

**Comments of In Defense of Animals
on USDA Docket No. APHIS-2006-0044
“Captive Elephant Welfare”**

December 11, 2006

Prepared by:

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***“Even if the public expects to see elephants in
zoos, we should only maintain them in captivity if it
is in the best interests of the elephants.”***

**- Rick Barongi, Director of Houston Zoo
Houston Chronicle, June 12, 2005**



Feet of Calle, San Francisco Zoo, Euthanized at age 37 in March 2004

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Section I. Introduction

In Defense of Animals (IDA) is an international animal protection organization founded in 1983 by veterinarian Elliot Katz, and represents the interests of 85,000 members around the world. The organization's focus is on advocating for the welfare of individual animals as well as supporting species conservation. IDA's Sanaga-Yong Chimpanzee Rescue Center provides much needed protection and sanctuary for the abused and orphaned chimpanzees of Cameroon, Africa. IDA-Africa works with the Cameroon government to stop the chimpanzee and gorilla bushmeat trade through educational programs and increased law enforcement.

IDA is uniquely positioned to provide insightful and valuable comment regarding the conditions for elephants in captivity, with a focus on zoos, for the following reasons:

- The organization has been gathering medical records through state open records laws from zoos around the country in order to centralize and assess, with the assistance of veterinarians, the current status of elephant health and welfare in zoos. This is something not even the zoo industry has done (Fowler 2006).
- IDA consults with and gathers information from a variety of elephant experts representing multiple of fields, including scientists, former zoo professionals, and veterinarians, to accurately position and report on issues involving elephants in the wild and in captivity.
- IDA is not constrained by financial investment in institutions or activities that employ elephants, i.e., zoos, circuses, elephant ride businesses, etc., therefore we can speak honestly and openly.
- It is the organization's mission to put the welfare of the animals first. Our goal is simply to improve the lives of elephants currently held in captivity and encourage practices that lead to optimum health and well-being for elephants.

The care and management of elephants in captivity is highly contentious issue. IDA's objective is to provide undeniable facts, derived from elephant medical records, expert statements, research, and literature on the many issues impacting elephant health and welfare, and show that conditions for elephants in this country must radically change.

Of 51 elephants who died in AZA-accredited facilities since 2000, more than half never lived to age 40 (Exhibit B, Elephant Deaths Since 2000) Average life expectancy in AZA-accredited facilities 33.0 years for African elephants and 35.9 years for female Asian elephants (survival analysis estimates give average life expectancy of 44.8 years) (Wiese and Willis, 2003). Compare this to median life expectancy for African elephants in the wild of 54.4 years for females and 42.5 for males (Lee and Lindsay, 2006).

Most important are the actual medical records (Exhibit A) collected from 35 zoos in the United States. This represents almost half (46 percent) of U.S. zoos holding elephants between 2000 and 2005. IDA has compiled information taken from those records to

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illustrate the pervasive physical, psychological and social problems afflicting elephants in zoos.

IDA reviewed 13,000 pages of medical records detailing the health issues of 132 elephants (74 Asian, 58 African) from 2000 through 2005. Only records of notable problems were tracked; information does not include routine or preventive foot care. The prevalence of physical and psychological disorders, many of which recurred several times during the period covered by the records (i.e., lameness, foot disorders, temporal gland abscesses, aberrant behavior) is undeniable.

There is a vast amount of research on elephant biology and behavior, and we are learning more about elephants every day. The Elephant Voices web site, which provides information on free-ranging and captive elephants (www.elephantvoices.org), states there are 4,900 studies on African elephants alone, with the oldest going back to 1868. Included in the IDA submission is a selection of research documents on both species of elephants (Exhibit D). That information, combined with the anecdotal information that has always been important to the care of elephants (Fowler, 2006), presents a strong case for radically changing the way elephants are kept in captivity.

This statement will address major health and psychological disorders afflicting elephants in zoos, discuss possible causes as found in published literature, and show that present conditions for elephants in zoos are not only inadequate, but are causing needless suffering and premature death. This evidence illustrates the urgent need for the USDA to issue a rule clarification regarding conditions for elephants, as requested in the IDA petition, and to enforce of the existing Animal Welfare Act law.

Section II. Elephant Natural Behavior and Biology

A. Introduction

Elephants, also known as proboscideans, can weigh over six tons and are the largest land mammals on earth. They are considered a keystone species because of their size and affect on biodiversity in the regions they inhabit. Three species of elephants exist, the Asian elephant (*Elphas maximus*), the African savanna elephant (*Loxodonta africana*) and the African forest elephant (*Africana cyclotis*). All species have evolved to live in warm climates. (Clubb & Mason, 2003).

Elephants are highly social and have the largest social network of any mammal yet studied other than humans. Like humans, elephants live in multi-tiered fission-fusion societies (Vidya & Sukumar, 2005; Douglas-Hamilton, 1972; Moss, 1988).

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Adult females and their offspring live in tight-knit stable family groups, with social ties extending from mother-offspring bonds to families, bond groups and clans (Douglas Hamilton, 1972; Moss & Poole, 1983; Sukumar, 1989). Elephant clans can have as many as 550 members (Poole, 2005).

Females stay in their family group for life. (Moss & Poole 1983, Sukumar, 1989). Calves are usually weaned between age three to six. Males disperse from their family groups between 10 and 12 (Moss, 1988, Sukumar, 1989). After leaving their family unit, young bulls go on to become independent or join smaller all-male groups (Poole, J. Aug. 2005, Sukumar, 2003).

Family groups are led by the matriarch who is usually the oldest female in the herd (Moss, C., 1988). The matriarch's role is crucial in that she retains vital ecological information, such as feeding patterns and movements, that is essential to the survival of the herd (Vidya & Sukumar, 2005).

Elephants have very strong social needs that include the sense of touch (Moss, C. 1988). They use their trunks to smell and caress one another. When a member of the herd dies, elephants will cover the carcass with leaves, branches and particles of earth as the herd mourns over their loss (Moss, C. 1988). Elephants will stay at the site for several hours before walking away (Moss, C. 1988). Elephants have the capability of recognizing one another and will greet familiar elephants enthusiastically. "Social networking is an essential aspect of an elephant's daily life." (Poole, Aug. 2005)

B. Home Range/ Space

Elephants are physically vigorous, non-territorial animals that move almost continuously for 20 out of every 24 hours (Moss 1988). They range 5 to 12 miles or more per day without regard to species type (Sukumar 2003, Williams, 2005, Poole, 2005).

A typical home range for an elephant family is 60 to over 200 square miles (Poole, 2005; Williams, 2005) Elephant habitat will typically include varied terrain, including mountains, valleys, grasslands, forests, and rivers." (Schmidt, M. 2001; Schmidt, M. 2005).

C. Sexual Maturity

The average age elephants become sexually mature is 11-14 years (Vidya & Sukumar, 2005; Sukumar, 2003). The period of greatest female fertility is between ages of 25 and 45 for females (http://www.worldwildlife.org/elephants/subspecies/subspecies_afe.cfm) and 30-40 for males (Moss, 1988)

Elephants have a long gestation period of approximately 22 months (Moss, C. 1988), and have the longest interbirth interval of any living mammal, with 3-7 years between two fertile cycles (Hildebrandt, 2006).

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D. Diet

Elephants are herbivorous and consume large quantities of various living plant species. Their diets range from eating short and tall grasses, roots, bark, herbs, sedges and fruit to aquatic plants, legumes and tree foliage (Moss, C. 1988; Sukumar, 2003; <http://www.elephantvoices.org/index.php?topic=facts>). Examination of stomach contents from culled elephants have shown a minimum of 25 different plant species per elephant, while elephants monitored over the course of one year were found to consume 133 different plant species (Sukumar, 2003).

E. Daily Patterns

Over the course of a day, elephants spend the majority of their time feeding (Moss, C. 1988). They also spend time traveling many miles a day between feeding areas and will include resting periods into their daily routines (Moss, C. 1988). Elephants will mud wallow and dust themselves, submerge themselves in water, and even swim (Moss, C. 1988). Their skin is very sensitive and requires frequent bathing and dusting to keep parasites and insects away and to remain disease-free. Calves often spend time playing together underscoring the importance of social interactions amongst family members.

F. Life Span Data

The average lifespan for an elephant is 60-70 years (Vidya & Sukumar, 2005, (<http://www.elephantvoices.org/index.php?topic=facts>). After the age of 65 the elephants' third set of teeth will wear down and starvation can gradually set in (Moss, C. 1988). Sukumar (2003) reports Asian elephant cows in a forest camp living 75-79 years, "virtually unthinkable in a zoo."

G. Mortality

Human-induced mortality is the main cause of death amongst elephants (Moss, C. 1988). Human encroachment into elephant habitats, agriculture, habitat destruction, conflict with human interests, fragmentation, poaching for their tusks and poaching for their meat combine to threaten their existence (Moss, C. 1988; Sukumar, 2003). Males are often significantly more affected than females due to the presence of tusks (Sukumar, 2003).

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Natural causes of death in African elephants are commonly due to drought related issues such as starvation and dehydration (Sukumar, 2005). Foot problems are never listed among the natural causes of death (Poole, J. 2005, Sukumar, 2003).

Mortality in calves less than three years old is most often attributed to premature birth and malnutrition if during pregnancy the mother experienced a drought, infections and accidents (Sukumar, 2003). Calves in this age group also suffer significantly due to predation by tigers and lions (Sukumar, 2003). A population of elephants studied from 1971-1987 at the Etosha National Park in Namibia revealed a significant portion (32%) of calves less than three years old suffered predation by lions (Sukumar, 2003).

Accidents and unknown causes attributed to death have also been recorded. Elephants sometimes fall into steep slopes (Sukumar, 2003), are bitten by poisonous snakes (Moss, C. 1988; Sukumar 2003) and are injured in competition to gain access to females to mate (Sukumar, 2003).

H. Conclusion

Recent reports of the ability of elephants to recognize themselves in the mirror (Plotnick, J., et. al., Proceedings of the National Academy of Science, October 2006), and the predisposition of elephants to Post Traumatic Stress Disorder (Bradshaw, G., 2005, New York Times, Oct. 8, 2006) have demonstrated that among all species, elephants are perhaps the most vulnerable to suffering in a captive setting.

In the next section we will examine the zoo industry's failure to incorporate information about elephants' natural biology and behavior into zoo management, care and housing practices. We will then address the numerous captivity-induced health problems from which elephants suffer in zoos and other intensive confinement systems like circuses,.

III. Zoos are Failing to Meet Elephants' Needs

A. Space and Confinement

1. Space

The past four decades have seen an exponential growth in knowledge about the biology and natural behavior of many non-human species. For species like Great Apes, zoos have met this increased knowledge base with significant changes in housing and care. (Schobert, Les, former AZA/SSP coordinator for chimpanzees and co-chair of the Great Ape Taxon Advisory Group, personal communication, 2006) Zoos, however, continue to house elephants in conditions that have not significantly changed in two centuries.

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(Schmidt, 2005, 2001).

This is especially true with regard to the issue of space. Elephants' need for space and movement is well documented in the scientific literature. Elephants are physically vigorous animals who move almost continuously for 20 out of every 24 hours (Moss 1988). They range from 5 – 13 miles per day (Sukumar 2003, Poole, 2005, Williams, 2005), and can walk much greater distances at times. (Sheldrick, 2005; Williams, 2005; Poole 2005; Lindsay, 2005)

Despite these facts, it is not atypical for zoos to house earth's largest land mammals in spaces not larger than an average suburban backyard.

In IDA's survey of 35 zoos, data on exhibit size was available for 30 of them. **At the vast majority of these zoos (28), elephants have access to an acre or less of outdoor space at any given time.** Only two zoos provide elephants with access to more than an acre at a time: the North Carolina and Rosamond Gifford Zoos each have outdoor spaces of 3.5 acres. (Exhibit B)

A survey of elephant enclosures at 20 European and North American Zoos found a range of .02 to 12 acres, or .004 to 1.7 acres per elephant. (& MASON, 2001, p. 41)

Various experts in elephant biology and natural behavior have recommended large enclosures for elephants ranging from as large as 62 to 2,470 acres. (Kurt, 2006, Williams, 2005, Schmidt, 2005, 2001; Poole, 2005)

Zoo industry standards, existing and planned U.S. zoo exhibits do not come close to meeting these recommendations of space necessary for "elephants to be elephants." (See Section VI)

Field biologists (Poole, 2005, Lindsay, 2005, Williams, 2005) have written about the zoo industry's failure to meet the basic space needs of elephants:

"I am stunned that the AZA is not able to perceive the empirical evidence that elephants need much more space than what is currently allotted to them. In the form of routine problems captive elephant managers face every day, the evidence is unmistakable: foot diseases, arthritis, weight related diseases, infertility, heightened aggression, and other neurotic behavior. In the Amboseli population where the life histories of over 2,000 free-ranging individuals have been followed for 34 years, wild elephants do not develop foot problems (zero cases); they are not seen swaying rhythmically back and forth (zero incidents in over 34,000 sightings of groups containing 1-550 elephants); they do not have difficulties conceiving (two cases of infertility out of 558 females over 10 years old); they do not kill their own infants (zero cases out of 1500 births); they do not attack and kill the individuals with whom they are bonded (zero cases; unlike captive elephants who injure and kill their keepers). All these zero cases in the wild add up to an enormous amount of evidence that elephants need space to be elephants." (Poole, J. 2005)

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2. Overnight Confinement

Few zoos give elephants access to outdoor yards 24 hours a day, seven days a week, meaning that many elephants spend 12-14 hours per day confined to barn stalls. This intense confinement is associated with foot and joint disease, aggression, stereotypic behaviors and other issues discussed in Section III.

Overnight confinement (for 12-14 hours a day) can also interfere with natural elephant behavior as elephants are known to be active for 20 out of 24 hours in a day (Moss 1988). Unchained elephants in the zoo have been observed to have extensive nocturnal activity (socially and non-socially), especially between the hours of 6 p.m. and midnight and 6 – 7 a.m. (Brockett, et al. 1999). Such natural activity is inhibited when elephants are chained or confined to small stalls at night.

3. Chaining

In some zoos, elephants are still chained overnight. A major reason for overnight chaining is to prevent aggression for elephants when they are confined indoors, prevent accidents, and prevent alterations in the social hierarchy while the handler is absent. (& MASON, p. 43)

While many U.S. zoos have phased out chaining at night, the practice does continue. Of the zoos in IDA's survey, four continue to chain elephants for more than routine husbandry: Rosamond Gifford Zoo ("tethered" between the hours of 7:30 -8 a.m. and 4-4:30 p.m due to social problems between elephants); Louisville Zoo (to prevent fighting and "rowdiness"), Oklahoma City and Brec's Baton Rouge (when temperatures are below 50 or in inclement weather, when elephants cannot have outdoor access.)

In addition, IDA has records from the Jackson Zoo in Mississippi indicating that elephants are chained at night and when inside due to inclement weather ("not more than 16 hours without being taken off chains for an exercise period").

At Oregon Zoo, chains are used for a variety of reasons in addition to routine care, including "control of aggressive or overly inquisitive behavior" and limiting access to some part of the enclosure. They state, "...every attempt will be made to ensure that restraint by chaining is considered a positive experience by the animals," and "We want to maintain an environment where elephants that are routinely restrained...willingly approach the Elephant Keeper in order to be restrained." Generally elephants are restrained for short periods of time not to exceed 45 minutes. (Oregon Zoo Elephant Management protocol)

Elephants are the only zoo animal managed through chaining. (& MASON, page 44).

Prolonged chaining prevents movement and activity, prevents natural interactions between elephants and may be detrimental to physical and psychological health.

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Stereotypic behaviors and health issues such as colic, foot problems and arthritis decrease when elephants are not chained. (Brockett, et. al, 1999) IDA's medical records survey also revealed several instances of injury related to chaining (Rosamond Gifford Zoo, Mali and Emmet medical records).

"Elephants should not be subjected to prolonged chaining (for the majority of a 24-hour period) unless for veterinary treatment or transport." (Fowler, 1995).

4. Climate

Elephants are adapted to climates warmer than those found in many U.S. zoos. Wild elephants may experience colder temperatures occasionally but they are not subjected to snow, ice, and prolonged cold. Cold wet weather can be fatal to elephants. (& MASON, page 40)

AZA standards require zoos to monitor elephants outdoors in temperatures under 40 degrees (AZA Standards, 1.1.1), and most zoos allow elephants outdoors only for very limited periods in temperatures beneath 40 degrees.

The hazards of outdoor exposure during winter are many and include hypothermia (& MASON, p. 40) as well as injury from inclement conditions.

As a result of these hazards, elephants in cold-climate zoos frequently spend long periods indoors during winter months. This confinement impacts elephant welfare through reduced activity levels, opportunities for social interaction (what does behavioral opportunities mean? – misbehavior?), and prolonged exposure to unyielding, unnatural substrates. (Veasey, 2006).

The issue of climate has prompted some zoos to re-evaluate their elephant exhibits. After a series of meetings and consultations with experts, the Detroit Zoo decided to close its elephant exhibit and send the residents, Wanda and Winky, to The Elephant Sanctuary. It explains:

Asian elephants need not only much more space, but also a milder climate that would allow normal activity year round. Elephants require an appropriate (semi-tropical) climate that is more consistent throughout the year than a northern US temperate climate. Michigan winters are too cold for the elephants to be outside. They spent the majority of their time inside the building, which both prevented them from traveling as much as they should and required that they spend long periods of time standing on concrete. They need to walk a great deal (miles every day) and be on soft, natural substrate like dirt to maintain the health of their feet and joints. In addition, captive elephants need to have complex social environments that include many other elephants of different ages. ("Questions and Answers about not having elephants at Detroit Zoo, www.detroitzoo.org, August 2005)

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The Roger Williams Park Zoo in Providence, Rhode Island has considered closing its elephant exhibit. In a letter to the AZA about transfer of the elephants to another facility, the zoo wrote that it:

“strongly requests that the facility be in a **climate that would allow the elephants to remain active and outdoors year round or for the vast majority of the calendar year.**” (Emphasis added)
(RWPZ/AZA Correspondence Exhibit E)

When the AZA directed Roger Williams to send its elephants to Six Flags Marine World, a California elephant facility, it declined stating its “philosophy against program components like elephant rides.” (RWPZ/AZA Correspondence Exhibit E) The Zoo decided instead to keep the elephants, expand the outdoor exhibit to one acre and expand the size of its indoor sand room (see below), apparently in an attempt to compensate for the periods of time elephants will be confined indoors during Providence’s cold winters.

5. Substrate

Outdoor substrate in these exhibits varies from natural, dirt, sand and grass, loam and sandy loam. But indoor substrate is mostly concrete. In IDA’s survey, of the 21 zoos for which substrate data was available, **all have concrete-floored barns.**

Hard, unyielding surfaces like concrete are strongly associated with numerous painful and often fatal conditions such as arthritis, foot abscesses and pressure sores on cheeks and hips. (Roocroft, 2005) “Elephants spend upwards of 16 out of 24 hours a day on hard, unyielding, non-interactive surfaces, and we can now point to this as playing a major part of their medical and physical deterioration. (Roocroft 2005)

Some zoos have attempted to modify concrete floors by putting poured rubber or rubber matting on top. Six of the 35 zoos in IDA’s survey have experimented with this (Rosamond Gifford installed “humane mats” in the maternity room) by putting rubberized flooring or matting on top of the concrete in at least part of the indoor exhibit.

