input type="checkbox"/>	Yes; on a scale of 1-10, 10 being best:			
	Whether yes or no, how?					
3. Location enrichment was offered:						
<input type="checkbox"/>	On exhibit	<input type="checkbox"/>	Off exhibit	<input type="checkbox"/>	Both	
4. Material of enrichment is:						
<input type="checkbox"/>	Naturalistic	<input type="checkbox"/>	Artificial			
5. Does material need to be modified?						
<input type="checkbox"/>	No	<input type="checkbox"/>	Changed to naturalistic	<input type="checkbox"/>	Changed to artificial	
	Reason and suggestion:					
6. Typical frequency offered:						
<input type="checkbox"/>	# of times during the week	<input type="checkbox"/>	# of times during a month	<input type="checkbox"/>	# of times during the year	
7. Did safety issues change during use?						
<input type="checkbox"/>	No	<input type="checkbox"/>	Increased	<input type="checkbox"/>	Decreased	
	Reason for change:					
8. Did enrichment elicit species-appropriate behavior(s)?						
<input type="checkbox"/>	Yes	<input type="checkbox"/>	No			
	Please explain:					
9. Average length of time animal engaged in enrichment:						
<input type="checkbox"/>	(minutes)					
10. Total material/supply cost invested in this particular enrichment:						
<input type="checkbox"/>	(dollars)					
11. Total number of keeper hours spent on this particular enrichment:						
<input type="checkbox"/>	(# of hours)	per	<input type="checkbox"/>	(day, week, month, or year)		
Below, please list your ideas how this enrichment item could improve the experience of the animal(s):						

10. Re-adjusting

Readjusting includes:

- Taking information (conclusions) from evaluation review and other information to refine and improve enrichment activities.
- Considering what we learned and making changes to be more effective.

The Behavioral Management Coordinator will meet quarterly with the Living Collections Manager and with the Director of Animal Management to discuss the evaluations and to readjust. The Living Collections Manager then will inform the trail keepers of the decision.

Contra freeloading program

Effective as of July 30, 2008

From: Hilda Tresz
Sent: Wednesday, July 30, 2008 4:09 PM
To: Team Living Collections; Team LC Management
Cc: Bert Castro
Subject: Contra freeloading as minimum standard

Dear staff,

Following the concept of ***“A World Class Zoo for a World Class City!”*** our plan is to elevate **contra freeloading (making animals work for their food) to a minimum standard + providing an extra 7 days per week regular enrichment.**

Offering a variety of enrichment is fine, but doing the right enrichment is even more important. We need to focus on eliciting species-appropriate behaviors. **Foraging (working for food) is the most frequent species-typical behavior in the wild and it should be the most important behavior to focus on in captivity as well.**

Most of the zoos provide some type of enrichment and some of them incorporates contra freeloading into their weekly/monthly schedules but as far as we know no one schedules their animals to work for their food on a daily basis. We could really be a world leading zoo if we can pull this off.

Please take a look at the new master plan:

<Q:\Living Collections\Behavioral Management\ENRICHMENT\Contra freeloading\Contra freeloading master plan.doc>

For greater details please review our introduction: <Q:\Living Collections\Behavioral Management\ENRICHMENT\Contra freeloading\Introduction to contra freeloading master plan.doc>

Thanks

Hilda Tresz
Behavioral Management Coordinator
The Phoenix Zoo
455. N. Galvin Pkwy
Phoenix, AZ 85008
Phone: 602 273-1341 Ext. 7120
Fax: 602 914-4380
htresz@thephxzoo.com

Proposal of master plan
Contra freeloading master plan
H.T. 06-18-08

Foraging (working for food) is the most frequent species-typical behavior in the wild and I believe it should be the most important behavior to focus on in captivity as well. The next step in our enrichment program is elevating contra freeloading to minimum standard –meaning that it should be provided every day in one form or another- and besides that regular enrichment will be also given daily.