However well-intentioned, this is not an effective remedy to the problem. “[R]ubber flooring in prime housing areas is only an uneducated gesture and recognition that the elephant needs a different surface on which to stand, but at the same time there is also a need to hang onto the convenience of cleanable flooring; it has nothing to do with elephant comfort. Rubber flooring does not offer digging, sleeping position variations or topography options for older and medically impaired elephants as a natural surface would.” (Roocroft 2005)

One zoo, Roger Williams Park, has created an indoor sand room (“the first joint-friendly elephant space of its kind in the country”) measuring 1300 square feet (soon to be expanded to 2100 square feet. However well intentioned, the Roger Williams Park Zoo is not likely to adequately compensate for long periods of confinement by giving elephants partial access to a sandy room that measures just .04 acre.

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Only one U.S. facility offers an indoor elephant facility completely floored with natural substrate: the Performing Animal Welfare Society's ARK 2000 sanctuary in San Andreas, Calif. This substrate provides elephants with soft flooring to help protect joints and feet, the opportunity to dig out comfortable sleeping positions, and the chance to be involved in enriching activities like digging and dusting (Derby, P., personal communication, 2006).



Photo of PAWS Asian Elephant Barn, Dec. 2005

If a small, privately-funded sanctuary can provide elephants with indoor quarters made of natural substrate, then certainly major, well-funded urban zoos can do so as well.

6. Conclusion: Space, Confinement Substrate

IDA agrees with the recommendation that if elephants are maintained in captivity, they should be held in large, naturalistic enclosures that allow them to manifest essential natural behaviors like walking and foraging. (Schmitt, 2001/2005, Poole, 2005). Further, IDA agrees with the “Best Practices” of the Coalition for Captive Elephant Well-being, a group of leading elephant experts, that elephants should be given access to the outdoors year-round, day and night, and that elephant exhibits should only be constructed in those climates which allow elephants this kind of year-round access. (“Coalition for Captive Well-being, 2005)

B. Social Issues

As stated in Section I, elephants are highly social and have the largest social network of any mammal yet studied other than humans (Poole, 2000). Adult females and their offspring live in tight-knit stable family groups, with social ties extending from mother-offspring bonds to families, bond groups and clans (Douglas Hamilton, 1972; Moss & Poole, 1983; Sukumar, 1989).

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Females stay in their family group for life. (Moss & Poole 1983, Sukumar, 1989). Calves are usually weaned between age three to six. Females will stay with their mothers for life; males disperse between 10 and 12 (Moss, 1988, Sukumar, 1989). Mean size for a family group of elephants is ten individuals.

Bulls are not entirely solitary, and spend a great deal of time with each other (over 30 percent of observation time). (Clubb & Mason, 2003)

Zoos have failed entirely to establish normal social conditions for elephants. This failure may be linked to the many problems, such as tension and aggression between elephants, faced by zoos in managing elephants. (Veasey, 2006)

1. Unnatural Social Groupings in the Zoo

a. **Unnatural social groupings of a few unrelated individuals are the norm for zoos.**

In IDA's survey of 35 zoos:

- 19 zoos (54 percent) maintain groups of two unrelated female elephants;
- 5 zoos (14 percent) maintain groups of three unrelated females;
- 3 zoos (9 percent) maintain groups of more than three unrelated females
- 5 zoos (14 percent) maintain multi-generational groups of three or more females, where at least two of the individuals are related.

(Exhibit B)

IDA's survey indicates that zoos remain far from the goal of establishing more natural social groupings for elephants. Lenhardt reports that only ten percent of North American females live with calves or female relatives. (Fowler, 2006)

In IDA's survey, **the majority of zoos (54 percent) do not comply with the AZA's recommendation that institutions should hold no fewer than three female elephants.**

The housing of bulls is problematic as well. Of the seven zoos in IDA's survey with adult bulls, the majority (4 zoos) house a lone bull; one zoo houses 2 bulls; and one zoo houses 3 bulls. Bulls are generally housed singly and under conditions of intense confinement due to aggressive tendencies during musth. (Exhibit A)

The maintenance of solitary bulls older than six is allowable under AZA standards. However, a male calf of six in the wild could still be nursing; he would not leave his mother for another 4-9 years. (& MASON, p. 86). The solitary nature of bulls has been misinterpreted. **Bulls need other bulls, females and space.** (Garai & Kurt, 2006).

2. Mixing of species

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AZA standards (section 3.2.1) advise against the housing of African elephants and Asian elephants together, however several zoos continue this practice. In IDA's survey, three zoos: Louisville, Reid Park and Topeka house the two species together. A fourth zoo that houses African and Asian elephants did not provide IDA with its management protocols, so it is unknown if that facility co-houses the two species. At Louisville, the mixing of species led to Mikki, an African female, breeding with Sabu, an Asian male, an event which prompted the zoo to consider options, including RU 486 for terminating the pregnancy. Mikki did not become pregnant from the encounter. Sabu has since been sent to Dickerson Park Zoo, but Mikki continues to be housed with a female Asian elephant named Punch. One of the risks of co-housing the two species is disease transmission, in particular, the Elephant Endothelial Herpesvirus infection. See discussion of this health problem in Section IV below.

3. Transfer elephants without regard to social bonds.

The primary social attachment in elephant society is between mother and calves. Most elephants in U.S. zoos are wild caught and were separated from their mothers (often traumatically) at a young age. Out of 438 Asian elephants shipped to western zoos, about 50 percent were neonates (1-2 years) and 25 percent were infants (3-4 years) when separated from their families. (Garai & Kurt, 2006)

This early trauma creates a vulnerability to Post Traumatic Stress Disorder and is associated with the development of stereotypic behavior, such as weaving, swaying, rocking and rhythmic head nodding (Garai & Kurt, 2006). The absence of "compensatory social structures" such as older elephants can impede recovery. (Bradshaw, et. al, Nature, 2005; NY Times 2006).

In the zoo, elephants can form deep bonds with other elephants, and these bonds may be important to helping overcome early trauma. (Garai, Kurt, 2006). These bonds can be deep, and long-lasting. This was emotionally evident when the elephants Jenny and Shirley were reunited at The Elephant Sanctuary in Tennessee in 1999. Twenty-two years earlier, when Shirley was 30 and Jenny was just a baby, the two elephants had spent a summer together in a circus. Their reunion was captured on film in the Emmy-award winning documentary The Urban Elephant. The elephants' recognition and joy at seeing each other again was indisputable. They remained constant companions at the Sanctuary until Jenny's death this year. (The Elephant Sanctuary, www.elephants.com).

Elephants in zoos have been known to pine and even die after the loss of a close friend. (Garai, Kurt, 2006)

In IDA's survey of medical records, evidence of the trauma of social separations was found. In one example, Jenny, a 30-year old, severely traumatized elephant at Dallas Zoo was described as "moderately depressed" after her elephant companion was shipped. She "rocked constantly" for a period of about two months. During this time, she was being given the drug acepromazine, a tranquilizer frequently used in veterinary medicine. Jenny was on this drug from Jan. 1997 to December 2001. (Exhibit A, Dallas Zoo Medical Records)

In another example of separation that involved death and not transfer, Lucy at Milwaukee Zoo was described as "distressed" and "repetitively swinging head and trunk and shifting

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weight back and forth” following the death of her companion Babe in 2001. Sadly, Lucy died this year after suffering for years from chronic arthritis . (Exhibit A)

Unfortunately, the process of separating closely bonded elephants continues in zoos to this day:

- In September 2006, Lion Country Safari, an AZA-accredited zoo in Florida, separated a group of three tightly-bonded elephants who had lived together for 34 years, when it shipped an African elephant named Ladybird to Greenville Zoo in South Carolina. Lion Country Safari is closing its elephant exhibit; the fate of the two remaining elephants, Mamma and Stumpy, remains unknown. (Palm Beach Post, September 22, 2006).
- In May 2003 at Los Angeles Zoo, an African elephant named Ruby was separated from her companion of 16 years, Gita, an Asian elephant. Ruby was returned to Los Angeles after a year of failing to integrate with elephants at the Knoxville Zoo. However, she was kept separate from Gita.

4. Separating mothers and calves

AZA standards allow for the separation of mothers from calves as young as three years, a time when calves in the wild would not yet be weaned. Calves can suckle for up to six years. (Moss, 1988; Lee, 1991)

Separation of mothers and calves at zoos has decreased, but still occurs. At Dickerson Park Zoo in Feb. 2000, the male calf named Kala was weaned and separated from his mother, Patience, at 21 months of age. Patience was chained front and back for this separation. Kala was put with other elephants, and suffered injuries and gore wounds from Moola who was aggressive toward him and pushed him around. In May 8, 2000, just days shy of his second birthday, Kala was shipped to Six Flags Marine World. He died six months later from a Herpes infection. (Exhibit A)

Dickerson Park Zoo has also stated that it will probably separate a new baby calf from her mother Moola when the female reaches breeding age at approximately 10 or 11. (Springfield, MO News Leader, 2006).

5. Multi-generational herds may not be possible in a zoo setting.

Several factors mitigate against the creation of naturalistic, multi-generational “herds” of elephants in zoos, including: space constraints, high infant mortality and an average life expectancy of just 38.9 years for elephants in North American zoos. (Wiese and Willis, 2005) The Oregon Zoo provides an example of many of these problems.

a. High mortality:

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Oregon Zoo had 26 captive births between 1962 and 1994. (The zoo has not had a captive birth in over 12 years.)

- **Out of 26 captive births, 15 are dead.**
- **Of the four breeding bulls, three are dead. .**
- **Of the eight females who gave birth, five are dead.**

The mother of each of Oregon Zoo's three current captive-born elephants is dead, as are two of the three fathers:

- Packy (age 44) – Mother: Belle (dead at 45); Father: Thonglaw (dead at 27)
- Sung-Surin (age 24) –Mother: Pet (dead at 51); Father: Packy (still alive)
- Rose-Tu (age 12) – Mother: Me-Tu (dead at 34); Father: Hugo (dead at 43)

b. Early infertility:

The high rates of early infertility in captive elephants also mitigate against establishment of multi-generational herds in zoos. (See Section IV, C). Of the 7 females who were born at Oregon Zoo, only 2 gave birth to calves. Only one of these females, Hanako, survives today.

(Source: Asian Elephant North American Studbook, Jan. 2003 – April 2005; Oregon Zoo medical records, Exhibit A)

c. Lack of space:

The zoo that has come closest to establishing more natural social conditions for female elephants is Rosamond Gifford, which until this year had 2 mother/daughter pairs. (Targa (age 23)/Mali (age 9) and Romani (age 30)/Kirina (age 11). The calves have witnessed breeding, birth and rearing. Kirina has shown maternal instincts, “auntie” behavior and has begun reproductive cycling

Having two mother/daughter pairs living together was a rarity for a U.S. Zoo. However, space constraints led this zoo transfer Targa and Mali to Calgary Zoo, leaving a less naturalistic group of just three elephants (mother/daughter pair and an older elephant who has “several major problems” including aggression causing her to be kept separately.) (Exhibit A),

d. Incompatibility

The problems of putting together social groupings of two or more unrelated individuals is well-illustrated by the Riverbanks Zoo, which currently holds three female African elephants, Penny, Tumpe and Belle.

A fourth elephant, Belinda, was held by Riverbanks until her death, at age 33 on Nov. 13,

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2002. The cause of death officially remains undetermined. A fifth elephant, Star, was added to the collection in 2003 and then removed from the collection again in 2004, apparently due to inability to integrate her into the group.

Belle, Belinda and Penny lived together at Columbus Zoo before coming to Riverbanks. (Belle and Belinda, long-term, Penny just for a year.) In 2001, all three elephants were shipped to the Riverbanks Zoo. Belinda died a year later.

Belle, Belinda and Penny arrived at the same time at Riverbanks. Belle and Penny fared fairly well, but Belinda (who was noted to have stereotypic behaviors and a tendency to isolate herself from other elephants) had a harder time. It took her four months to go out into the exhibit with Belle and Penny, but when Tumpe arrived five months later, Belinda regressed, returning to a reluctance to leave the barn. She was found dead in Nov. 2002, just two months after Tumpe's arrival.

Aggressive incidents between elephants increased after Belinda's death. Belle and Penny fight with each other, but mostly they beat up on Tumpe, who is described as at the bottom of the pecking order. A year after Belinda's death, an elephant named Star is brought to Riverbanks. She is kept indoors for 2.5 months and apparently isolated from the other elephants for 8 months before she is let out in the exhibit. Records are sketchy after this point, but there are two entries about Star trying to climb over a log at the back corner of the exhibit. The records don't state this, but possibly she is trying to get away. (Source: Exhibit A, Riverbanks Zoo medical records)

The Riverbanks experience does not bode well for zoos trying to establish larger groups of female elephants in a traditional zoo setting.

6. Conclusion: Social Issue

IDA agrees with the Best Practices recommendation so the Coalition for Captive Elephant Well-being and other elephant experts (Garai & Kurt, 2006) that:

- Female elephants should be held in stable social groups of at least 5-10 adults, depending on species
 - Female calves should not be separated from their mothers
 - Male calves should not be separated from their mothers before reaching sexual maturity.
 - Bonded individuals should not be separated from each other
- Bull elephants should not be held under conditions of isolation. They must be given the opportunity for social interaction with other elephants.

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C. Conclusion

Current zoo conditions fall far short of providing conditions that meet the physical, social and psychological needs of elephants. This failure has led to serious health and behavioral disorders that have seriously eroded quality of life for elephants in U.S. zoos. These health and behavioral problems will be discussed in detail in Section IV.

IV. Physical and Psychological Health Issues

A. Overview

There is a vast array of physical and psychological health issues affecting elephants in zoos that can be attributed to conditions of captivity, including foot disease with no known etiology (i.e., puncture wounds, trauma), degenerative joint disease, reproductive disorders, digestive disorders, and stereotypic and aberrant social behavior. Many of these problems are not seen in relatively undisturbed wild elephant populations (Poole, 2005; Hildebrandt, et al, 2006).

In addition, life expectancies are decades shorter for elephants in zoos versus those of wild elephants. This is despite the fact that captive elephants are not subject to threats such as poaching, drought and famine, which represent the major causes of mortality in the wild (Moss, 1988, Sukumar, 2003). Quite the opposite, elephants in many zoos are provided quality keeper care and veterinary treatment and therefore should live closer to their natural lifespans of 60-70 years (Vidya and Sukumar, 2005; Moss, 1988). Yet African elephants in AZA zoos have a life expectancy of only 33.0 years versus life expectancies in the wild of 54.4 years for females and 42.5 years for males. (Lee and Lindsay, 2006; Wiese and Willis, 2003) Of 51 elephants who have died in AZA-accredited facilities since 2000, more than half never lived to age 40.

Out of seven elephant deaths at AZA zoos this year, six elephants suffered from severe foot and/or joint problems prior to death. All were females. Three elephants were Asian, three were African. Average age at death was 44.5 years (Asian, 46 years; African, 43 years). (Exhibit B)

Even major scientific and conservation organizations recognize the complications elephants experience because of captivity. In a meeting with the Association of Zoos and Aquariums, the African Elephant Specialty Group (AfESG) of The World Conservation Union, the world's largest and most important conservation network, expressed concerns about poor breeding success and low life expectancy for captive African elephants. The organization "did not see any contribution to the effective conservation of the species through captive breeding per se." AfESG declined to endorse AZA's importation of African elephants. (Dublin memo, 1998, Exhibit E)

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It is IDA's position that inadequate zoo conditions, including insufficient space for movement and social interaction, injurious zoo conditions and management (hard substrates, use of ankus and prolonged chaining), absence of natural social structures, and lack of complex physical environments, all lead to a variety of health problems. As long as elephants remain in these substandard conditions, health problems will continue to cause great suffering and to debilitate and prematurely kill elephants in zoos.

Elephant care is qualitatively different from that of other animals in zoos, in that elephants require regular "hands-on" care. Without this care, elephants are subject to health problems that reduce both quality of life and longevity (Exhibit E-Milwaukee Zoo). For elephants, more time is spent on foot care than any other task, except cleaning and feeding (Fowler 2006). Despite routine care provided in zoos, nonresolvable foot problems and arthritis remain the leading reasons for euthanizing elephants in captivity (Fowler, 2001).

B. Foot Disease

A zoo really isn't conducive to the health of elephants and the feet are a large part of it. You just have to accept this as a chronic condition, because you aren't going to cure it."

- Blair Csuti,, zoologist who organized the first North American conference on elephant foot care in 1998, Wall Street Journal, Nov. 17, 2006 (EXHIBIT F)

IDA's survey of 35 zoos revealed that 62 percent of elephants (82 of 132) suffered some type of foot disorder (abscesses, nail cracks, toe fractures, worn and cracked pads, ulcerations, osteomyelitis) on more than one occasion, with many of the problems being recurrent. This rate is higher than previously the reported estimate that over fifty-percent of elephants affected during their lifetimes (West, 2001).

Foot disorders, caused by decades spent in traditional zoo enclosures, are the leading cause of suffering and premature death for elephants in zoos (Schmidt, 2001). It is considered to be the "single most important ailment of captive elephants" (Fowler, 2006), The presence of foot problems can be considered an indicator of poor animal welfare (Veasey, 2006).

The presence of serious foot disorders and related deaths is a critical indicator that conditions for elephants are inadequate. (Expert Declarations in Support of IDA Citizens Petition to USDA). In fact, foot disorders, such as abscesses, are merely the symptoms of a bigger problem. The physical environment and abnormal behaviors caused by zoo conditions is the actual problem. (Roocroft, 2005).

The elephant's foot is "highly specialized" to accommodate the animal's massive weight, with the anatomy of the foot being basically the same for Asian and African elephants. The limbs are designed to support the massive weight of Earth's largest land mammal,

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with the sensitive cushion of the foot playing an important role (Weissengruber, Egger, et al, 2006). Slight differences include shape and number of toenails (Fowler 2006). However, it is commonly recognized that African elephants in captivity require less foot care than Asian elephants, which is believed to be due to differences in habitat and foraging behaviors (Roocroft and Oosterhuis, 2001).

The following are case studies, gleaned from IDA's review of veterinary records, of elephants suffering from foot disease in U.S. zoos.

- **CASE EXAMPLE: Casey** - , a male African elephant at Kansas City Zoo (now deceased), suffered from chronic foot disorders for as long as **22 years**, including a “chronic abscess of 15 year duration” on his left foot. (Exhibit A-Kansas City Zoo Records)
- **CASE EXAMPLE - Connie**: a female Asian elephant at Reid Park Zoo (Ariz.), has suffered chronic foot abscesses for at least 10 years, often enduring multiple foot abscesses at one time. Attempts to force Connie to wear a protective boot were defeated. (Exhibit A – Reid Park Zoo medical records)
- **CASE EXAMPLE - Oregon Zoo**: Of the seven Asian elephants living at Oregon Zoo during the period of the IDA survey, **all seven** elephants endured foot problems requiring repeated treatment. Most of the elephants suffered these problems chronically. (Exhibit A -Oregon Zoo medical records)

Of seven elephants who died at AZA-accredited zoos in 2006, three are known to have suffered remarkable foot disorders prior to death, including chronic abscesses. Of 51 elephants known to have died since 2000, at least 13 suffered from notable foot disease prior to death. (Exhibit B, Elephant Deaths Since 2000).

1. Concrete

Major contributors to foot disease are lack of sufficient exercise, standing on hard, unyielding substrates like concrete and hard packed soil, and poor hygiene resulting in contamination of the feet due to the animal standing in its own excreta (Fowler, 2001; Roocroft & Oosterhuis, 2001; Zuba, et al, 2006). Other factors include excess body mass and stereotypic behaviors (and Mason, 2003).

Routine foot care is a mandatory part of captive elephant maintenance because most zoos do not have the natural substrates and space for movement that would normally wear elephants' nails and foot pads (Schmidt, 2001). However, this regular care is still not preventing foot problems because the conditions of captivity have not changed. Roocroft

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and Oosterhuis (2000) assert that “no matter how good a foot care program is, eventually foot problems will be seen because they are the result of keeping elephants in captivity.” **Therefore, it is the conditions of captivity that must change.**

In the wild, elephants walk on a variety of substrates, such as dirt, sand, forest mulch, and mud (Schmidt, 2001). This contrasts with the hard, unyielding substrates, particularly concrete, found in most zoos (Exhibit B-Spreadsheet of Zoo Exhibits in IDA’s survey), even though concrete is considered to be detrimental to elephant foot health (Schmidt, 2001). In the IDA survey, information on indoor substrates was available for 21 of the 35 zoos. All are concrete, with six zoos using rubberized flooring or matting on top of the concrete in at least part of the indoor facility. A seventh, Roger Williams Park Zoo, has an indoor sand room, which elephants may have access to for some of the time they are confined indoors. This information is consistent with at least one 1997 study that found concrete substrates in 91 percent of zoos (Dimeo-Ediger, 2001).

The following case history shows the direct correlation between hard substrates in the zoo environment and foot disease.

- **CASE EXAMPLE: Chendra** - a female Asian elephant, at Oregon Zoo provides a strong case for how quickly elephants' feet can become damaged once exposed to hard substrates in captivity. Chendra had been radiographed with no defects upon coming to Oregon Zoo. Within just two months of her arrival (Nov. 1999), she began to experience foot problems. Within a year, she had fractured toes, probably as a result of overgrown nails. Chendra displayed intense stereotypic behaviors upon her arrival at Oregon Zoo, leading to concerns about foot ulceration due to excessive wear and the fact Chendra was on hard flooring for the first time. Zoo veterinarians recommended extra bedding in her stall to ease the transition for her feet from “forest and river ground to the hard flooring of captivity.” **Chendra’s foot problems continued, as a notation from April 2003 describes a “classical nail abscess” which is “pretty alarming in an animal this young.”** (Exhibit A-Oregon Zoo medical records) (Emphasis added.)

2. Wet Flooring, Standing in Excreta

Wet concrete, from urine and water, is reported in veterinary records as a cause of foot disorders, especially in the winter (Exhibit A-Lee Richardson Zoo, Milwaukee Zoo). Lee Richardson Zoo veterinary records state that **foot pads “deteriorated from being on wet cement so much of the time.”** Standing on concrete floors in urine resulted in urine scalds to the feet and degradation of the foot pad, including pad separation in one case (Exhibit A-Rosamond Gifford Zoo, Milwaukee Zoo, St. Louis Zoo). (Given the choice, elephants apparently will not stand or sleep in their own excreta. An elephant held in a Netherlands Zoo uses a sand area to sleep and defecates on a nearby hard floor. Roocroft, 2005.) Other zoos cite humid or moist environments as causing problems (Exhibit A-Seneca Park Zoo, Rosamond Gifford Zoo, Abilene Zoo). At Rosamond Gifford Zoo, a foot lesion was attributed to “tissues exposed and macerating in humid conditions.” At least one zoo withholds water from elephants while inside the barn in order to keep

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concrete flooring dry (Exhibit A-Louisville Zoo), despite the fact this practice is not advised because of the possibility of colic. (Nutrition Advisory Group Handbook)

3. Compacted Soil

Outdoor substrates can also cause problems. Even soil can become so compacted by the elephants' weight that it becomes extremely hard and requires rototilling (Schobert, pers. comm.). Abrasive outdoor substrates, including asphalt, have been suspected of causing excessive pad wear (Exhibit A-Woodland Park Zoo, Seneca Park Zoo).

4. Other Causes of Foot Problems

Other related factors include **stereotypic behaviors**. Repetitive movement can put abnormal pressure on the nails and lead to soft spots and abscesses (Roocroft and Oosterhuis, 2001). Oregon Zoo reported that a male Asian elephant, Hugo, exhibited stereotypic rocking behavior that increased when he was in musth and often exacerbated his foot problems (Exhibit A-Oregon Zoo Records).

Climatic conditions also affect foot health. Zoo veterinary records note that disorders involving foot pads often improve when elephants are allowed outdoors onto natural substrates, usually after being kept indoors for long periods on hard substrates, such as during the winter months in cold weather areas of the U.S.

CASE EXAMPLE: Milwaukee Zoo - Veterinary records for Brittany, a female African elephant, state: "Pads look worse than when animal first arrived, and is most likely due to persistently wet concrete floor in the winter time. Keepers report that pads usually improve once spring starts and the animals go outside on the dirt." A similar notation was recorded for another elephant at that zoo, Lucy. (Exhibit A-Milwaukee Zoo)

While some zoos claim that elephants are allowed outside even during cold weather, the truth is that outdoor time for exercise is very limited and insufficient. Records show that elephants may be allowed outdoors for as little as 15 minutes to one hour (**Exhibit A-Lee Richardson Zoo**) in winter weather conditions.

Exercise is strongly linked to foot health, so space for movement is crucial. Roocroft and Oosterhuis (2001) emphasize the importance of exercise, stating that "exercise of all joints, tendons, and ligaments" are required for healthy feet (Roocroft & Oosterhuis, 2001). In fact, sedentary elephants are considered more likely to experience foot problems (Fowler, 2006; Gage and Blasko, 2000). Significant exercise also prevents elephants from becoming obese, which can predispose an animal to foot disease (Gage and Blasko, 2000). The Dimeo-Ediger survey found that 63 percent of elephant managers believed foot disorders and lack of exercise were related, and 80 percent of the respondents would make exercise a priority (Dimeo-Ediger, 2001).

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Nutrition plays a part in maintaining foot health. Both exercise and proper diet are necessary to prevent obesity as overweight elephants are prone to foot problems (Gage and Blasko, 2000). The provision of natural vegetation, particularly browse, provides necessary trace minerals and vitamins that promote foot health. (Fowler, 2006).

Lack of proper training and facilities can contribute to foot problems. In 2005, Topeka Zoo was cited by the USDA for failing to provide adequate veterinary care to elephants. The USDA inspection report stated: “Elephant foot care at this facility is not adequate as evidenced by the poor condition of the feet at the time of inspection.” Problems included nail and pad cracks, a permanent bulge in the center of the pad of one Asian elephant, and the fact that in a 240 day period, footwork was done on the African elephant only 17 times, and on the Asian elephant only 28 times. The USDA also cited the zoo for failing to have a reliable method of restraint for elephants to allow for necessary husbandry and veterinary procedures. (Exhibit A-Topeka Zoo) At Tulsa Zoo, “regular foot care has been minimal” for the male elephant, Sneezy, due to “facility, manpower and behavioral problems.” (Exhibit A-Tulsa Zoo)

A secondary complication caused by foot problems includes the inability for a female elephant to breed and carry a calf to term because of severe foot problems (Hildebrandt, et al, 2006). The elephant, Pet, at Oregon Zoo was reproductively evaluated in 1999. Veterinarians concluded that **“her reproductive tract would probably be healthy enough to carry a pregnancy, unfortunately her feet are not.”** (Exhibit A-Oregon Zoo Records)

5. Early Onset

It can take years of accumulation before foot disorders manifest (Roocroft and Oosterhuis, 2001). The cumulative effects of a sedentary life spent on hard substrates creates these ailments (Schmidt, 2001). However, foot problems are not limited to “older” elephants. Though only 12 years old, Oregon Zoo’s Rose-Tu, a young female elephant, has suffered from foot problems. It was speculated that one cause of her various foot problems was “possible substrate problem.” (Exhibit A-Oregon Zoo Records) Another example is Shaba, a female African elephant at Reid Park Zoo. Veterinary records indicate she was just two years old and noted to have “signs of sole sloughing.” Her first nail crack is recorded when she was nine years old, and nail cracks have been a problem since that time. Although the records do not specifically cite abscesses, Shaba’s profile states that foot abscesses are a chronic problem (Exhibit A-Reid Park Zoo).

6. A Problem of Captivity

Foot disorders are rarely seen in wild elephants. The cases that are seen differ from foot disorders in captive elephants in that the cause of foot problems has a known etiology. In Africa’s Kruger National Park, for example, an outbreak of pododermatitis was related to drought and over-browsing, which left dry wooden stumps that penetrated the pads of 13 bulls. Elephants also gathered around provided water tanks where water mixed with urine

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and feces, providing a source of infection. (Fowler 2006, Toit, 2006) In captive elephants, a cause is typically not found (Zuba, et al, 2006). Likely factors are the conditions of captivity cited above.

7. Conclusion

Experts agree that the best course of action is to prevent foot problems altogether. (Gage, 2000; Fowler, 2006) However, **until the conditions causing foot problems are radically changed**, zoos will remain unable to prevent foot problems.

To prevent foot disorders, zoos must:

- Provide large spaces for movement and exercise.
- Eliminate concrete flooring and other hard substrates; elephants must be housed on soft and natural substrates.
- Utilize effective management that focuses on eliciting species-typical behavior and a more natural range of movement.
- Ensure year-round access to natural substrates.
- Provide proper nutrition, including access to browse.

Without these changes, zoos will continue the present disastrous course of medically managing painful, chronic foot ailments until elephants are no longer able to stand and are either die or are euthanized. This is unacceptable and inhumane, and a major reason **that USDA needs to enforce existing Animal Welfare Act law.**

C. Joint Disease

The prevalence of joint disease in captive elephants is another important indicator that environmental conditions are not adequate for maintaining elephant health. Arthritis, along with unresolvable foot problems are the primary reasons for euthanizing elephants (Fowler, 2001).

Elephant's limbs are uniquely designed to support the weight of the largest land mammal (Weissengruber, et al, 2006; Kuss, et al, 2006). However, musculoskeletal disorders, caused by arthritis and trauma, affected 73 percent of elephants studied in 69 North American zoos (Bechert, 2002). The IDA survey, representing a smaller sample of zoos, found that joint disorders affected 55 of 132 elephants (42 percent). In 2006 alone, six of seven elephants who died at AZA-accredited zoos suffered from severe joint disease prior to death. Of 51 elephants known to have died since 2000, at least 20 elephants suffered notable joint disease prior to death. At least four of those elephants were euthanized due to joint disease, though all suffered foot disorders as well. (Exhibit B, Elephant Deaths Since 2000, Elephant Deaths and Joint/Foot Disease)

1. Discussion

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Degenerative joint disease (DJD), a major cause of disability in captive elephants, represents a group of disorders that results in progressive cartilage deterioration and changes in the bone and soft tissues of the joint. DJD affects the limbs and feet and is one of the most common musculoskeletal problems in captive elephants (West, 2006). Contributing factors include hard, unyielding substrates; cold, damp and concrete surfaces; lack of sufficient exercise and movement; excessive body weight; and prolonged chaining (West, 2006, Hittmair, 2000). This condition is more common in captive elephants than in wild elephants (Hittmair, 2000).

Pet, an elephant who was euthanized at Oregon Zoo this year, suffered “severe DJD (degenerative joint disease) in all four limbs.” In 2002 she was reported to suffer “chronic debilitation and multiple joint pain.” Veterinary records note that the degenerative joint disease she suffered is “probably the result of poor conformation, age and having lived most of her adult life on concrete and asphalt surfaces.” (Exhibit A-Oregon Zoo)

Other causes of degenerative joint disease include prolonged chaining that limits movement and elephants that pull on the chains or even resist chaining. Performance of certain behaviors can put stress on the joints (West, 2006). These “power behaviors” include circus-style tricks where elephants stand on their hind legs or front legs, perform “headstands,” kneel down, or sit on tubs. These behaviors are seen during “educational” performances at zoos, as well as in circuses. (and Mason, 2003) For example, Rosamond Gifford Zoo records contain notations of elephants performing “power moves.”

Lameness may or may not be exhibited with DJD. (Fowler, 2006). When lameness does manifest, it is after joint damage has occurred (West, 2006). Veterinary records may note a decreased range in motion or joint mobility (Exhibit A-El Paso), which occurs later in the development of the disease. The advanced state of degenerative joint disease may cause chronic bone pain and lameness, even with the aid of inflammatory medications (West, 2006). This condition is reflected in veterinary records for a number of zoos (Exhibit A-National Zoo, Six Flags-Vallejo, St. Louis, Rosamond Gifford). (See section on Pain for further discussion.)

- **CASE EXAMPLE: Tina** - a female Asian elephant at Six Flags-Vallejo, died in 2003 at age 46 after suffering from severe arthritis in all of the major joints and most of the minor joints of all four limbs. Her joints would audibly creak. Tina stopped lying down by June 20, 2002, almost a year and a half before she was euthanized, because it was “too difficult for her to get up.” Abscesses were reported on her hips, and Tina suffered from multiple foot abscesses. In the final month of her life, Tina spent as much time as possible submerged in the pool to take pressure off her arthritic limbs and infected feet. One entry in the veterinary records indicates that Tina was “hesitant to move” but wanted to go outdoors. It took her two hours to reach the pool, where she submerged herself for 1.5

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hours. Records show administration of phenylbutazone and demerol for pain relief.

Degenerative joint disease is generally confirmed in elephant necropsies, often revealing the tremendous extent of the damage, in many instances affecting multiple joints and the feet (Exhibit A-L.A. Zoo, St. Louis Zoo, National Zoo, Oregon Zoo, Point Defiance Zoo, El Paso Zoo, San Francisco Zoo). It is not uncommon to find bone-on-bone contact in the leg and hip joints (Exhibit-L.A. Zoo (Tara, Gita); El Paso Zoo).

Like foot disease, degenerative joint disease is the cumulative result of the damage caused by an elephant having spent her entire life standing on concrete flooring, with little exercise (Schmidt 2001). Degenerative joint disease and foot disease are linked together. Foot disease can cause an elephant to abnormally shift her weight onto other legs, causing joint degradation (Roocroft 2005). Likewise, degenerative joint disease can cause an elephant to move less, therefore placing more weight on the feet and often causing abnormal gait, foot wear, and abnormal pressure on the nails. (Schmidt, 2001; Roocroft and Oosterhuis, 2001).

A secondary complication of degenerative joint disease is that elephants do not lie down to sleep because of the difficulty in rising (West, 2006) or the discomfort of concrete substrates, which puts even more damaging pressure on the joints and feet and causes progression of the disease (Roocroft, 2005; Hittmair, 2000). Elephants are active for 20 out of 24 hours each day (Moss, 1988), lying down to sleep overnight, sometimes for several hours (Fowler, 2006). In many cases, an elephant may not have laid down for prolonged periods, some lasting as long as 10 years (Fowler, 2006; Exhibit A-Rosamond Gifford Zoo). At L.A. Zoo, director John Lewis reported, “Gita has not been lying down for years. Mostly related to her arthritis, not the current injury.” (L.A. Zoo Board of Zoo Commissioners, 2006)

Conversely, elephants may lie down for prolonged periods to relieve joint pain and discomfort, causing painful pressure sores to develop (Exhibit A-St. Louis Zoo). Elephants normally lie down to sleep overnight (Fowler, 2006) and elephants in sanctuaries can be observed napping in the grass during the day (Doyle, pers. obs.).

Another secondary complication results from elephants leaning against walls, enclosure bars and other surfaces to relieve the pressure on painful limbs. Leaning, along with prolonged recumbency, can cause pressure sores and abscesses to develop (Roocroft, 2005; Exhibit A-L.A. Zoo, Six Flags, Oregon Zoo, San Francisco Zoo, National Zoo).

As with foot disorders, concrete is detrimental to joint health. Prolonged periods of time spent indoors, which can be especially prolonged during cold winter weather, impacts the joints due to lack of movement and the elephants being forced to stand on hard surfaces.

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This was recognized by the National Zoo in its veterinary records regarding Nancy, a female Asian elephant, who suffered arthritis and chronic foot infections. The records state: “All elephants have been housed indoors continuously for the past few days due to extreme cold weather. **The floors are extremely hard (cement) and this may have exacerbated her lameness...** Consider recommending application of permanent soft flooring for this geriatric elephant.” Nancy was 46 years old at the time. (Exhibit A-National Zoo) Six Flags-Vallejo veterinary similarly note that Taj, a female Asian elephant, **has joint problems that flare up after spending more time in the barn and also during cold weather.** (Exhibit A-Six Flags)

In addition to the unyielding nature of concrete, it also retains wetness and cold, conditions that predispose elephants to degenerative joint disease (Hittmair, 2000). All zoos in the IDA survey that provided information on indoor substrates contained concrete flooring indoors. One cold-climate zoo provided information stating its concrete floors are not heated (Exhibit A-St. Louis Zoo). It is suspected there are many more of these zoos, however, additional requests for information would be necessary to obtain this information.

Degenerative joint disease is often characterized as an “old age” problem in elephants, deflecting attention from the problem of inadequate captive conditions. Degenerative joint disease, like foot disorders, represents the cumulative damage to elephants’ joints caused by the environmental conditions discussed here. However, onset of degenerative joint disease has been recorded at relatively young ages.

- **CASE EXAMPLE:** *Gita, a female Asian elephant at Los Angeles Zoo (now deceased), was diagnosed with arthritis while still in her twenties.*
- **CASE EXAMPLE:** *Methai, a female Asian elephant at Houston Zoo, showed symptoms of arthritis for over 15 years. At age 26 her mobility became increasingly affected and she appeared to be in pain. Radiographs of the hoc joints showed “extreme proliferative bone reaction.”*

Elephants as young as 27 years of age have been euthanized because of arthritis (Contra Costa Times, 2003), and many elephants have died or been euthanized before the age of 40 because of the condition (Exhibit B, Elephant Deaths and Foot/Joint Disease). Carolyn, a female Asian elephant, died at St. Louis Zoo at age 32. She suffered from arthritis and foot disease. The necropsy identified osteo-skeletal erosions on three of four limbs (arthritis). The left stifle (knee) showed severe degenerative joint disease, erosion of half of the kneecap, femur and tibia. The left coxofemoral joint (hip) showed severe degenerative joint disease.

In the wild, elephants are vigorous and active animals who are almost continuously active. Whereas in zoos, movement is limited by small enclosure size. As noted above,

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lack of exercise is a major causal factor in degenerative joint disease. Regular exercise helps promote flexibility in the wrist, knees and joints (and Mason, 2003). At the Schoenbrunn Zoo in Vienna, an African elephant was diagnosed with severe degenerative joint disease ascribed to lack of movement (Hittmair, 2000). Captive elephants can lose joint function even after minor trauma if they are not required to move the joint after injury (Exhibit A, Milwaukee Zoo). Studies of other species, including humans, show that inactivity is one of the predisposing factors for osteoarthritis (and Mason, 2003.)

2. Conclusion

Again, the best course of action is to prevent degenerative joint problems. However, zoos will not be able to achieve this as long as captive conditions remain relatively unchanged.

To prevent joint disorders, zoos must:

- Provide large, natural spaces for movement and exercise.
- Supply opportunities for digging.
- Eliminate concrete flooring that retains moisture and cold; elephants must be housed on soft substrates.
- Utilize effective management that focuses on eliciting species-typical behavior and a more natural range of movement.
- Ensure year-round access to natural substrates.
- Provide proper nutrition, including access to browse.
- Offer opportunities for immersion in water to relieve pressure on the joints.

Without these changes, elephants will continue to needlessly suffer from debilitating joint disorders that inevitably lead to premature death. **This is unacceptable and inhumane, and a major reason that USDA must enforce existing Animal Welfare Act law.**

D. Pain and Suffering

Pain is the terrible consequence of advanced, degenerative joint disease and foot disorders. Elephants have been recorded and observed going to extremes to shift pressure off painful feet and joints and adopt unusual and pathetic stances to escape the pain. Advanced stages of degenerative joint disease may cause chronic bone pain and lameness, despite the use of anti-inflammatory medications (West, 2006).