Contra freeloading as a minimum standard + additional 7 days per week regular enrichment

1. B.E. representatives will submit a list of all species by strings of their trails to the Behavioral Management Coordinator
2. Coordinator will assign BOT volunteers to create template master B.E. calendars on excel sheets cataloged by strings. Each page will indicate a species within a string. One trail will have 5-6 documents (only) depending on the number of strings they have.
 - Titles will be in color green if animals are already transferred over to contra freeloading
 - Natural color if animals have a weekly schedule but not transferred over to C.F. yet
 - Red if animals have no weekly schedule made what so ever
3. Primary keepers of strings and the B.E. Representatives together will fill out the blank schedules for the species or individual animals by using existing weekly/monthly schedules, blanket and species logs books, etc. **If an animal cannot work for its' food, keepers need to indicate reason.** Sick, geriatric or otherwise incapacitated animals will not be made to work for their food. Animals who receive the entirety of their diet through training are already working for their food, and will not need to be fed from puzzle feeders.
4. The zoo will keep to USDA standards. For example, if an animal will be fed from puzzle feeders in a way that food will fall on the ground, then feeders will be hang above concrete areas, over grass areas, will have rubber tubs under them, or be placed into troughs, etc. Sometimes animal will work for only partial diet. If animals (such as Galliformes) forage from substrates (seed in dry leaves, hay, straw, etc.) substrate with diet will be offered in boxes, trays, tub, etc. Equal diet distribution will be considered. Feeders could be filled the day before (if applicable) to save time.

Keepers need to indicate:

 - *In the first row* how they will make their animals work for their food (easy feeder, hay feeder, boomer ball feeder, amazing graze, food in substrate, scatter diet, hide diet, whole prey, carcass feeding, food in paper products, insect feeders, etc.
 - *In the second row* will indicate additional behavioral enrichment for the day
 - *Initial*
 - *Rate enrichment*
5. All animals that are currently being fed only from dishes and new to the concept of working for food will be taught to search for their food in a “slow but methodical and simple process” Murphy, 2008.
6. All type of enrichments that are listed on the monthly calendars will be evaluated yearly. If an animal have 50 different enrichments approved, staff will choose maybe 10-20 of the best enrichments and only those will get evaluated yearly. The rest as time allows.
7. B.E. Representatives submit schedules to the Behavioral Management Coordinator and Area manager for review.
8. Paper copies of monthly calendars (double sided) will be posted in each area as needed (by the night houses fro clipboards, inside kitchen areas, wooden hay boxes, etc.) where they safe from weather. Copies will be collected by the B.E. Representatives at the end of each month and scanned onto the Q drive..[\Schedules\New monthly enrichment schedules](#)- folder. Managers and the Behavioral Management Coordinator will review the documentations monthly. Some areas (with less collection ACC, Equine, APC, and A.R.) will document online.

Appendix

1. Approved brows list at the Phoenix Zoo
2. List of toxic plants by common name
3. List of toxic plants by scientific name
4. Behavioral Enrichment samples at the Phoenix Zoo

Approved browse list at the Phoenix Zoo:

<u>Common Name</u>	<u>Scientific Name</u>		<u>Family</u>
Acacia	<i>Acacia spp</i>		Fabaceae
Bear's Breech	<i>Acanthus mollis</i>	Ants	Acanthaceae
Queen Palm	<i>Arecastrum romanzoffianum</i>		Palmae
Salt Bush	<i>Atriplex spp</i>	Sheep	Chenopodiaceae
Desert Broom	<i>Baccharis sarothroides</i>		Compositae
Bamboo	<i>Bambusa spp</i>		Gramineae
Bottle Tree	<i>Brachychiton spp</i>	Ants	Sterculiaece
Carob Tree	<i>Ceratonia siliqua</i>		Fabaceae
Palo Verde	<i>Cercidium spp</i>		Fabaceae
Lemon Grass	<i>Cymbopogon citratus</i>	B.E.	Gramineae
Umbrella Grass	<i>Cyperus alternifolius</i>		Cyperaceae
Indian Rosewood	<i>Dalbergia sissoo</i>		Fabaceae
Gum Tree	<i>Eucalyptus spp</i>	Birds	Myrtaceae
Ficus	<i>Ficus spp</i>		Moraceae
Hibiscus	<i>Hibiscus spp</i>	Ants	Malvaceae
Desert Fern	<i>Lysiloma micrphylla</i>		Fabaceae
Mint	<i>Mentha spp</i>	B.E.	Labiatae
Banana	<i>Musa spp</i>		Musaceae
Cat Nip	<i>Nepeta cataria</i>	B.E.	Labiatae
Cat Mint	<i>Nepeta faassenii</i>	B.E.	Labiatae
Basil	<i>Ocimum basilicum</i>	B.E.	Labiatae
Prickly Pear	<i>Opuntia spp</i>		Cactaceae
Oregano	<i>Origanum vulgare</i>	B.E.	Labiatae
Jerusalem Thorn	<i>Parkinsonia spp</i>		Fabaceae
Fountain Grass	<i>Pennisetum setaceum</i>		Gramineae
Date Palm	<i>Phoenix dactylifera</i>		Palmae
Pine	<i>Pinus spp</i>		Pinaceae
Cottonwood	<i>Populus fremontii</i>		Salicaceae
Mesquite	<i>Prosopis spp</i>		Fabaceae
Pumpkin	<i>Pumpkin</i>		Cucurbitaceae
Pomegranite	<i>Punica granatum</i>		Punicaceae
Firethorn	<i>Pyracantha spp</i>	Ants	Rosaceae
Rose	<i>Rosa spp</i>		Rosaceae
Rosemary	<i>Rosemarinus officinalis</i>	B.E.	Labiatae
Palmetto	<i>Sabal spp</i>		Palmae
Sugar Cane	<i>Saccharum spp</i>		Gramineae
Gooding's Willow	<i>Salix goodingii</i>		Salicaceae
Bulrush	<i>Scirpus spp</i>		Cyperaceae
Tamarisk	<i>Tamarix spp</i>		Tamaricaceae
Yellow Bells	<i>Tecoma stans (flowers)</i>	Ants	Bignoniaceae
Cape	<i>Tecomaria capensis</i>	Ants	Bignoniaceae

Honeysuckle	(flowers)	
Tipu Tree	<i>Tipuana tipu</i>	Fabaceae
Cat-tails	<i>Typha spp</i>	Typhaceae
CA Fan Palm	<i>Washingtonia filifera</i>	Palmae
MX Fan Palm	<i>Washingtonia robusta</i>	Palmae

The Following List of plants toxic to animals is presented by the University of Illinois,
 Veterinary Medicine Library:

LIST OF TOXIC PLANTS BY COMMON NAME

- Alfalfa (*Medicago sativa* L.)
- American Coffee Berry Tree see Kentucky Coffee Tree
- Bloodroot (*Sanguinaria canadensis* L.)
- Bouncing Bet (*Saponaria officinalis* L.)
- Bull Nettle (*Solanum carolinense* L.)
- Bracken or Brake Fern (*Pteridium aquilinum* L.)
- Burning Bush see Fireweed
- Buttercup (*Ranunculus* spp.)
- Carelessweed see Pigweed
- Castor Bean (*Ricinus communis* L.)
- Clover, Alsike & Other Clovers (*Trifolium hybridum* L. & other species)
- Cocklebur (*Xanthium strumarium* L.)
- Creeping Charlie see Ground Ivy
- Crown of Thorns (*Euphorbia mili*)
- Curly Dock (*Rumex crispus* L.)
- Daffodil (*Narcissus* spp.)
- Delphinium (*Delphinium* spp.)
- Devil's Trumpet see Jimson Weed
- Dogbane (*Apocynum* spp.)
- Dutchman's Breeches (*Dicentra cucullaria* (L.) Bernh.)
- Elderberry (*Sambucus canadensis* L.)
- English Ivy (*Hedera helix* L.)
- Ergot (*Claviceps purpurea* (Fr.) Tul.)
- Fern, Bracken (*Pteridium aquilinum* L.)
- Fireweed (*Kochia scoparia* L.)
- Foxglove (*Digitalis purpurea* L.)
- Ground Ivy (*Glechoma hederacea* L.)
- Hemlock
 - Poison (*Conium maculatum* L.)
 - Water (*Cicuta maculata* L.)
- Hemp (*Cannabis sativa* L.)
- Horse Chestnut, Buckeyes (*Aesculus hippocastanum* L.)
- Horse Nettle (*Solanum carolinense* L.)
- Horsetails (*Equisetum arvense* L. & other species)
- Hyacinth (*Hyacinth orientalis*)
- Hydrangea (*Hydrangea* spp.)
- Ivy
 - English (*Hedera helix* L.)
 - Ground (*Glechoma hederacea* L.)
 - Poison (*Toxicodendron radicans* (L.) Kuntze)
- Jack-in-the-Pulpit (*Arisaema* spp.)
- Jamestown Weed see Jimson Weed
- Japanese Yew (*Taxus cuspidata* Sieb. & Zucc.)
- Jerusalem Cherry (*Solanum pseudocapsicum* L.)

Jimson Weed (*Datura stramonium* L.)
Kentucky Coffee Tree (*Gymnocladus dioica* (L.) K. Koch)
Kentucky Mahogany Tree see Kentucky Coffee Tree
Klamath Weed see St. Johnswort
Lamb's Quarters (*Chenopodium album* L.)
Lantana (*Lantana camara* L.)
Larkspur (*Delphinium* spp.)
Lily-of-the-Valley (*Convallaria majalis*)
Lupine (*Lupinus* spp.)
Mad Apple see Jimson Weed
Maple, Red (*Acer rubrum*)
Mayapple (*Podophyllum peltatum* L.)
Milkweed, Common (*Asclepias syriaca* L.)
Mint, Purple (*Perilla frutescens*)
Nicker Tree see Kentucky Coffee Tree
Nightshade (*Solanum* spp.)
Oleander (*Nerium oleander* L.)
Ohio Buckeye (*Aesculus glabra* Willd.)
Philodendron (*Philodendron* spp.)
Pigweed (*Amaranthus* spp.)
Poison Hemlock (*Conium maculatum* L.)
Poison Ivy (*Toxicodendron radicans* (L.) Kuntze)
Poke (*Phytolacca americana* L.)
Purple Mint (*Perilla frutescens*)
Redroot see Pigweed
Rhododendron (*Rhododendron* spp.)
Rhubarb (*Rheum rhaponticum* L.)
Squirrelcorn (*Dicentra canadensis* (Goldie) Walp.) see Dutchman's Breeches
Staggerweed (*Dicentra* spp.) see Dutchman's Breeches
St. Johnswort (*Hypericum perforatum* L.)
Stink Weed see Jimson Weed
Stump Tree see Kentucky Coffee Tree
Sudan Grass (*Sorghum vulgare* var. *sudanense* Hitchc.)
Summer Cypress see Fireweed
Thorn Apple see Jimson Weed
Tulip (*Tulipa* spp.)
Water Hemlock (*Cicuta maculata* L.)
White Snakeroot (*Eupatorium rugosum* Hout.)
Wild Onion (*Allium* spp.)
Yellow Sage see Lantana