Behaviors include weight shifting from foot to foot, lifting the foot consistently, leaning against bars, wall or even another elephant, using trunk as a “crutch,” resting head on gate or fence posts, difficulty ambulating, increased recumbency, absence of recumbency, increased time spent in pool, and lack of appetite. (Exhibit 1)

1. Examples of Pain and Suffering in Zoo Elephants.

(All information taken from medical records in exhibit A)

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Tika, Female African Elephant; died at age 24

Six Flags-Vallejo

Pregnancy Complication – Dead Fetus

Tika died in 2002 from a massive infection due to failure to expel dead fetus. Records note that Tika is uncomfortable and standing with one rear leg in front of the other, depressed, lacking appetite and experiencing abdominal pain. (Exhibit A – Six Flags Marine World)

Tina, Female Asian Elephant, died at age 46

Six Flags-Vallejo

Severe Arthritis and Foot Abscesses

Tina suffered severe arthritis and multiple foot abscesses. She had stopped lying down **almost a year and a half before she died** because it was “too difficult for her to get up.” In the final month of her life (2003), she spent as much time as possible submerged in the pool. One entry in the veterinary records indicates that Tina was “hesitant to move” but wanted to go out. It took her two hours to reach the pool, where she submerged herself for 1.5 hours. (Exhibit A – Six Flags Marine World)

SIRI (born 1964, wild)

Rosamond Gifford

Arthritis

Arthritis, limb swelling; Siri leans and weight-shifts to take pressure off the fore-limbs.

- Oct. 2001 – At “chain up time” Siri puts little weight on her right leg. She is kept chained and zoo personnel discuss altering her chains so she can lay down more easily. She is not laying down much, if at all.
 - Jan. 2002 – Arthritis diagnosed; Siri leans her head to take the weight off her forelimbs; suffers limb swelling. “May” be lying down. Phenylbutazone administered (dosage taken from The Elephant’s Foot, Csuti, et. al.) and later Ketoprofen.
 - June 2002 – Weight-shifts on front limbs. Siri is “painful.” Pain not considered to be controlled (“overall nonsatisfactory analgesia achieved with Ketoprofen”) until July 2002.
 - Sept. 2002 – Siri experiencing good “moments” of activity.
 - Oct. 2002 – Quality of life is determined to be “adequate at this point”
 - January 2003 – Siri can’t go out when the temperature is cold; she gets uncomfortable; Ketoprofen use continued.
 - August 2003 – Siri “head resting,” a behavior she displays during pain in her front legs.
 - Apr. 2004 – Difficulty laying and getting up
 - Sept. 2004 - Ketoprofen stopped; “keep the drug on reserve for this fall.” Siri shows discomfort; more since weather has gotten into 40s at night and some mornings (dosed with Ketoprofen)
- Other medications include: Ibuprofen, acetaminophen

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- Feb. 2002 – Lifting her “right foot up and hold it without weight or crossed over her left foot for up to 1.5 minutes at a time.”

Babe, Died in 2001 at age 43

Milwaukee County Zoo

Colic, Foot disorders

Sept. 2000– Babe lethargic, reluctant to walk, trunk limp; stretched back legs “as if in pain”; gas, loose stool

Dec. 2000 – lameness on right rear, “placing weight onto the heel and then rolling foot forward as if to keep weight off of the toes.” Keeper inspection reported “crack on the sole at the front of the foot.”

Lucy Died 2006 at age 49

Milwaukee County Zoo

Joint Disease

- Jan. 26, 2000 – Flares up again “three days ago.”
- Feb. 2000 – Recurrence of left forelimb lameness; Lucy “slow to move” and holding forelimb “rigidly straight when walking, swinging the limb out to the side”
- Apr. 2000 – “walking stiffly on the left forelimb, without bending the left elbow.”
- May 2000 – “stiffness and lameness of the back right leg” noted by keepers the day before. Lucy was given 9600 mg of Ibuprofen. “This morning animal is walking normally on the back right leg” and no additional medications given. IBU, ACETO
- Aug. 2003 – Lameness in right forelimb. “... holding leg stiff and sliding its foot along the ground.”

COLIC

- Dec. 2001 – Signs of colic. “Will periodically dip down on one hind leg. Hangs trunk limply over exhibit bars.” (Banamine administered.)
- Sept. 2002 – Lucy appears “colicky.” “At 1200, staff noticed that animal was laying down on cement platform outside.”
- Oct. 26, 2002 – Colicky again; “leaning against wall, and crossing its back legs.”
- Oct. 29, 2002 – “grouchy, charging curator through bars.” Stool “filled with sand/dirt.” New dirt in exhibit “contained more sand than usual. Will consider getting dirt with more clay.” Not allowed outdoors until Oct. 31st.
- Apr. 2003 – Colic. Lucy “stretching in indoor enclosure and leaning against the wall. Eyes appeared to roll back during wall pressing episodes.” (no sand noted in stool) Later in the day, Lucy stands with “hind limbs crossed” and would “lean against wall occasionally and squat with hind limbs.” “Suspect colic is secondary to ingestion of outdoor exhibit substrate.” “Recommended exercise within inside enclosure if possible.”
- May 2003- “...animal is rocking back and forth, which has indicated pain in the past... Animal appears afraid of other elephant.”

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- Dec. 12, 2003 – Lucy observed leaning “against the side wall of the exhibit and its third eyelids will be raised.” Lucy also “stretches rear limbs medially under the body or behind in positions of relief... Suspect gastrointestinal colic.”
- Dec. 13, 2003 – Lucy painful again. “Painful behaviors increased over time and included leaning against the wall, holding rear limbs under the abdomen, stretching rear limbs out, draping trunk over front bars, holding mouth open when stretched, and occasionally knuckling on its front limbs.”
- Apr. 2004 – Colicky . Lucy is listless. “Keepers noted groaning and leaning earlier...”
- Oct. 2004 – Starting to show signs of colic; leaning against wall, “stretching out and occasionally down on its rear limbs.” No interest in morning food or treats. “Keep animal inside.”

PAIN AND AGGRESSION

- July 2005 – “Over the last couple of years, animal has become increasingly intractable, aggressive and unpredictable, therefore assessment done only visually... **Keeper Dolphin said that changes in behavior, meaning increasing aggression and intractability have been noted in old elephants, and there is a hypothesis that these changes may be related to cognitive disorders and senility.**”
- Nov. 2005 – “...keeper has noticed some unusual behaviors, including pulling at chains and squatting. Animal was less attentive during bath today than yesterday.”

Khun Chorn, Male Age 28

Dickerson Park Zoo

Foot Disease

Repeated foot trims have resulted in sore nails and soft tissue inflammation.

Casey, Male, Age 53 at death

Kansas City Zoo

Foot problems for 22 years (since 1981)

- A 1994, an entry states, “**Has chronic abscess of 15 year duration on left foot.**”
- 1995: he had **abscesses on both feet that persisted until his death in 2003.**

Records replete with references to chronic abscesses, holes in feet, toenail separated, necrotic tissue around nails and on pads, feet with nasty smells, etc. Some examples:

- “Golf ball to softball size hole” between nails on left front foot. 28 June 2000
- “On PE of right front foot, there is a 1 ½ to 2 inch deep abscess” 6 Sept 2000
- “Keeper reports seems painful when flushing open abscess on left front foot and objects to flushing it.” 21 June 2001
- Very large deficit in sole/pad ventral to three of the four digits. Keepers removed large flaps of pad. 20 July 02
- R foot – large circular white areas of abscessation of 2 inch diameter Swelling between toes and up leg. Pocket on bottom of nail 28 July 02

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There is also evidence that the foot treatments were painful to Casey, and notes about crouching prior to placing feet in soaks, difficulty putting weight on front feet, and shakiness and difficulty raising feet for treatment. One note indicated that a foot treatment took 2 hours.

At the end of his life, Casey was clearly in pain. He was lethargic and depressed. Shortly before his death, he was observed to be “wobbly” and “Standing stretched out, lifting right foot consistently. Keeps touching trunk to left front leg and wrapping it around the elbow.” and “Standing outside resting head on gate 90 percent of time.”

Calle, Age 37 at Death in 2004

San Francisco Zoo

Severe Foot and Joint Disease

Toward the end of Calle’s life, the records describe frequent episodes of discomfort where she would literally wince and call out in pain. Calle lost the ability to lie down sometime in the fall of 1993, meaning she was not able to take weight off her rotting feet and degenerated joints for months before she was euthanized. Calle developed pressure sores on her hips and sides of her face from leaning against the walls to take weight off. In the days before her death, Calle was seen leaning her head and trunk on the bars to take weight off her feet and joints, and wrapping her trunk around the bars to stabilize herself. – nsaid, pain

Tinkerbelle, Age 39 at Death 2005

San Francisco Zoo

Beginning in Spring 2003, keepers become worried about Tinkerbelle’s physical health, as she has been lethargic and has a poor appetite. Tinkerbelle has been observed resting on the tire in her exhibit. The veterinarians decide to up her dosage of anti-inflammatory drugs.

Dale, Male Age 25 at death

Kansas City Zoo

BODY ABSCESSSES

There are periodic episodes of inappetance, depression, lethargy. He suffered from abscesses on his shoulders and elbows in 95-96, then developed a major swelling/abscessation on his left knee (stifle) that lasted for years. The swelling was basketball-sized and developed a smaller basketball-sized lump on top of it and oozed bloody pus. He limped, dragged and walked stiffly on this leg. Although it would improve periodically, it does not appear to have ever resolved.

Signs that he is in pain include refusal to leave stall, leaning on wall and gates, lethargy, depression, inappetance, aggression during treatments, especially when hosing/flushing

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the wound. He also packed the abscessed area with sand and dirt and flicked it frequently with his tail.

FEET: Dale also has chronic problems with his right rear foot, which obviously cause him discomfort. These include:

- a golfball size swelling on right rear foot followed by an open wound on the same foot (2001).
- Wide cracks (finger width) in right rear toes and a lesion on the right rear foot that is draining pus (2002). Keepers trimming the necrotic tissue from this lesion can fit the exacto blade up into the wound.
- A chronic 3-4 inch opening that is being flushed regularly and a new adjacent area that opened and was found draining (2003). By this point Dale has become aggressive during foot work and keepers have had to discontinue flushes.

REPRODUCTIVE: KCZ started collecting semen from Dale in 96. This involved repeated manual stimulation over the years. Notes indicate that this was uncomfortable for Dale:

- Significant amounts of blood from rectum following manual stimulation,
- Need for softer gloves to cause less irritation
- Vets prescribe “adequate rest from rectal palpation indicated for adequate healing of rectal mucosa”

Despite this, zoo personnel continued rectal stimulation on Dale even when he was in obvious discomfort from the giant swelling/problem with his left knee or ongoing problems with his right foot. For example, in May 03, Dale has gone through a period of lethargy, depression and lack of appetite and his prognosis is listed as “fair.” He is described as lethargic, not eating, standing in the corner of enclosure all day, lifting right rear leg, then left leg. Yet the zoo is still performing manual stimulation on him to collect semen.

2. Conclusion

The medical records document the extreme pain and suffering that many elephants in zoos experience on a daily basis for years at a time. Elephants are given massive doses of anti-inflammatory and other pain-relieving drugs (Section E), but they are ineffective in alleviating the problem. **The extensive pain and suffering of elephants in zoos is an undeniable, intolerable and unacceptable situation.** USDA should immediately undertake a comprehensive review of medical records to identify clearly suffering elephants. Zoos should be forced to provide these elephants with adequate conditions (space and natural substrate) necessary to alleviate their medical problems. If zoos cannot provide these conditions, they should be ordered to send the elephants to sanctuaries that maintain conditions capable of restoring quality of life to clearly suffering elephants.

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E. Complications from Medications

The prolonged use of some drugs, particularly non-steroidal anti-inflammatory drugs (NSAIDS), may have a negative impact on an elephant's health, and, in some ways, be counter-productive. Cartilage may actually be lost through chronic use of NSAIDS (West, 2006).

Commonly prescribed NSAIDS for joint, foot, and digestive disorders include flunixin meglumine (banamine), phenylbutazone, ketoprofen, and ibuprofen (West, 2006).

Kidney damage has been associated with long-term NSAIDS use. The necropsy for Nita, a female elephant who died at North Carolina Zoo (2003), states that kidney damage was identified (renal necrosis) "likely associated with the usage of nonsteroidals, but decreased vascular flow cannot be fully excluded as a cause."

At St. Louis Zoo, Asian elephant Clara suffered kidney damage and bleeding ulcers, attributed to long-term NSAIDS use:

"BUN and phosphorus results are consistent with renal compromise. Looked back over BUN and phos values for the past five years and both started to rise 18 May 2005, which is about two weeks after Clara was started on phenylbutazone to manage chronic arthritis. Sent an email to curator and ZM notifying them of changes and possible association with NSAID administration. Said that vets will investigate other NSAIDS used in elephants to see if there is one that is effective with less potential for renal compromise. Also asked vets and animal managers to meet and discuss risks **of continuing long-term treatment with NSAIDS vs. welfare issue of allowing animal to live with chronic pain.**" (Aug. 6, 2005)

Gita, a female Asian elephant who died in 2006 at Los Angeles Zoo, was evaluated in 2005 by an "independent" veterinarian who noted: "Blood chemistries (reports as above): Changes consistent with tissue bruising/necrosis, returning to more normal levels in 11 Nov. sample. Changes consistent with chronic inflammation, possible chronic liver damage and/or reflecting the chronic administration of anti-inflammatory drugs, antibiotics, and antifungal drugs, are enhanced in 11 Nov. sample." The cost of medications to treat Gita's chronic foot and joint disease totaled \$8,000 per month. (Los Angeles Elephant Exhibit Review, CAO File No. 0150-06978-0003, 2005)

Toni, the female Asian elephant who was euthanized in 2006 at National Zoo after suffering severe arthritis, was administered ibuprofen between 1997 and March 2001. It was discontinued because of suspected kidney toxicity, but administered again in 2005.

Clearly, use of NSAIDS is not a long-term solution for elephants suffering from foot and joint disorders. These major health problems must be prevented in the first place. With proper facilities and management, foot disorders and degenerative joint disease are preventable. Until zoos can provide the critical space and conditions elephants need, the

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USDA must recognize that prolonged use of NSAIDS for foot and health disorders indicates poor physical condition caused by inadequate zoo conditions, and decisively enforce existing Animal Welfare Act regulations.

F. Case Studies: Foot and Joint Disease

The course of foot and joint disease in elephants is as predictable as it is destructive. These case studies are presented to illustrate both the progression of the disease and the extreme pain and suffering it causes to elephants over the course of many years.

Pet, 51 at death, Oregon Zoo

Asian Elephant

Wild Caught

Health Problems:

- **Severe Foot Disease**
- **Severe Degenerative Joint Disease all four limbs**
- **Multiple ankus wounds/abscesses: (Dec. 2000, Jan. 2001, Oct. 2002, March 2003, June 2003, Nov. 2003, Dec. 2003, Nov. 2005**
- **Pressure Sores from lying on concrete**
- **Lesions on kidneys (poss. long-term NSAID use), multiple joints, digit 3 (osteomyelitis) front foot, uterus. (identified on necropsy.)**

Pet suffered for years from severe foot disease – recurrent lesions,, abscesses, ulcers, defects, cracked and undermined nails, etc. that required almost daily intervention from keepers. She also had severe arthritis. Pet was euthanized on Aug. 2, 2006. **She was the third elephant to be euthanized by Oregon Zoo in the last ten years due to foot disease.**

Pet’s veterinary records are rife with examples of pain and suffering caused by her chronically infected feet. There are voluminous notes about cleaning out infections, lesions and pockets in her feet and constant debridement of lesions– cutting away of dead, necrotic tissue. There are numerous references in the records to pain that Pet is in after what vets term “atraumatic foot trims.” They note that she remains in “prolonged lateral recumbency after foot trimmings.” At one point (Dec. 21, 2002) vets note that a lesion covering 20 percent of Pet’s caudal sole would not be debrided as “it would leave no protective layer for Pet to stand on.” On Dec. 24, 2002, the records indicate that the 10 cm defect on this foot had left the fatty tissue under the skin exposed. Pet’s feet were so damaged that she was frequently made to wear sandals.

A March 9, 2002 note in the records diagnosed her with “severe DJD (Degenerative Joint Disease) in all four limbs” and a June 12, 2002 entry noted “chronic debilitation and multiple joint pain.” Radiographs of her feet show complete collapse of intercarpal joint spaces, bone lysis and osteophyte formation. A February 8, 2001 entry notes that the DJD is “probably a result of poor conformation, age and **having lived most of her adult**

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life on concrete and asphalt surfaces.”

Notes throughout the records indicate that Pet was in **significant pain**. Keepers observed her **using her trunk as a crutch to take weight off her right front foot** and she would also lean against the bars of her indoor enclosure also to take weight off her feet. She regularly lifted her right foot every 30 seconds or so, clearly indicating pain. Pet was on high doses of many kinds of pain medications, including Ibuprofen, Legend, and Adequan. Butorphenol, an opioid painkiller was also used frequently, causing Pet to appear “drugged” at times.

Pet developed **pressure sores** from lying on her left side on the hard indoor floor. Although veterinarians recommended a softer surface for Pet to lie on, it does not appear that the zoo was able to provide this for Pet.

Most disturbing, this clearly tormented elephant suffered from **numerous wounds to her skin as a result of aggressive ankus use**. On ten separate occasions between 2000 and 2005, veterinarians diagnosed ankus wounds (abscesses, punctures penetrating dermis, lacerations, lesions) on her trunk, feet, shoulders, head, back, hip and ear. On Nov. 22, 2003, veterinarians reported “**a problem with ankus use on Pet**” to curatorial staff. Keepers acknowledged using the ankus more on Pet, in chronic pain from severe DJD and foot disease, to “maintain her activity level so she just doesn’t stand around.” The veterinary records indicate that it would be nice to accomplish this “in a manner which causes less trauma to her skin.” A Dec. 21, 2003 entry indicates that “**Pet may have sustained numerous new ankus contact injuries today** as keepers communicated poorly about commands given and **Pet was reprimanded** in the process.”

In 2000, the Oregon Zoo was charged by USDA for violating the Animal Welfare Act in the abuse of Rose-Tu with an ankus, but these serious charges do not appear to have had an impact on Portland keepers, as Pet’s records show ankus abuse continuing.

Despite all of Pet’s problems, on July 6, 1999, she was chained for a reproductive exam. Vets concluded that “**her reproductive tract would probably be healthy enough to carry a pregnancy, unfortunately her feet are not.**”

Also, in Dec 2002, the zoo decided to put the debilitated Pet in with Rama, a young bull, to reduce his “stereotypical swaying, which is causing him foot wear problems.” Vets speculate that the pairing might make Pet move more too but worry that “Rama may be too rough with old Pet.” Later entries indicate that Rama had pushed Pet around, opening an abscess on her back that had formed due to an ankus wound.

At the end of her life, Pet was moving very slowly, shuffling her feet, not bending either carpus, and **bracing herself with her trunk**. She had difficulty walking on the sand exterior, and would not move for long periods of time when outside. About two weeks before she was euthanized, morning keepers found Pet “standing with her front limbs in a depression that she had dug out by throwing sand on her back. Apparently she had stood in the same place without moving for a long time and had excavated a depression around

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her front feet.”

In recommending euthanasia, the veterinarian wrote, **“Pet appears miserable and chronically in pain.”**

The treatment of Pet in these final months is shocking. She spent years lying on concrete, yet even as the pressure sores worsened, zoo staff was apparently hesitant to bring in dirt or sand for Pet to lean up against or lie upon. In her medical records, the veterinarian wrote, **“Need to get her a soft place to lie down. Need to get curatorial and keeper buy in to make this happen.”**

This crippled elephant was still being forced to go through her training routines, and in Nov. 2005, she sustained the last of many **ankus injuries**, a wound under her trunk that “corresponds with probable ankus tip poke wound (prompting trunk lifting) and keepers believe ankus injury is the cause.”

Despite Pet’s extremely debilitated state, the zoo subjected this 51-year old elephant to another **transrectal ultrasound/reproductive exam by Dr. Schmitt on May 4, 2006 – just 3 months before she would be euthanized.** They concluded, “No reproductive abnormalities noted, although will not be bred due to age and severe DJD.”

In June 2006, Pet was put in with Packy, who had been rough with her on previous occasions. Packy “traumatized her tail head” during this encounter.

On August 2, 2006, Pet was euthanized. Her last act was to obey her keepers command to go into the “half” position (on elbows resting rear on left side of her rump/thigh) so that they could inject the drugs that would eventually end her suffering.

Toni, 39 at death, National Zoo

Asian Elephant
Wild caught.



Photo: Peter Granli, Elephant Voices

Toni was a severely debilitated elephant who suffered from “chronic,” and “severe” osteoarthritis in multiple joints, nail abscess, and thin pads on feet from “overpacing

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markedly.” In her final months, she suffered a weight loss of 900 pounds “probably associated with the arthritis.”

The veterinary records indicate that that Toni was on Ibuprofen between 1997 and March 2001. The medication was discontinued because of suspected kidney toxicity.

Toni was plagued by “acute lameness” from April 10, 2005 until she was euthanized on January 25, 2006. In July 2005, she was put back on Ibuprofen. From this time, she was treated with increasing doses of Ibuprofen, intravenous administration of Legend (an anti-inflammatory commonly used in horses), intramuscular injections of Adequan (anti-inflammatory drug commonly used to treat canine arthritis), and oral doses of Cosequin (a supplement intended to halt joint damage.)

Toni also had foot disease, with irregularly thin pads on her feet and “inflated areas giving impression of bubbles below the sole” possibly due to “overpacing markedly,” according to her 2004 physical exam. At the time of her death, she also had a nail abscess (first identified in October 2005) that had turned the nail black and was backed by a 13 cm x 15 cm sole depression.

In April 2005, Toni developed a tusk infection that continued through her death. Keeper notes indicate that Toni banged the area and that it was swollen. Her necropsy indicated that the infection had invaded the bone of her jaw. (“Osteomyelitis maxilla)

In July 2005 Toni’s condition was observed to be “**generally declining. . . Elephant seems old although is 40 years old.**”

In August 2005, the records indicate that Toni was lame in her **right front foot** and “leaning against wall to relief weight from rear end”.

At the end of her life, Toni was emaciated and obviously in extreme pain. She could not bear weight on her front legs and could barely walk. She would lean her back end against the wall, her elephant companion or sit down on an old tire in her yard. She was observed leaning her head against the bars of her cage.



Photo: Peter Granli, Elephant Voices

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In January 2006, Mel Richardson, DVM, a zoo and wildlife veterinarian, and Joyce Poole, Ph.D., research director of the Amboseli Elephant Research Project in Kenya visited the National Zoo and observed Toni. Both of these experts had observed and worked with numerous elephants over the course of their 30-year careers. And both were shocked at Toni's debilitated condition.

Dr. Richardson wrote, "When I saw Toni on January 4th, 2006, I was appalled. I have never seen an elephant in such a debilitated condition. . . . The fact that I could see her spine, shoulder blades, and hip bones was beyond belief. I had expected her to be in poor shape; but this was more than I could have ever imagined." As to the cause of Toni's debilitated state, Dr. Richardson was clear:

Whenever possible we as veterinarians are trained to prevent pain and suffering, not just treat it. Why are the veterinarians at the National Zoo not preventing the painful degenerative arthritis in their elephants like Toni and Ambika [Toni's yardmate]? They cannot! Because the cause of the crippling degenerative joint disease is the exhibit itself: the concrete; the packed unyielding abrasive substrate inside and outside; the lack of exercise and normal use of the elephant's feet and limbs – climbing, digging, walking, wading into streams, kicking logs, and foraging. . . . [Elephants] evolved to travel miles each day on uneven natural substrate using their feet to find and apprehend food. To keep them healthy we must provide that opportunity as well. The zoo exhibit itself is the cause of the Degenerative Joint Disease. **The zoo exhibit itself is killing her.** And treating these elephants like Toni and Ambika with long term, high dose NSAID, in an effort to control their pain, is contributing to their agony not alleviating it.

Dr. Poole concurred with Dr. Richardson's opinion:

Although I already knew that 39-year old Toni had severe arthritis, I was not prepared for what I witnessed at the enclosure. In all my 30 years observing wild elephants, I have never seen an elephant as crippled as Toni.

Although the zoo blamed Toni's arthritis on an injury she sustained at Scranton Zoo, the lack of space and hard substrates (cement indoors, hard compacted earth outdoors) at National Zoo exacerbated Toni's condition by preventing her from exercising and walking (thus causing her muscles to atrophy, placing increased pressure on her joints) and forcing her to stand on unyielding surfaces, which also put more pressure on her joints. (Richardson, 2006, Poole, 2006).

Wild elephants have sustained injuries similar to Toni's and have been able to move and lead productive lives. Dr. Poole's report (Exhibit G) includes photographs of one such elephant, Xala, age 43, who sustained a broken ankle similar to Toni's injury over 20 years ago. Despite this injury, Xala was able to keep up with her family, reproduce and successfully raise offspring. The difference in condition between these two elephants is striking.

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Clara, Age 53, St. Louis Zoo

Asian elephant

Wild born

Health Summary:

- **Foot disease: Severe foot and sole abscesses (wears “sandals”)**
- **Arthritis**
- **NSAIDs Toxicity: Renal compromise and bleeding ulcers**
- **Pressure sores from “Prolonged recumbency”**
- **Tested Positive for Tb exposure: given anti-Tb drugs prophylactically.**
- **Anemia**
- **Uterine Cysts**



Clara’s condition graphically illustrates the effects of long-term zoo captivity on an elephant. She resides at St. Louis Zoo, where the largest outdoor yard is half an acre. She is confined indoors at night to a concrete-floored barn stall. In addition, the cold climate in St. Louis means that Clara spends long stretches of time indoors during winter.

After five decades in this zoo, Clara is severely debilitated. She suffers from severe foot and joint disease. She has had recurring abscesses of both back feet for at least six years (from the onset of the records). Her left foot has a serious defect – a 1.5 x 5 cm fissure near her middle toe.

Clara has also suffered from decubital sores (bedsores) on the left side of her face, her left elbow and left hip as a result of “prolonged recumbency” (laying down a lot) presumably due to foot pain.

Clara wears sandals on both back feet due to the chronic abscesses.

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Prior to the sandals, a boot was placed on Clara's abscessed left foot. A note in the records from April 2000 indicates that when a boot was first placed on this foot, Clara removed it and "rubbed sole on chain until moderate hemorrhage." Chaining of course would only worsen Clara's problem and the fact that she rubbed her foot to the point of hemorrhage is an indication of the degree of discomfort she has experienced.

Notes indicate that Clara has arthritis as well. Her left leg has had a problem with swelling. Signs that Clara is in pain include direct mention of pain in the medical records: "arthritis pain" on 8/1/01, and "pain management" on 4/28/05. In addition, the records include entries noting "prolonged recumbancy" (lying down) leading to pressure sores, and prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs).

Clara's foot infections are treated with antibiotics, foot soaks and trimming the necrotic tissue from her foot. Her foot pain and arthritis have been treated with banamine and phenylbutazone, two Non-steroidal Anti-inflammatory Drugs (NSAIDs).

Long-term NSAID use has caused kidney damage and bleeding ulcers. These side effects have prompted zoo personnel to **"discuss risks of continuing long-term treatment with NSAIDs vs. welfare issue of allowing animal to live with chronic pain."** (Aug. 6, 2005)

There are also a few notes in Clara's records that suggest aggression between elephants is occurring. Ulcers inside Clara's mouth along the lower mandible were thought to be related to "trauma." (Dec. 2001). A note about abnormal blood test results showing monocytosis, neutropenia, and lymphopenia are thought to be a "lab error, effects of chronic inflammation or result of **recent stress in barn.**"

Clara is has abnormalities of her reproductive tract. "This Asian elephant has significant uterine and vaginal gross pathology, making her an unlikely reproductive candidate . . . The intramural lesion, consistent with a leiomyoma is often seen in Asian elephants. The endometrial cysts, commonly seen as part of the cystic endometrial hyperplasia complex are more common in African elephants, although they may commonly occur in Asian elephants. The etiology is currently unknown, although **continued cyclicity is a presumptive cause.**" (no pregnancies or nursing of young) (Dec. 18, 2003)

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In 2005, Clara was treated with anti-tuberculosis drugs (isoniazid and Rifampin) after “repeated positive PT and MAPIA serology for mycobacterial antigens.” (Sept. 7, 2005). These drugs were discontinued two months later after Clara began refusing food. The records note “Ok to stop anti-Tb meds pending discussion with curator re: test results, quality of life.” Clara’s appetite returned after the drugs were discontinued.

Clara’s condition has deteriorated for years. She moves slowly due to foot and joint pain. Yet the zoo considers her normal for her age. “Animal is in good general condition for her age.” (Feb. 2004) “Decreased muscle mass as expected for geriatric state.”

Gita, age 48 at death, Los Angeles Zoo

Asian elephant

Wild caught

At LA Zoo since 1959



Gita was taken from her family in India and put on exhibit at the L.A. Zoo at less than two years of age, where she has since been confined to small exhibits

According to former zoo personnel, Gita and the other elephants were kept in chains for 12 to 14 hours overnight, a practice that lasted for years. Today, her body shows the results of her being forced to stand on hard surfaces such as concrete in cramped quarters and the years of being chained. She suffers from chronic infections of the foot and bone and arthritis – foot problems and arthritis are the two leading causes of euthanasia in captive elephants in the United States.

- **Gita suffered from painful, chronic foot abscesses in the nails and soles of the feet since at least 1976, while still in her teens.** Abscesses have generally involved more than one toe and often on more than one foot. Through the years Gita suffered *continuously* from this condition, which was accompanied by lameness.
- **Arthritis was first recorded in Gita’s records in 1985, while Gita was in her twenties** and has been evident ever since.
- Gita was been treated with pain killers and anti-inflammatory drugs for years. A December 2005 L.A. City report stated that medications to treat Gita’s foot and joint

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problems totaled \$8,000 per month.” Drugs include the NSAIDs (non-steroidal anti-inflammatory drugs) Banamine and Phenylbutazone, the latter of which was administered both for arthritis as well as “acute pain” from the constant cutting away at Gita’s abscessed feet.

- Gita may have suffered from prolonged use of antibiotics, antifungals, NSAIDs, and pain killing drugs, which can damage the liver and kidneys. In the December 2005 L.A. City report, medical information for Gita included: “Changes consistent with chronic inflammation, possible chronic liver damage and/or reflecting the chronic administration of anti-inflammatory drugs, antibiotics, and antifungal drugs, are enhanced in 11 Nov. sample.
- By November 2005, the infection in Gita’s foot had invaded the bone and she underwent surgery to remove part of a toe on her left front foot.
- Following the surgery, the zoo continues to report that Gita is doing well, but by January 2006, Gita is observed leaning up against bars, which results in skin ulceration on right rump. This is possibly an indication that Gita was likely trying to take pressure off painful feet and/or joints.
- In March 2006, Gita develops an ulceration at the head of her tail. Clinical notes indicate that it is painful. At the time, Gita was on both antibiotics and NSAIDs, and keepers lifting Gita’s tail to insert antibiotic suppositories was potentially associated with this lesion. This tail abscess would grow to 17 inches long by 22.5 inches wide in the next month.
- On June 9, 2006 Gita was observed in a “downed” position at 8:45pm by a Zoo security guard. The Guard relayed the information to the night keeper, who apparently failed to take action. Gita was left unattended and unable to rise for more than eight hours. (*This information is not initially released by L.A. Zoo.*)
- Morning keepers find Gita down at 5 a.m. **The zoo veterinarian** arrives at 7:30am. Gita dies at 9:40am due to damage to her muscles from being down for so long (“toxins from her muscles flooded her system and caused vascular distress” - L.A. Times, 6.11.06).
- According to zoo veterinarian Stephen Klause, “Gita has not laid down for years.” Zoo director John Lewis had stated earlier this year, “Gita has not been lying down for years. Mostly related to her arthritis, not the current injury.” (Board of Zoo Commissioners Meeting Minutes, January 17, 2006, p. 13)
- Gita’s necropsy report identifies “Extensive... severe to very severe Degenerative Joint Disease [“arthritis”] involving right radioulnar-carpal joint [“wrist”] (very severe); and right and left intercarpal carpometacarpal, metacarpophalangeal [both front feet] and stifle [knees – rear legs] joints (severe).”

Former LA Zoo vet Gary Kuehn stated that the arthritis in Gita’s front legs and feet would have been extremely painful, especially as she suffered bone-on-bone contact in the right leg. Nonetheless, Los Angeles Zoo states: “Foreknowledge of these findings would not have changed the course of Gita’s care and treatment.” Indeed, this is a sad admission on the part of the Zoo, says Dr. Kuehn.

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G. Behavioral Problems

David Shepherdson of Oregon Zoo stated: “An elephant’s rich array of diverse individual and social behavior is as much a part of what makes it an elephant as is its trunk and its huge feet. Since behavior is a consequence of interactions between both genetic and environmental factors, failure to reproduce an environment that is at least functionally equivalent to that of the wild will inevitably result in the loss of many forms and patterns of natural behavior.”

Zoos have failed to reproduce an environment, either physically or socially, that replicates an elephant’s wild environment. Thus far, inadequate zoo environments have only suppressed and altered natural behavior patterns in elephants. Elephants, who peacefully co-exist with their families in the wild, engage in aggressive and destructive behaviors in zoos. Instead of hours spent foraging, exploring, bathing, mating, and mothering, elephants in zoos stand in one corner of their tiny enclosure, swaying and rocking incessantly. Naturally maternal females are known to stalk, injure and even kill their own calves in zoos.

Following is an overview of behavioral problems reported in elephants in zoos.

1. Aggressive Behavior

Of the 132 elephants recorded in the IDA survey, **aggressive behavior was noted for 37 elephants (28 percent)**. This did not include elephants who were on the receiving end of aggressive acts. Agonistic behaviors include: striking another elephant with the trunk, goring with the tusks, tail biting, ear biting, kicking, chasing, pushing, and cornering. This resulted in bruises, wounds, infections, partial tail amputations, abrasions, tusks injuries, and chronic tail wounds.

Close confinement and the inability of one elephant to hide or escape from another due to space and exhibit design creates this dangerous problem (Schmidt, 2001; and Mason, 2003). Other factors may include the grouping of unrelated animals and mixing of unfamiliar animals (and Mason, 2003). An entry in the Kansas City Zoo records notes that after Lea, a female African elephant, received gore wounds on her back end from another elephant, “Animals are restless being locked in at night due to cooler weather and are showing some aggression to each other.” (Exhibit A, Kansas City Zoo)

***CASE EXAMPLE: Patience** - a female Asian elephant at Dickerson Park Zoo. There are numerous mentions in the veterinary records of Patience frequently not getting along with females in her exhibit. She sustained several tail injuries as a result of her aggressing. Clinical records for Haji, a young male, indicate that Patience tried to kill him. She was taken away and “worked” by the staff. A reference is made in Connie’s veterinary file indicating that Patience has a habit of stalking and attacking the elephant calves. There are problems due to space*

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limitations with putting Patience into different bull yards and having enough space to allow all of the elephants outdoor access (referred to in Sabu's veterinary record). (Exhibit A, Dickerson Park Zoo)

Records for another elephant at Dickerson Park Zoo, an Asian female named Connie, show numerous instances of aggression toward other females, especially Vicky. Other behavioral issues displayed are throwing hay, feces and rocks into public area. On at least two occasions, Connie has been chained to prevent this behavior, and in one instance she was "chained for the last few days." (Exhibit A, Dickerson Park Zoo)

CASE EXAMPLE: *There are at least 51 entries between Jan. 2002 and Feb. 2005 about aggression by Moki, a female African elephant at Lee Richardson Zoo. Incidents include "ramming into the fence with her head," tusking a rhino, ramming bars at keepers and other elephant, ramming stall and trying to kick other elephant in the head, excessively throwing hay, manure and sticks at keeper and other elephant. (Exhibit A, Lee Richardson Zoo)*

The Abilene Zoo has reported serious problems with aggression between its two female elephants, Tanzy and Tanya, who cannot be allowed together. Moving one elephant outdoors must be carefully choreographed. The records note: **"We are dealing with psychological issues that we do not currently understand..."** (Exhibit A, Abilene Zoo) Tanya has suffered broken tusks from ramming a door and fighting with Tanzy through a fence. She also sustained a wound from a fight with Tanzy.

CASE EXAMPLE: *The behavior of the African elephants at the Riverbanks Zoo is a stunning example of how integrating unrelated females can create a dysfunctional dynamic. Belle, Belinda and Penny arrived at the same time at Riverbanks. Belle and Penny fare well, but Belinda (who was noted to have stereotypic behaviors and a tendency to isolate herself from other elephants) has a harder time. It takes her four months to go out into the exhibit with Belinda and Penny, but then she regresses after the arrival of Tumpe five months later. Belinda does not want to come out of barn and is found dead in Nov. 2002, just two months after Tumpe's arrival. Aggressive incidents between elephants increase after Belinda's death. Belle and Penny fight with each other, but mostly they beat up on Tumpe, who is described as being at the bottom of the pecking order. A year after Belinda's death, an elephant named Star is brought to Riverbanks. She is kept indoors for 2.5 months, and apparently is isolated from the other elephants for eight months before she is let out in the exhibit. Records are sketchy after this point, but there are two entries noting that Star tried to climb over a log at the back corner of the exhibit. Star was later transferred to another facility.*

Veterinary records also show the effects on those elephants who are on the receiving end of their cage-mate's aggressive behavior and generally sustain an injury. In Tulsa, female Asian elephant Sooky was housed with the zoo's male. She sustained injuries to her face and hindquarters and a bite wound to the tail (Exhibit A, Tulsa Zoo). At Six Flags-

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Vallejo, the female African elephant Misha was beaten up by other elephants (Exhibit A, Six Flags-Vallejo). Lisa, a female African elephant at Virginia Zoo, was pinned down in the transfer by other elephant. Lisa was “tusked down into stretch position” and an abrasion was noted on her back (Exhibit A, Virginia Zoo).

At Woodland Park Zoo, the Asian female, Hanako, is submissive to the aggressive female Suki. Hanako urinates around Suki, to the point that she suffers urine scalds. Hanako has received abrasions from being pushed into a cable; she is regularly pushed and hit by Suki. When Suki gives her a ‘hard time,’ Hanako performs stereotypic behaviors or what the records refer to as a “dancing pattern.” (Exhibit A, Pt. Defiance Zoo) At Milwaukee Zoo, an elephant also dribbled urine and acted as if “frightened or submissive” when the other elephant was present. (Exhibit A, Milwaukee Zoo) A female African elephant in Cleveland was diagnosed with Leukocytosis, “likely stress-related as this animal is subordinate and has periodic run-ins with 970601 (Jo).” (Exhibit A, Cleveland Zoo)

2. Stereotypic Behavior

Stereotypies are defined as repetitive, unvarying behaviors having no obvious goal or function. They often develop in captive animals, and are more common when conditions cause deprivation or frustration. It is believed that frustration of highly motivated behaviors, such as foraging, predisposes elephants to stereotypic behavior. Physical restriction in small enclosures or by being chained also can cause the behavior (and Mason, 2003). Stereotypic behavior can include head bobbing, swaying and rocking, nipple pulling, and pacing. This behavior is absent in wild African elephants (Exhibit G, Poole, 2005). While there are reports of some swaying in free-ranging elephants (Fowler, 2006), this is very different from the prolonged amount of time elephants spend in stereotypies in zoos (Doyle, pers. obs.) It is like someone tapping a toe for a few moments compared to someone who continuously toe taps for an hour.