LIST OF TOXIC PLANTS BY SCIENTIFIC NAME

Acer rubrum -- (Maple, Red)
Aesculus glabra Willd. -- (Ohio Buckeye)
Aesculus hippocastanum L. -- (Horse Chestnut, Buckeye)
Allium spp. -- (Wild Onion)
Amaranthus retroflexus. -- (Pigweed)
Apocynum spp. -- (Dogbane)
Arisaema spp. -- (Jack-in-the-Pulpit)
Asclepias syriaca L. -- (Common Milkweed)
Cannabis sativa L. -- Hemp
Chenopodium album L. -- (Lamb's Quarters)
Cicuta maculata L. -- (Water Hemlock)
Claviceps purpurea (Fr.) Tul. -- (Ergot)
Conium maculatum L. -- (Poison Hemlock)
Convallaria majalis -- (Lily-of-the-Valley)
Datura stramonium L. -- (Jimson Weed)
Delphinium spp. -- (Delphinium)
Dicentra spp. (Dutchman's Breeches & Squirrelcorn)
Digitalis purpurea L. -- (Foxglove)
Equisetum arvense L. & other species -- (Horsetails)
Eupatorium rugosum Hout. -- (White Snakeroot)
Euphorbia milii -- (Crown of Thorns)
Glecoma hederacea L. -- (Ground Ivy)
Gymnocladus dioica (L.) K. Koch -- (Kentucky Coffee Tree)
Hedera helix L. -- (English Ivy)
Hyacinth orientalis -- (Hyacinth)
Hydrangea spp. -- (Hydrangea)
Hypericum perforatum L. -- (St. Johnswort)
Kochia scoparia L. -- (Fireweed)
Lantana camara L. -- (Lantana)
Lupinus spp. -- (Lupine)
Medicago sativa L. -- (Alfalfa)
Narcissus spp. -- (Daffodil)
Nerium oleander L. -- (Oleander)
Perilla frutescens -- (Purple Mint)
Philodendron spp. -- (Philodendron)
Phytolacca americana L. -- (Poke)
Podophyllum peltatum L. -- (Mayapple)
Pteridium aquilinum (Desv.) Hier. -- (Bracken or Brake Fern)
Ranunculus spp. -- (Buttercup)
Rhododendron spp. -- (Rhododendron)
Rheum rhaponticum L. -- (Rhubarb)
Ricinus communis L. -- (Castor Bean)
Rumex crispus L. -- (Curly Dock)
Sambucus canadensis L. -- (Elderberry)
Sanguinaria canadensis L. -- (Bloodroot)
Saponaria officinalis L. -- (Bouncing Bet)
Solanum spp. -- (Nightshades)
Solanum carolinense L. -- (Horse or Bull Nettle)
Solanum pseudocapsicum L. -- (Jerusalem Cherry)
Sorghum vulgare var. *sudanense* Hitchc. -- (Sudan Grass)
Taxus cuspidata Sieb. & Zucc. -- (Japanese Yew)
Toxicodendron radicans (L.) Kuntze -- (Poison Ivy)
Trifolium hybridum L. & other species -- (Alsike & Other Clovers)
Tulipa spp. -- (Tulip)
Xanthium strumarium L. -- (Cocklebur)

VIII. Resources

IMATA- International Marine Animal Trainers Association
IAATE- International Avian Association of Trainers and Educators
ABMA- Animal Behavior Management Alliance
AAZK – American Association of Zoo Keepers
AZA – American Zoo and Aquarium Association

Books and articles:

- Bayne, K.A.L. 1989.** *Resolving issues of psychological well-being and management of laboratory nonhuman primates.* In Housing, Care and Psychological Well-being of Captive and Laboratory Primates. E.F. Segal, ed., Noyes Publications: Park Ridge, New Jersey, pp. 27-39
- Bennett, C.L., and Davis, R.T. 1989.** *Long term animal studies.* In Housing, Care and Psychological Well-being of Captive and Laboratory Primates, E. F. Segal. Ed., Noyes Publications: Park Ridge, New Jersey, pp 213-234
- Bloomsmith, M.A. 1989.** *Feeding enrichment for captive great apes.* In House Care and Psychological Well-being of Captive and Laboratory Primates, E. F. Segal. Ed., Noyes Publications: Park Ridge, New Jersey, pp 336-356
- Broom, D.M., and K.G. Johnson 1993.** *Stress and animal welfare.* Chapman and Hall; London, England
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