The IDA survey did not find many recorded cases of stereotypic behavior, however, it is believed that zoos just do not generally include this information in veterinary records. For example, records for elephants with severe stereotypies at El Paso Zoo and Los Angeles Zoo do not reflect the behavior (Doyle, pers. obs.)

At North Carolina Zoo, stereotypic behavior in a female African elephant, Rafiki, is exacerbated when she is anxious or left alone for extended periods. With Rafiki’s introduction to the zoo’s other elephants and its three-acre exhibit, a large majority of the swaying has been eliminated. Still, if Rafiki and Little Diamond are separated for extended periods, Rafiki will hit the bars and start to sway again. (Exhibit A, North Carolina Zoo)

Stereotypic behaviors are related to foot problems because of the pressure put on the nails by repetitive movement (Roocroft and Oosterhuis, 2001). Bamboo, a female Asian elephant at Woodland Park Zoo, has a chronic problem with thin pads on the rear feet.

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Keepers suspected abrasive surfaces were the cause and referred to chaining the Bamboo in order to “limit pacing.”

3. Behavioral Changes Related to Pain and Discomfort

There is some evidence in the veterinary records suggesting a correlation between pain and changes in behavior, including aggression.

Connie, a female Asian elephant at Reid Park Zoo, became more aggressive as her foot infections worsened. This “usually good tempered” elephant suffered chronic foot abscesses for over 10 years. Other health problems included a recurrent hip abscess and infected temporal gland. Behavioral changes were noted beginning in 2003 and by 2005 she was reported to be “weaving a lot.” (Exhibit A, Reid Park Zoo) Weaving is generally considered a stereotypic behavior. Siri, an Asian elephant at Rosamond Gifford Zoo suffers from progressive arthritis. In 2005, she began throwing feces at night. The veterinary records note that Siri “used to be a very clean elephant.” (Exhibit A, Rosamond Gifford Zoo)

A keeper at Milwaukee Zoo is reported to have said that increasing aggression and intractability in “old” elephants maybe related to “cognitive disorders and senility.” However, there is a strong case to be made for the fact that painful and progressive diseases, such as one elephant experienced at Milwaukee Zoo (degenerative joint disease and repeated episodes of painful colic) may have played an important role in the behavior.

In 2002, Lee Richardson Zoo started working Moki and Chana with chains in the elephant restraint device and began vaginal and injection desensitization and daily blood draws. In April 2002 the first notes about aggression start, as noted above about Moki. Chana also became aggressive after undergoing a surgical artificial insemination procedure, after which both stitches tore. Chana became aggressive during treatment of the wound. She was noted to be “turning around and ramming bars.”

4. Aggression and Training

Suki, the dominant female Asian elephant at Pt. Defiance Zoo, was formerly owned by a private circus where she gained a reputation for being very aggressive. She was sent to several circus trainers who all deemed her unmanageable. Suki was sold to Dickerson Park Zoo for breeding, where she underwent surgical artificial insemination (AI), and her aggression continued. She attacked several trainers. Suki was isolated from the other elephants, then sold to Point Defiance Zoo in March 1996. Records state that “...her circus aggression...is very well known in circus elephant circles.” As her aggression escalated, so did the discipline sessions and her resentment toward trainers, men in particular.

5. Separation from Other Elephants

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Behaviors have been observed that can only be described as depression and grief at the loss of a companion. Lucy, a female African elephant at Milwaukee Zoo (died 2006), suffered severe distress after the death of her companion, Babe. Lucy was reported to be “continually rocking back and forth” and “repetitively swinging head and trunk and shifting weight back and forth.” Due to her chronic arthritis, the veterinarian noted a concern that “repetitive movements will worsen lameness in this older animal with chronic arthritis.” Lucy stopped eating and would only drink water when offered by hand. As time moved on, the swaying decreased but Lucy spent “time with trunk drooped and eyelids closed, shifting weight frequently from one foot to another.” Lucy slept frequently while standing. The zoo considered looking into grief management for Lucy. (Exhibit A, Milwaukee Zoo) Also see Jenny, below.

6. Self-Mutilating Behaviors

Jenny, a female African elephant at Dallas Zoo, suffered a variety of aberrant behaviors, including aggression toward other elephants, stereotypies, and self-mutilation. She suffers chronic abscesses stemming from her self-mutilating behavior (using her trunk to strike her rear leg). Jenny’s stereotypies are remarkable for their sheer number. The zoo created a list of 15 of Jenny’s aberrant behaviors, including toe tapping, banging her back feet on other structures, and repetitive leg rubbing. Jenny was treated for six months with hydrotherapy. Veterinary records note: “The treatment must have been extremely painful, because we frequently observed her knees buckling as treatment was administered.” Jenny was put on the sedative acepromazine from Jan. 1997 through Dec. 2001. Jenny became depressed when another elephant, Vasha, was transferred to another facility. “She rocked constantly and was not interested in enrichment. This lasted for about 2 months.”

7. Ingestion of Foreign Objects

Throughout the records there are incidents involving elephants ingesting foreign objects, including glass. Two elephants at Topeka Zoo are noted to have ingested electrical cable, hose parts, plastic bags, hydraulic cable, and pieces of hot wire. In 2001 both elephants were either poisoned or ingested a toxic substance, resulting in serious illness.

8. Other Behaviors

Of 132 elephants in the IDA survey, 26 (20 percent) showed other aberrant behaviors, such as throwing feces, ingesting gravel and excessive amounts of sand, isolation from other elephants, sudden fear of keepers, etc.

Targa, a female Asian elephant at Rosamond Gifford Zoo, displays an unusual behavior when “she doesn’t want to be where she is.” In 2005, Targa was observed her ramming walls, spinning in circles and lying down on right side several times. At another time,

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“while isolated in male stall during baths observed her head pressing on walls and floor, trunk flipping, spinning in circles. Mixed in were several long pauses (lasted about 20 minutes). Put back with group in center stall. Behaviors stopped except for one lie down right before leaving for the day yard.”

9. Conclusion: Behavioral Problems

When aberrant behaviors are present, including aggression, stereotypic behaviors, behavioral changes due to pain and serious discomfort, and psychological distress, it is a clear sign that social and environmental conditions are not adequate for elephants. The USDA must then strictly enforce the Animal Welfare Act regulations.

H. Reproductive Disorders

The captive elephant population in North America is not sustainable due to lack of reproductive success. (Faust, D., Technical Reports on Demographic Analyses and Modeling of the North American Asian and African Elephant Populations, 2005)

In this section we will discuss the numerous reproductive issues created in the zoo environment, as evidenced by the veterinary records that IDA reviewed.

1. Early infertility

In the wild, female elephants can remain reproductively active into their 50's. (Sukumar, 2003, Hildebrandt, 2006) Of the 20 big females in the Amboseli African elephant population who are over 55, only five have stopped reproduction. Echo, who is estimated to be near 60, gave birth to a new calf in January 2006. (Moss, C., www.elephanttrust.org)

A substantial number of elephants in captivity do not cycle normally. In North America about 28% of the African elephants and about 14% of the Asian elephants fail to cycle or have irregular estrous cycles. Although most of the acyclic Asian elephants are over 30 years old, in Africans the prevalence is found among all age groups of adults. (Fowler)

Demographic studies of the Asian and African elephant population that are part of the AZA's Species Survival plan, show that most captive elephants become infertile in their 30's. (Faust, 2005). In North America:

- 32 of 34 female African elephants, aged 30-40, are non-reproductive and
- 49 of 63 female Asian elephants, aged 30-40 are non-reproductive.

IDA's survey of zoos found several female elephants who became infertile (“flatlined,” or stopped reproductive cycling) at a young age. These include:

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- Ruby, African, Los Angeles Zoo, flatlined in her 30's
- Punch, Asian, Louisville Zoo, flatlined at 25.
- Peggy, African, Miami Zoo, flatlined at 28.
- Donna, Asian, St. Louis Zoo, flatlined at 31
- Belle, African, Riverbanks Zoo, flatlined at 23
- Belinda, African, Riverbanks Zoo, flatlined at 31

Those elephants who are still cycling at 35 and have never given birth are considered post-reproductive because of the high risk of dystocia and stillbirth. (Hildebrandt, 2006; Schmitt, 2006) But statistics show an increased tendency for first-time mothers **over the age of 15** to have a higher incidence of labor and birth complications. Zoos appear to be ceasing breeding efforts for elephants at ever-younger ages. This year the Reid Park Zoo dropped plans to breed its 26-year old African elephant, Shaba, citing lower success rate and higher complications in older, first-time mothers. (Arizona Daily Star, March 23, 2006). This year, North Carolina Zoo dropped plans to transfer 3 young African elephants (each around 24 years old) from Atlanta. The NC Zoo decided to seek out younger elephants, after learning that not all the Atlanta elephants were good candidates for breeding. The NC Zoo cited studies that indicate that elephants of that age (24) do not breed as easily as younger females in captivity. (Atlanta Journal Constitution, November 13, 2006).

Possible causes of early infertility include reproductive tract abnormalities (below), hormonal problems, social suppression (with subordinates experiencing lower reproductive rates as compared to dominant females), stress, and excessive body weight. (RSPCA, 2001)

2. Reproductive tract abnormalities.

Ovarian and uterine pathologies responsible for infertility in captive elephants have a “management-related aetiology.” (Hildebrandt, 2006). Endometrial hyperplasia, uterine fibroids and leiomyomas, and ovarian cysts are common in elephants who have never given birth and are thought to be related to uninterrupted reproductive cycling for elephants who have never been pregnant or nursed a calf. Elephants have the longest interbirth interval of any living mammal, 3-7 years between two fertile cycles. This, plus the elephant’s long gestation means that wild elephants who breed have many fewer reproductive cycles in their lifetime than do captive elephants. (Hildebrandt, 2006)

Ovarian cysts are rare in wild African elephants. (Schmitt, 2006).

IDA’s survey of zoo veterinary records found that 21 percent of females were diagnosed with reproductive tract abnormalities. (Exhibit A).

3. Birth Complications

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In the wild, the rate of stillbirths appears to be low. Just 5 stillbirths were recorded in over 1500 observed births in the elephant population in Amboseli National Park in Kenya. (Amboseli Elephant Research Group 30-year demographic database as reported by Joyce Poole, personal communication, Feb. 20, 2006)

In the zoo, however, the rate of stillbirth and other birth complications for elephants is high. ***Since 2001, at least 14 elephant pregnancies have ended in stillbirth or other complications, including death of calf during labor, euthanasia of premature calf and failure to thrive:***

- 2001 Rosamond Gifford Zoo
Targa gives birth to stillborn calf
- Sept. 2001 Kansas City Zoo
Lady gives birth to a stillborn
- March 2002 Six Flags Marine World
Tika's baby dies during labor. Tika is euthanized 3 months later
- March 2002 Ft. Worth Zoo
Babe gives birth to stillborn
- July 2002 – Toledo Zoo
Rafiki gives birth to a still born
- Jan. or Feb. 2003 – Riddle's Elephant and Wildlife "Sanctuary"
Mary (Asian, age 29) dies after giving birth; calf died during birth
- March 2003 Six Flags Marine World
Misha gives birth to a still born
- July 27, 2003 Toledo Zoo
Rafiki gives birth to stillborn
- Sept. 2003 Ft. Worth Zoo
Rasha gives birth prematurely – baby is euthanized
- December 2003 Houston Zoo
Methai gives birth – baby dies one day later
- April 2005 Disney Animal Kingdom
Ibala's baby dies during labor. Ibala dies from infection 1 month later
- November 2005 St. Louis Zoo

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Around

Sri's calf dies during labor. Sri is still carrying dead fetus

- February 2006 Seneca Park Zoo
Genny C's calf dies during labor. Fetus is surgically extracted from mother
- June 2006 Rosamond Gifford Zoo
Romani's induced labor fails to progress. Baby dies in utero, is surgically extracted from mother

IDA's survey of medical records for 35 zoos identified 11 stillbirths and only 6 successful births between 2000 and 2006.

There are several possible reasons for the high rate of birth complications in zoo elephants.

- Lack of exercise, obesity and lack of physical fitness is believed to be a "contributing factor in long labors, dystocias, stillbirths, and ultimate deaths of both calf and cow in many instances." (Dierenfeld, in Fowler, 2006)
- Inexperienced mothers who were prematurely separated from their own mothers and have never observed or assisted in births, or cared for (or even seen) young calves. This applies to the majority of female elephants in zoos today. (RSPCA, 2001; Garai & Kurt, 2006)
- Lack of social support including aunties or allomothers to assist in the birthing process and care of the calf (RSPCA, 2001, Garai & Kurt, 2006).
- Stress, including that produced by zoo industry birthing procedures, which force elephants to give birth in isolation while chained by 2-4 legs during labor and delivery, and force elephants to give birth in the presence of veterinarians, keepers and even sometimes strangers. Unnatural birthing conditions may cause elephants to delay labor and birth until the death of the fetus, or to reject or even kill the baby when it is born. (Garai & Kurt, 2006)

The records seem to uphold this thesis. At Rosamond Gifford Zoo, the now-deceased elephant Babe gave birth in April 1990. The records note that during pre-labor, elephant manager Chuck Doyle came in and Babe stopped pre-labor behaviors and assumed "normal" behaviors, swaying, eating and dusting herself. "After he left, she began to show pre-labor signs again, but they were not as significant as before." (4/17) During hard labor, Doyle entered the barn and Babe "immediately stood and watched Chuck; stopping the labor process momentarily. He retreated and she resumed the process." (4/18) (Exhibit A)

A NOTE ABOUT ZOO BIRTHING PROCEDURES:

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Although freedom of movement and walking is known to be essential to healthy labor and delivery in human mothers. Common sense dictates the same would be true for elephants. Zoos however, isolate and chain elephants during labor and birth as standard operating practice. This description from the Louisville Elephant Management Protocol explains the procedure:

When the first signs of labor appear, the elephant handlers will tether the elephant on 3 or 4 leg restraints (chain or rope). It is recommended that inexperienced or nervous elephants be tethered so the newborn can be pulled if the mother becomes excited. Inexperienced elephants have rejected or even killed newborns. The newborn calf will be immediately removed from the mother. The female is allowed to calm down as she watches her infant being attended to. This period of separation gives the female time to recover from the shock of birth, gives the staff time to clean and inspect the baby, the veterinarian time to perform the neonatal exam and the baby time to become steady on its feet. . . The rest of the herd will be in adjacent stalls to avoid interfering with the elephant care staff but still observe the birth and newborn calf. It is important for all females to witness the birth and after-care as this is an invaluable learning experience. They may also need to be tethered if they become agitated.

A similar protocol was included with the Rosamond Gifford Zoo elephant management manual as well. (Exhibit C) Females are to be chained on 2-4 legs. Calves are removed at birth and reintroduced in “controlled situation” once handlers are in full control of the mother and she’s responsive to commands. The calf is tethered by a rope and the mother is forced to accept its attempt at nursing. “All females managed in this manner have accepted and successfully raised their calves,” the manual states.

4. High infant mortality.

Infant Mortality (Age 0-1)

Infant mortality for elephants in the AZA’s SSP program is significantly higher than elephants in the wild.

- Infant Mortality (Age 0-1) in AZA Zoos (1950-2004):

Asian: 41 percent (87 births, 36 deaths)

African: 50 percent (36 births, 18 deaths)

("Technical Report on Demographic Analyses and Modeling of the North American Asian and African Elephant Populations, Lisa Faust (Lincoln Park Zoo), Feb. 1, 2005).

- Wild Infant Mortality

Asian: 10 percent

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(Sukumar, R. et al. 1998. Impact of poaching on an Asian elephant population in Periyar, southern India: a model of demography and tusk harvest. Anim. Cons. 1:281.)

African: 6 percent (non-drought year)
55 percent.(drought year)
(Moss, 1988, Elephant Memories)

Infant mortality in the North American captive elephant population is equivalent to the infant mortality under the worst environmental conditions in the wild population of African elephants in Amboseli National Park in Kenya.

The likely causes of infant mortality are the same as those discussed above in the birth complications/stillbirths section.

5. Artificial Insemination is a serious welfare issue.

IDA's survey of zoo veterinary records has identified artificial insemination (AI) as a serious welfare issue. AI, which has a 30 percent success rate (while natural breeding has a 50-60 percent success rate), can be done either surgically or non-surgically. (Schmitt, 2006)

The non-surgical method is more complicated, involves more expensive equipment and requires a compliant female who will allow the insertion of a large cannula into her urogenital tract.

Surgical AI is less complicated, expensive and is used for females who will not tolerate urogenital manipulation or who have urogenital polyps that hinder insemination. The surgical process involves making an incision just below the anus into urogenital canal. Semen is then deposited through speculum with an equine insemination pipette. The incision is closed with 3-4 sutures. The procedure is technically less difficult but requires more after care, as the incision takes 4-6 weeks to heal. (Schmitt, 2006)

Schmitt (2006) claims that non-surgical insemination is the predominant method used, but IDA's survey of veterinary records identified AI procedures conducted on 14 elephants, and half of them (7) were subjected to surgical procedures. IDA's survey of the records indicates that surgical AI raises serious welfare issues. The following examples of artificially-inseminated elephants illustrate this clearly.

- Patience, age 34, Dickerson Park Zoo:
Patience was originally brought in on loan from Brookfield Zoo in 1990 for breeding and was later donated to Dickerson Park permanently. Patience was bred intensively both naturally and through artificial insemination (10 attempts) for six years. One of the AI attempts, described as surgical, left a fistula that caused her to leak urine and have feces cake up around the hole. Notes record that she showed signs of pain from the AI incision/fistula. This wound continued to be a

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problem for several years, but she was bred with bulls anyway.

In June 03, she was put with Sabu, who was very aggressive toward her. Patience sustained several abrasions as a result, and her AI incision wound got bigger, from dime-sized to quarter-sized with “strings of tissue, blood and pus” being “exuded from the wound.”

Patience gave birth to a live calf named Kala in May 1998. Kala was transferred to Six Flags Marine World, Vallejo, Ca. in May of 00, but died 29 Nov 00 from a herpes virus. Patience has had no other calves. She appears to have aborted a calf in Feb. 04.

- Misha, age 25, Six Flags Marine World:

Misha had a “massive” swelling/abscess on her jaw that began in 2000 and persisted through 2005 (when the records ended). This very painful condition was flushed, suctioned, irrigated and infused repeatedly. At one point, the draining tract for the infection is 7 inches long and “painful.” When it closed up, it was opened with a hoof knife and metal feeding tube. Once the knife broke off and the tip was left in the wound. Keepers also excise large pieces of tissue from the wound.

During the period of time when Misha’s jaw was “massively swollen,” she was artificially inseminated through a surgical procedure. Since she was “uncooperative” she was heavily sedated for the first insemination on May 23, 2001. A second procedure was done the next day without sedation. The surgical episiotomy site became infected, with purulent discharge and necrotic tissue. On June 19, the site had begun to heal and she was noted to be “no longer urinating through the episiotomy site.” Her jaw abscess persisted.

By Dec. 2001, Misha was confirmed pregnant. During her entire pregnancy, her chin wound was infected, draining and painful. On March 21, 2003, Misha gave birth to a dead calf. Less than a year later, she was artificially inseminated surgically, and the surgical site again became infected. She did not become pregnant this time.

On June 23, 2003, Misha gored a trainer. Her tusk went through his entire body, but miraculously did not pierce any organs and the trainer survived. Misha was isolated and put in protected contact, apparently for almost 2 years. IN April 2005, she was moved to Hogle Park Zoo in Utah. Her chin abscess was still chronic and draining at the time of her transfer.

- Asali, age 16, Memphis Zoo:

The zoo started working with Asali in 2002 in preparation for AI. They tested different tube sizes to put in her vagina, but she would not stand still. Unable to pass it fully due to “rear limb dance.”

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In July 2003, Dennis Schmitt performed the AI procedure on her. It took one hour to find the correct opening in which to insert tube with semen. A surgical incision was made. The samples got contaminated. The main problem was too much back and forth movement by Asali in the chute. The next day, Schmitt reopened the surgical site, and they tried again but could not insert pipette all the way due to movement.

Following the procedure, the surgical site was swollen, with pus/purulent discharge from the site. It took over 1 ½ months to heal.

On 24 January 2004, Schmitt tried again and left the surgical site open for another attempt the next day. On January 25, they tried for two hours to position Asali correctly in the restraint with a chest strap to prevent her from moving forward. When they were unsuccessful, Asali was given two doses of sedation, but it still took another hour to get the chest strap positioned. Then Schmitt tried for 40 minutes to pass the speculum before giving up.

The records state that Asali “struggled very hard in chute” during this prolonged attempt at AI. They also note “ No significant external abrasions this time” indicating that last time she had suffered from abrasions due to struggling in the restraint. A week later, Asali had “copious amounts of purulent drainage from surgical site.”

AI was attempted two more times on September 18 and 20, 2005. Asali was reported as calm this time, but it does not appear that the procedure was a success. A keeper at Memphis Zoo resigned in protest of the zoo’s decision to keep inseminating Asali, given the trauma the repeated procedures had caused. (Dwyer, A., personal communication)

The zoo still considers Asali a good potential for breeding.

6. Conclusion

The high rate of reproductive disorders has prevented elephants from breeding successfully in captivity and has caused much pain and suffering to elephants who have endured the loss of calves, the death of calves in utero, and painful disorders of the reproductive tract. Female elephants are forced to endure all manner of insult as their bodies are prodded, poked and examined to determine their reproductive abilities. Artificial insemination procedures are particularly invasive and are a significant welfare concern. Birthing protocols at zoos are highly unnatural and barbaric and are no doubt a contributor to the high rate of birth complications and stillbirths experienced in the zoo.

The USDA should carefully scrutinize all aspects of zoo breeding practices and procedures. The inhumane and injurious effects of many of these procedures on elephants are well documented.

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Zoos should be required to provide the space and natural conditions necessary for elephants to fulfill their physical, social and psychological needs and maintain reproductive health. Such conditions will facilitate natural breeding. Artificial insemination, which is extremely costly and has a low success rate, should be prohibited.

I. Other Health Issues

The IDA survey of zoo veterinary records found an array of health challenges for elephants in zoos. Primary problems included digestive disorders, skin lesions (mainly pressure sores and abscesses, and tusk injuries.

1. Digestive Disorders

Out of 132 elephants in the IDA survey, 30 (24 percent) suffered from digestive disorders, the most common being colic. Colic is a painful event for elephants, and it often strikes an individual repeatedly. Tinkerbelle, a female Asian elephant at San Francisco Zoo (died 2005), was reported to have endured 20 incidents of colic between 1993 and 2003. Colic is medically treated with the NSAID, banamine.

Obstruction colic results from the ingestion of clay and high-fiber food, causing the formation of hard fecal balls that are difficult to pass (du Toit, 2006). Camp elephants in Nepal show similar symptoms as captive elephants, including resting or leaning against walls and lifting the hind leg. Elephants will bite the tips of their trunks and vocalize when the pain is excruciating (Shrestha and Gairhe)

Babe, a female African elephant at Milwaukee Zoo, suffered a six-year history of colic. She had suffered “intermittent bouts of colic” for several months preceding her death, which was caused by “mechanical ileus/impaction with secondary obstruction, loss of fluid into the large intestine and the abdomen with subsequent cardiovascular collapse.” A second female elephant at Milwaukee also suffered painful bouts of colic. (Exhibit A, Milwaukee Zoo)

Many elephants are reported to ingest sand, gravel, rocks and dirt. While eating dirt is not uncommon in wild elephants (du Toit, 2006), it appears to create problems in captive elephants. Two female African elephants at Virginia Zoo have suffered from chronic bouts of abdominal discomfort and colic due to sand impaction. Feces were repeatedly heavy with sand. Rocks were also defecated. Both elephants show signs of abdominal discomfort by propping tusks and hind legs, crossing hind legs, and laying down. The zoo veterinarian speculated that sand ingestion is related to a deficiency their diet.

In addition to colic, some incidents of problems with loose stools were identified in the veterinary records. Sabu, a male Asian elephant at Dickerson Park Zoo, has experienced chronic problems with loose stools, which the veterinarian described as “stress induced.” (Exhibit A, Dickerson Park Zoo) Mali, a female Asian elephant at Rosamond Gifford

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Zoo had loose stools that were also attributed to being “stressed from the other elephants as a result of the new neonate.” (Exhibit A, Rosamond Gifford Zoo)

2. Body Lesions

The IDA survey recorded all incidents of lesions found on the body, other than feet. This category includes lacerations, temporal gland abscesses and infections, pressure sores, abscesses, hook wounds, etc. Of 132 elephants, **79 (60 percent) suffered some form of skin lesion, with the majority being pressure sores.**

a. Dermatitis

In the wild, elephants regularly dust, bathe, wallow in mud and rub against trees. This is important for keeping the skin supple, permeable to water, and aids in thermal regulation. (and Mason, 2003) Inflammation of the skin, known as dermatitis, can be caused by extremes in temperature, mechanical irritation, infection or parasites (Mikota, 2006).

Ty, a female African elephant at Memphis Zoo, has suffered recurrent dermatitis on her back, apparently related to the inability to keep her skin moist. Improvement was attributed to keeping her skin moist and “getting her outside earlier this year where she spends a lot of time in the water.” (Exhibit A, Memphis Zoo)

Chana, a female African elephant at Lee Richardson Zoo, is reported to have a chronic problem with lesions and abscesses on her back and sides. At times these lesions appear painful, and there are observations of her “whole body twitching, putting mud and twigs on her back” A record from 2004 indicates that this problem is related to unnatural conditions at the zoo: “Discussion with four different vets around country indicate that the skin problem is seen when animals do not have access to good scratching to remove dead skin. It is more common in cold wet conditions as described by San Diego Zoo.” (Exhibit A, Lee Richardson Zoo)

b. Pressure Sores

The IDA survey found that pressure sores were common among elephants. Pressure sores result from extended contact with hard surfaces, occurring on the elbows, hips, face and other pressure-sensitive areas. These lesions can appear swollen or irritated and can be painful. When elephants lie down for too long because of foot and joint problems, pain, or other problems, pressure sores develop. Exposure to cold, rough and dirty surfaces also contributes pressure sores (Mikota, 2006).

Csar, a male elephant at North Carolina Zoo suffers chronic abscessation of a pressure in the left temporal area (Exhibit A, North Carolina Zoo). At Point Defiance Zoo, Hanako, a female Asian elephant, has a callous on her right hip that becomes dry and cracks. She is known to lie down on her right side. (Exhibit A, Pt. Defiance Zoo). Connie, a female Asian elephant at Reid Park Zoo, suffers chronic foot disease, a recurrent hip abscess,

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and infected temporal gland. There is a record of Connie being found in the morning with a bloody right cheek and right hip. (Exhibit A, Reid Park Zoo)

Lulu, an African elephant formerly at San Francisco Zoo, suffered from a persistent impaction/abscess on the right side of her face near the temporal gland. It was determined that the tissue swelling was probably due to pressure on her temporal ridge due to her lying down on that side at night. Keepers noted that the problem flared up when Lulu spent more time in the barn lying on her right side. (Exhibit A, San Francisco Zoo)

Pressure sores can also develop from an elephant excessively leaning against an aspect of her enclosure, due to problems with foot and joint disease. Gita, a female Asian elephant at Los Angeles Zoo (died 2006), was reported to be leaning up against the bars of her enclosure. Gita suffered from chronic foot abscesses and which resulted in a skin ulceration on the right rump. An abscess later developed above the tail head. At one point, the abscess was so large that a veterinarian was able to insert an arm up into the upper part of the abscess. Just before her death, it was noted that Gita was likely “resting her rear and getting weight shift done against the facility bars/railings.” (Exhibit A, Los Angeles Zoo)

Indy, a male Asian elephant at Rosamond Gifford Zoo, experienced “seasonally recurring chronic proliferative/ulcerative dermatitis on right lateral facial area.” The wound had been treated for three months. Indy is reported to sleep on both sides, but “predominately on his left side. It is possible that he sleeps more on his left side to prevent pressure on the lesion.”

c. Temporal Gland Abscesses/Infections

The IDA survey found temporal gland abscesses were common and sometimes reported as painful. Many cases were recurrent. Sunda, a female Asian elephant at Topeka Zoo, suffered a chronic temporal gland abscess throughout the zoo’s records from 2000 through 2005 (Exhibit A, Topeka Zoo).

3. Tusk Injuries

Few tusk conditions have been noticed in free-ranging elephants (du Toit, 2006). However, in captive elephants, tusk injuries are common. The IDA survey found out of 132 elephant, 47 (36 percent) suffered tusk injuries, sometimes repeatedly. Injuries were caused by fighting, and hitting and rubbing the tusks against the bars of the enclosure.

Moki, a female African elephant at Lee Richardson Zoo, suffered repeated tusk wounds, cracks, breaks and/or infection from 2000 to 2003. These incidents were attributed to boredom. Records note: “Keepers will allow Moki access to hallway at night so maybe the extra stimulation will prevent boredom and her banging on tusk.” (Exhibit A, Lee Richardson Zoo) At North Carolina Zoo, a male African elephant, Csar, hit the bars in his stall so hard he broke each tusk off in a span of two weeks (Exhibit A, North Carolina

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Zoo). At Milwaukee Zoo, Brittany, a female African elephant, wore her tusks by rubbing them against the bars of the enclosure (Exhibit A, Milwaukee Zoo).

4. Chaining-related Problems

While the practice of chaining elephants at night is waning, it has been practiced at some zoos during the time period the IDA survey covers. The practice of chaining can lead to abrasions, lacerations, abscesses and arthritis (Subramanian, 2006, Mikota, 2006).

Mali, a female Asian elephant at Rosamond Gifford Zoo suffered lameness in August 2005 that was attributed to being tethered throughout the night. Keepers felt that “she was tugging on the chain and that this caused trauma to her leg.” She was administered Ketoprofen. The lameness was not resolved until September. (Exhibit A, Rosamond Gifford Zoo) At Six Flags-Vallejo, a female African elephant named Malaika was kept in the barn for several days and suffered “mild skin irritation on both hind legs from leg straps.” (Exhibit A, Six Flags-Vallejo)

5. Injuries

A variety of painful accidents and injuries afflict elephants in zoos. Some injuries are facility-related (trunk caught in hydraulic door, Lee Richardson Zoo; chain driven through elephant’s mouth, Rosamond Gifford Zoo). Some wounds are self-inflicted (banging head against bars at night, Cameron Park Zoo). However, the most significant number of injuries are caused by other elephants. The IDA survey found that out of 132 elephants, 32 (25 percent) experienced injuries sustained from other elephants and during fights.

At Kansas City Zoo, elephants have sustained gore wounds and other injuries that were Lois has twice suffered from wounds/abrasions to her hindquarters. At least one of these was attributed to a fight with Penny. She also developed an abscess on her left thigh along two scars caused by previous aggressive interaction with other elephants. (Exhibit A, Kansas City Zoo) Another elephant, Megan, suffered abrasions to the left side of her head after “intraspecific” aggression. In 2003, Megan fell after being “worked up from other elephants.”

6. Ankus Wounds

Ankus wounds have been noted on a number of elephants. At the Honolulu Zoo, a female Asian elephant, Mari, suffered a “chronic ankus wound abscess” in 2003 that persisted for three and a half months after first noted in the records. (Exhibit A, Honolulu Zoo)

At Oregon Zoo, four elephants suffered hook wounds, including Pet, Chendra, Rose-Tu and Shine. On April 17, 2000, four-and-a-half-year old Rose was abused by a keeper with an ankus. An exam on April 19 found multiple puncture wounds on her head, behind her ears, on both shoulders and on both rear limbs. There were also two puncture wounds in the soft skin between the anus and the base of the tail. Rose also had a 15-inch long

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laceration over the top left gluteal area. She became agitated during the exam, especially when her tail area was examined, and further lesions could not be identified. Rose Tu's abuse at her keepers' hands was so severe as to warrant the USDA to file charges against the Oregon Zoo for Animal Welfare Act violations a step rarely taken against a zoological institution. Three months later, vets noted "superficial scars around the perineal area from ankus abuse." Pet sustained ankus injuries as recently as Nov. 2005 (see case study on Pet). (Exhibit A, Oregon Zoo)

7. Obesity

Many of the elephants in North America are considered to be obese. A condition caused by lack of exercise and readily available feed (Fowler, 2006). Obese elephants are more prone to infertility (Fowler, 2006), stillbirths (and Mason, 2003), and foot and joint problems (and Mason, 2003; Roocroft and Oosterhuis, 2001).

9. Elephant Endoheliotropic Herpes Virus

The IDA survey shows that three elephants died from the herpes virus, a fatal disease that has only recently been diagnosed in elephants. Asian elephants can contract the disease from African elephants (and Mason, 2003). Another three elephants in the survey have been preventatively treated for the disease.

The female Asian calf, Preya, died in 2003 at Rosamond Gifford Zoo from the herpes virus. Veterinary records portray a sad and moving end for this young calf. Prior to her death, Preya was described as "leaning on side of wall and side of Mom. Will go to nurse but only for comfort." (Exhibit A, Rosamond Gifford Zoo)

Little is known about how the virus travels from animal to animal (Fowler, 2006). Questions need to be raised about the transfer of elephants between zoos, especially those who have lived in mixed populations of Asian and African elephants. Breeding programs that have produced multiple offspring who have succumbed to the virus (some of whom were sent to other zoos) should be forced to stop breeding elephants until more is known about the disease and its transmission. And certainly, no elephants should be transferred from those facilities to other zoos.

10. Tuberculosis

No active cases of tuberculosis were found in the IDA survey.

11. Conclusion Regarding "Other" Health Problems

Considering prevalence of elephant health problems, such as pressure sores due to elephants lying on hard surfaces (and often linked to arthritis and foot problems), tusk injuries, digestive disorders, and injuries sustained during fights with other elephants (aberrant social behavior), it is apparent that the welfare of elephants in zoos is severely compromised. Inadequate zoo conditions foster these problems, which the USDA must recognize and utilize when enforcing existing Animal Welfare Act regulations.

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Section V: Training Issues

“It’s not the physical hurt you can give them; it’s the mental punishment that finally controls them.”

- David Blasko, elephant manager at Six Flags Marine World
(The fate of the Elephant, Chadwick, 1992)

Of all the issues affecting captive elephants today, the issue of management is perhaps the most contentious. The debate over protected contact (“hands off” using positive reinforcement) and free contact (“hands on” establishing control through force and domination) rages on in the zoo community, with a lack of consensus on management issues within AZA. (Mulvena, J., memo to Olsen, D., May 2003).

No other species in the zoo requires such extensive management planning and methods. (Milwaukee Zoo Elephant Management Manual). This is both because of the large size of the elephants, the dangers associated with working with them [OSHA regards elephant handling as being a higher risk occupation than either police work or fire fighting], and because of the extensive daily foot and husbandry care elephants require to counteract the effects of intense confinement on these enormous, naturally free-ranging animals.

It is not IDA’s intention to discuss management and training methods in detail in this document, as the pros and cons of protected contact vs. free contact have been examined in depth by many experts, including:

- Clubb & Mason, RSPCA Report on the Welfare of Zoo Elephants in Europe, 2003
- Kurt, Fred, “History of Management in Captive Elephants, 2006, in press
- Kane, L, Forthman, D, and Hancocks, D., “Best Practices by the Coalition for Captive Elephant Well-being,” 2005
- Adams, S., “Elephant Welfare: Recommendations by British Wild Animal NGO’s for Elephant Management in the 21st Century, 2000, submitted as part of comments to USDA by Simon Adams, Dec. 2006)
- Kinsley, Colleen, Right Here Right Now: Oakland Zoo Improves the Lives of their Elephants, AZA Communiqué, Feb. 06

A. Misperceptions

The perpetuation of free-contact management appears to be based on two misconceptions:

1. That this is an acceptable system that has been used for thousands of years for maintaining elephants in captivity in Asia.
2. That the free contact system mimics the natural social structure of elephants which includes dominant animals who control the behavior of subordinate

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animals through physical discipline and force. (Louisville Elephant Management Manual, Brec’s Baton Rouge Elephant Management Manual.)

Neither of these beliefs is valid. Capturing, taming, training and guiding elephants have involved cruel practices that have been criticized since antiquity. (Kurt, 2006). And because human/elephant interaction has historically been based on exploitation, tradition does not provide us with insights into the proper management and care of elephants. (Poole, 2005, Chicago Testimony)

The notion that free contact systems of dominance and force recreate natural social interactions of elephant herds is also false. “Elephants in the wild are raised in a nurturing environment where they are protected, comforted, and reassured; contrary to claims by some, elephant calves are not physically “disciplined.” (Poole, 2005 (Chicago)

B. Trend Away from Protected Contact

There is a trend in the United States away from free contact to protected contact in zoos. In 2001, and Mason reported that, whereas all zoos previously used free contact, by 1999, only 44 percent of U.S. zoos used the “hands on” approach, while 32.5 percent used protected contact and the remainder (23.3 percent) use both.

IDA’s 2006 survey of 35 zoos (33 of whom still have, or plan to have elephants), indicates that 42 percent utilize protected contact and 33 percent utilize free contact, indicating that the trend toward protected contact continues.

FREE CONTACT	PROTECTED CONTACT	Mix/unknown
Brec’s	Abilene	Greenville (mix)
Honolulu	Cameron Park	
Lee Richardson	Dallas	
Louisville	Fresno	
National	Kansas City	
Portland	Memphis	
Roger Williams	North Carolina	
Rosamond Gifford	Oklahoma City	
Seneca Park	Pt. Defiance	
Six Flags	Riverbanks	
Virginia	St. Louis	
	Topeka	
	Tulsa	
	Woodland Park	

Despite the demonstrated advantages of protected contact in terms of elephant welfare and human safety, AZA standards still allow the use of free contact, and instruments such as ankuses and electric hotshots to control elephants through force.

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While many zoos strictly forbid the use of physical punishment and others actively campaign against the use of instruments of force, some zoos remain intransigent.



National Zoo keeper Marie Galloway cuing the crippled elephant Toni with an ankus
Photo by Peter Granli, Elephant Voices, Jan. 2006

C. Negative Welfare Implications of Free Contact

The negative welfare implications of these methods are clear in the elephant management protocols of zoos that still employ free contact management, as these excerpts demonstrate.

- Rosamond Gifford Zoo

“Elephants may occasionally need discipline. Discipline should be viewed as an important training technique which may be administered when unacceptable behavior must be modified.”

Ankus use is effective and has been used for centuries. “Hook quickly, then release”
“The elephant’s thick skin is protective, but very sensitive to the hook.”

Zoo advises use of physical discipline for aggressive acts, including refusal to obey commands

- Honolulu Zoo

“The elephant guide is the primary tool used for directing elephants’ behavior.”

“Elephants may occasionally need discipline. Discipline should be viewed as an important training technique, which may be administered when unacceptable behavior must be modified. Just as inappropriate elephant behaviors, (e.g.) aggressive behavior, will not be tolerated, unwarranted discipline by keepers will not be tolerated.

“ Discipline in free contact is to strike the elephant and in protected contact is to give the elephant a time out.”

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“Always give the elephants a chance to obey. Give a command the first time in a clear crisp voice without the use of the elephant guide. Remember, elephants have keen hearing; don’t yell. Never ask what you can’t get or don’t expect to get. If the elephant refuses a command, give the command a second time utilizing the elephant guide on the appropriate pressure point. The elephant guide is an effective tool, which has been used for centuries; use it to guide your elephant through behavior routines. When you use your elephant guide, hook quickly, then release. The elephants’ thick skin is protective, but very sensitive to the hook.”

“An aggressive act by an elephant may range from high-headedness, refusal to obey commands, displacing handler, trunk swing or full attack. Any of these behaviors must be dealt with immediately. Striking the elephant with the elephant guide is not recommended, but in an emergency situation it may come into play as a form of self defense. IF that predicament arises, the most suitable place to strike an elephant is the head, forcefully, applying the blow on the front cranium between and just above the eyes. The animal will not be injured as a result of this blow. The handler’s hope is that this, his ultimate sanction at that moment, will bluff the elephant out of carrying on the one-sided confrontation. Never strike or hook an elephant in or near eyes, mouth, ear canal, rectum or vagina. You must remain in full control of your own emotions and your behavior. Discipline is a technique to modify behavior, there is no other purpose. Discipline must never become abuse.

- **Louisville Zoo**

Physical discipline is administered by striking the elephant with the handle end of the ankus. In order for an aversive stimulus to be effective, it must be strong enough to stop or decrease the preceding behavior. The ultimate goal is to make the elephant tractable, refocusing it on the keeper’s commands. A hotshot is available in the barn in the event of a serious elephant attack.

The zoo believes that “physical discipline is part of the natural interactions in elephant herds. Subordinate animals are prodded by tusks, struck with trunks, kicked, and batted by other elephants. In free-contact, keepers are dominant members of herd. Behavioral control is primarily psychological but reinforced through physical discipline as it would in the wild.”

To maintain dominance over the animals, it is necessary that they respond to commands in the manner to which they have been conditioned. If they fail to do so, then they must be disciplined and forced to do so, much as the dominant herd member would do in the wild.

Discipline can take many forms, depending on the seriousness of the action. In some instances of a minor nature or with a timid animal, verbal reprimand may be enough to correct the situation. In other instances, **the use of force may be needed. This may include negative reinforcement, the use of cueing the elephant with the**

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ankus at the appropriate pressure point, or the use of ropes, chains and mechanical devices to physically force the animal into a position or movement. . .

- **Brec's Baton Rouge**

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D. Zoos Hide Physical Discipline from Public

The ankus wounds described in Section IV illustrate clearly the abusive implications of the free contact management system. **Zoos recognize these abusive implications, and caution keepers to be discreet with ankus use when in the public eye.**

- “As always, if you must use your guide, use it discreetly to achieve your goal.”
Rosamond Gifford Zoo
- “While working with your elephant(s), don’t look bored with the job or mad at the elephants or other people. **As always, if you must use your elephant guide, use it discreetly to achieve your goal.** Remain positive, informative and upbeat at all times in front of the zoo.” - Honolulu Zoo

The Brec’s manual suggests to keepers that they explain why physically disciplining an elephant in the Baton Rouge Zoo is important to conserving the species:

- “When discipline or reinforcement is required in the presence of zoo visitors, be sure to acknowledge and answer their questions in a straightforward manner. . . . Be sure to explain the nature of our program and remember we are trying to assist the **conservation of an animal** whose existence in the wild is in question and education has a vital role in that mission.”

E. Conclusion

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IDA endorses the Best Practices of the Coalition for Captive Elephant Well-being recommendation (Section T 1- T13) that captive elephants be managed through protected contact as a more humane and safer management method for elephants in zoos.

Section VI: Zoo Industry Standards and Response to Problems Inadequate

A. AZA Standards for Elephant Management and Care are Inadequate

As the attached analysis by Les Schobert, former general curator of the North Carolina and Los Angeles Zoos details, AZA standards for elephant management and care are woefully inadequate.

Among the most obviously deficient standards are those that allow for:

- The keeping of an elephant in a 20' x 20' indoor stall overnight and during inclement weather;
- The keeping of a single elephant in 1800 square feet or .04 acre. Two elephants may be kept in a space of 2700 square feet, or .06 acre. This means that an elephant which can weigh 10,000 pounds or more and can easily walk 10 or more miles a day can be kept in an outdoor lot that is about the size of a three car garage.
- The striking of an elephant with a bull hook, or ankus, a sharply pointed weapon used to “hook” elephants in sensitive parts of their body. Ankus use at zoos has become abusive, and several elephants in IDA’s survey were diagnosed with wounds from aggressive ankus use.
- The chaining of elephants for up to 12 hours a day.
- The use of elephants in elephant rides.

The AZA standards were not based on science, rather they were based on what zoos holding elephants could reasonably comply with at the time the standards were passed. (Schobert, 2006)

There is a lack of consensus in AZA on breeding and management issues. (Mulvena, J., Letter to Debbie Olsen, 2005) This lack of consensus is reflected in the AZA’s failure to prohibit controversial activities like elephant rides and mandate protected contact.

B. Majority of AZA Zoos Do Not Comply with Minimal Standards

Even with the extremely minimal nature of AZA standards, **52 percent -- of AZA-accredited zoos holding elephants – approximately 41 facilities -- do not comply.** (AZA Directors’ Elephant Workshop, January 2005, EXHIBIT G).

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The non-compliance continues despite the fact that zoos have had more than five years from the time the new AZA standards were adopted (March 2001) to come into compliance.

The non-compliance problem may be even more extensive than the survey responses indicate. Only one zoo in the entire country may comply fully with AZA standards, according to Chuck Doyle, General Curator of the Rosamond Gifford Zoo. (Doyle, et.al., Letter to Denny Lewis, director of AZA accreditation programs, 2004).

C. Planned Expansions Will Not Significantly Improve Conditions

According to the AZA, 40 zoos plan elephant exhibit expansions (AZA news release, January 2005). Given the number of zoos that currently do not comply with AZA standards (at least 41), it is reasonable to conclude that **most of these planned renovations will simply bring facilities into compliance with AZA's 2001 standards.**

Of the proposed expansions, only a handful envision going beyond the traditional concept of a few acres or less zoo exhibit. (Exhibit B) The following zoos have proposed larger exhibits:

- Maryland Zoo, 6 acres, \$16 million;
- Birmingham, 10-20 acres, \$15 million
- Denver, 10 acres (to house 15 Asian species, unknown how large the elephant exhibit will be);
- North Carolina, 7 acres;
- Sedgwick, 3.5 acres outdoor with 16-acre field for night, \$6-10 million

However, only North Carolina Zoo has begun work on its expansion project. Many of the others have not secured funds to underwrite the proposed projects. Early next year, Maryland Zoo will add 3 elephants from Philadelphia Zoo to its two elephants in a half-acre yard. The zoo has proposed an expansion project, but it has not begun fundraising efforts. Recently the zoo announced losses of \$3 million for the last fiscal year. (Baltimore Sun, Dec. 7, 2006).

Other zoos plan costly expansions that will only moderately improve conditions for elephants. Los Angeles intends to spend \$39 million on to construct a 3.5-acre exhibit and the price tag for the National Zoo's 4 acre (3.5 outdoor, .5 acre indoor) exhibit is \$60 million. Both zoos plan to add as many as 10 elephants in their expanded exhibits, meaning the improvement in space per elephant will be minimal.

Alan Roocroft summarized the futility and waste of money that these expensive expansion projects represent:

“In essence a total re-thinking of how elephants are being kept in zoos will need to be launched. The present industry standards do not meet even basic animal needs; we allow by the existence of these standards extremely poor conditions for elephants in our zoos to continue and, when new enclosures are being created, we spend much money on out-of-

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date captive elephant environments using the same worn-out ideas.” (Animal Keepers Forum, October 2005).

D. Zoo Industry Fails to Deal Substantively with Elephant Medical Problems

The high prevalence of foot and joint disease, psychological disorders, and other zoo-induced health problems in captive elephants is well documented. (See Section IV of these comments and EXHIBITS A and B)

The First North American Conference on Elephant Foot Care and Pathology was held in Beaverton Oregon in March 1998. It brought together experts in elephant husbandry and veterinary science. The conference and the publication that resulted from it (The Elephant’s Foot, Prevention and Care of Foot Conditions in Captive Asian and African Elephants) documented the high prevalence of foot disorders in captive elephants and the extensive foot care regimens that zoos must go through to treat the symptoms of foot disease. Methods include frequent and aggressive trimming of nails and pads; carving out of infected tracts, flushing and soaking of abscesses and debridement of necrotic tissue. ((Roocroft and Osterhuis, 2001; Sampson, 2001).

In the more than eight years that have followed this conference, however, zoos have made little progress in dealing with the root cause of foot disease in captive elephants, and the incidence this painful and frequently fatal disorder remains high.

In 1998, Fowler reported that more than 50 percent of the 230-odd captive elephants in North America suffer serious foot-related disease. IDA’s survey of 132 elephants at 35 zoos indicates that the prevalence (62 percent) is even higher today. Other zoo-induced health problems such as joint disease and psychological disorders remain prevalent as well. (Section IV of these comments, APPENDIX A AND B)

Zoos and their trade association, the AZA, have not only failed to address the captive elephant health crisis, they have frequently denied that a serious problem exists in the first place, a contention that is directly contradicted by the evidence contained in the medical records (Exhibits A and B).

1. Public Relations Instead of Substance

Rather than commit itself to a serious program to remedy the space, substrate and sociability problems eroding quality of life for captive elephants, the AZA has dedicated much effort to crafting public relations strategies to combat animal protection organizations. Elephant Meeting, (August 16, 2004, San Diego, CA; AZA Message Points, email from Syd Butler to Mike Crocker, January 24, 2005; AZA Zoo Elephant Management Challenges/Opportunities, PowerPoint Presentation, undated; AZA Planning and Trends -20/20 Project (members only) Dealing with animal rights/welfare.)

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These public relations strategies attempt to shift focus away from the poor condition of elephants in zoos.

2. Denial of the Problem

Zoos do not regard the resolution of foot and joint problems in captive elephants as a priority. In the introduction to Zoo Biology's special issue on elephants, Janine Brown, a reproductive physiologist at the National Zoo, wrote of health problems facing captive elephants, referencing herpes and Tuberculosis, but failing entirely to mention foot and joint disease, which afflict more than 50 percent of the captive population (West, 2001).

At a 2004 AZA Elephant Management planning workshop identifying goals, **not a single participant** chose "Resolve medical issues to optimize well being, decrease mortality, increase reproduction and facilitate population management." Instead the top goals were clarifying institutional commitment to elephants, speaking with a unified voice, and managing the population through reproduction and importation topped the list of goals for AZA elephant managers (AZA Elephant Management Strategic Planning Workshop, Dec. 5-7, Final Report, EXHIBIT D).

Zoos claim that elephants are in good health when their own medical records prove otherwise. Some examples:

- Oregon Zoo: Recently told a Portland TV station that its six elephants are healthy ("Feds Probe elephant foot care, KTU-TV, Nov. 21, 2006). However, Oregon Zoo's medical records document that each of the institution's elephants has foot disease (cracked nails, abscesses, lesions, ulcers, fissures, fractured toes). The problems require frequent to almost daily intervention from keepers. Even the youngest elephants suffer from foot problems. Chendra, an orphan from Malaysia, developed foot problems within 2 months of coming to the Oregon Zoo. **Foot disease has claimed the life of three Oregon Zoo elephants in the past three years, most recently Pet, who also suffered from severe joint disease.** (see section IV/Case histories)
- St. Louis Zoo: Zoo president Jeffrey Bonner stated that, "All of the elephants [at St. Louis Zoo] have healthy lives, in my opinion." (St. Louis Post Dispatch, May 2, 2006). In reality, all but one of the zoo's seven adult elephants has shown signs of foot disease. An eighth elephant, Carolyn, age 32, died in 2000. She had nail disease and arthritis in 3 of 4 limbs. Arthritis and foot disease have debilitated Clara, whose story is told in Section IV/case histories.

St. Louis Zoo has gone beyond misrepresenting the truth, it has also threatened to sue IDA for disseminating information about the elephants' health conditions. When IDA responded in detail to a threatening letter from a high-powered St Louis law firm, documenting the truth of IDA's statements and the misrepresentations of the zoo, the matter was dropped. (Cox, Christopher, Correspondence with Lewis, Rice & Fingeresh, May 8, 2006, Exhibit E).

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- Los Angeles Zoo: Continued to tell the public that its 39-year old Asian elephant named Gita was fine, despite advanced foot disease, including chronic infections that had invaded the bone. The following are quotes from zoo officials, followed by excerpts from Gita’s medical records show the extent of the LA Zoo’s misrepresentations:

“Richard Lichtenstein – Asked Mr. Lewis if our elephants are happy and healthy. Mr. Lewis responded we think they are.”

Minutes, Meeting of the Board of Zoo Commissioners of the City of Los Angeles, August 16, 2005

[Clinical records had already indicated erosion of bone in Gita’s left front foot. Osteomyelitis was noted.]

"Due to their care and attention, our [elephants] thrive physically and psychologically."

John Lewis, **Minutes, Meeting of the Board of Zoo Commissioners of the City of Los Angeles**, September 20, 2005

[Gita underwent surgery on September 23, 2005 – just three days after the above statements – to remove two-thirds of the bone in one toe due to severe infection (osteomyelitis) that already had caused bone to rot away in the foot.]

LA Zoo officials report that “Gita is OK” (NBC 4 TV, Oct. 5, 2005) and “fabulously” (LA Times, Oct. 6, 2005)

[Veterinary records show that Gita was experiencing colic due to use of opioids related to her surgery and lack of movement. At one point (Sept. 30) there was concern because it "appeared like she was going to go down." Zookeepers were monitoring Gita overnight. Gita was treated with pain killing drugs for colic through Oct. 6.]

“I want to reassure people that our elephants are fine,” [John] Lewis [LA Zoo Director] said. (CBS-TV, February 11, 2006)

[Gita had developed an abscess on her "right rump" in January "where she leans up against the bars." Daily rotation of intravenous antibiotic and antifungal drugs continues for treatment of left front foot.]

“MR. LEWIS: No, she's not suffering. If anything she's spoiled rotten.”

L.A. Zoo Under Pressure to Retire Its Elephants

National Public Radio - All Things Considered, March 10, 2006

[Daily foot treatments continue.]

“.. ..[Gita’s foot appears to be healed," says L.A. Zoo director John Lewis. (Los Angeles Times, May 9, 2006)

[Gita is still being administered a regular rotation of intravenous antibiotic and antifungal drugs to treat her left foot and the continued presence of dangerous

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bacteria. Large tail abscess still being treated. New abscess on right hindquarters appears on May 5.]

"We actually had thought her foot problems were healed, so as a result, she wasn't on 24-hour observation," Lewis said. "We were very surprised she was down that morning."

NBC-TV News, June 30, 2006

[Gita had refused to let anyone treat her left front foot in the week prior to her death. She had multiple abscesses (one so large a vet put an arm into it), experienced increasing swelling down her backside and along her stomach, and now had to wear a boot on her right foot due to undermining of the sole. Swelling is thought "likely due to her resting her rear and getting weight shift done against the facility bars/railings."]

3. More Zoo Misrepresentations

Recently, zoos have begun to revise elephant lifespan, which is well documented at 60-70 years downward, presumably to bring it in line with zoos' poor record of elephant care. After public pressure and scrutiny from IDA, both the St. Louis Zoo and the Oregon Zoo changed their website, virtually halving a natural elephant lifespan. (See Exhibit E)

" If elephants are content, have the possibility of 24-hour veterinary care, food in plentiful supply, and none of the primary causes of natural mortality - no predators, no drought and no poaching or conflict-related injuries and death (spearing, snares, poison arrows, automatic weapons, shooting on control etc., etc.), then why aren't they living significantly longer in zoos?" Joyce Poole, Ph.D., <http://www.elephantvoices.org/index.php?topic=tools>.

Zoos also misrepresent the well documented biological need of elephants to walk long distances to maintain foot and joint health, and have suggested that foot disease is a major problem for wild elephants, something that is simply not supported by the facts.

E. Conclusion

The failure of zoos to acknowledge the health problems and suffering that current conditions cause can be considered either a deliberate attempt to mislead the public, or an indication that the poor health condition of captive elephants has become accepted in the zoo community as the norm. In either case, it is clear that action from an outside regulatory entity is necessary if improvements in conditions for captive elephants are to be made.

Section VII: When You Give Elephants What They Need The Sanctuary Experience

A. Meeting Elephants' Needs in a Captive Setting

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Fowler states:

“Elephants’ foot health would be enhanced if they lived in a natural habitat, which is defined as a large space with diverse topography and natural substrate. There should be wetlands, seeded and native pastures, wooded areas, natural year-round water (ponds, washes, streams, and dry creek beds), all with sufficient vegetation to maintain the elephants. In a natural habitat, elephants spend their day walking, eating, bating, and digging in soil. Natural vegetation, particularly browse, contains necessary trace minerals and vitamins that promote foot health. Elephants use their feet to help them forage. For instance, by placing a foot on a clump of grass, they pull grass blades between their toes which helps groom the interdigital skin and cuticles. . . . It is not possible to provide the foregoing for captive elephants, except in rare occasions...”(Fowler 2006

It is possible to provide what elephants need in a captive setting, and the two U.S. sanctuaries for elephants are proving it every day.

The Elephant Sanctuary is a 2,700 acre natural habitat refuge in Tennessee. The PAWS ARK 2000 sanctuary encompasses 2300 acres in San Andreas, CA.

What these sanctuaries provide:

- Hundreds to thousands of acres of natural habitat
- Varied terrain, including hills, pastures, creeks ponds
- Natural substrate
- Live vegetation for foraging
- Freedom of choice in daily activity and companions
- Year-round access to outdoors

B. Reinstating elephant’s natural biology

These conditions “reinstatement the elephant’s natural biology,” as zoo elephant foot care expert Alan Roocroft has said (Roocroft, 2005) and have restored quality of life to even the most physically and psychologically debilitated elephants who have come from zoos and circuses to the sanctuaries.

1. Foot Health

The most visible, dramatic improvements regard foot health. As stated previously, confinement in the traditional zoo setting wreaks havoc on elephants’ feet. Inactivity, hard substrates like concrete, and surfaces contaminated with urine and feces cause elephant’s foot pads and nails to deteriorate and leads to infection, which requires almost constant trimming. Trimming in turn can create a thin or smooth pad that bruises easily and is vulnerable to penetration by foreign objects and infection.

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By contrast, a natural habitat, like those provided at TES and PAWS gives elephants access to vast space with diverse terrain and natural substrate, conditions that are necessary to maintain and regain foot health. The time required for an unhealthy foot to return to health in a natural-habitat environment is relatively short. Inner pad and nail overgrowth and cracks will be alleviated within weeks. With attention to stress reduction and a healthy diet, a severely infected and overgrown foot can be completely healed within a few months. (Buckley, 2001).

Buckley states that natural conditions promote and restore foot health in a variety of ways:

Trees provide the elephant not only with a valuable source of nutrition, but also opportunities for conditioning the feet by working at and tearing away the bark and root system.

Soil is rich in minerals and adds to the elephant's nutritional health, while promoting foot health. While an elephant digs and walks on soft earth, the activity stimulates blood flow, conditions muscles, tendons and joints, and wears the pads and nails.

Hills provide the elephant's foot with the types of movement necessary to maintain health. Varying topography provides both climbing and sideways motion that strengthens tendons and ligaments of the feet so the foot grows strong and straight. (Roocroft, 2005)

Creeks and creek beds provide rocks and digging opportunities that strengthens feet, removes debris and conditions the elephants foot. Moisture provided by creeks keeps the elephant's foot from becoming dry and cracked.

Moisture provided by pasture, washes and streams acts as a conditioner for the elephant's foot, softening dry areas and keeping the pad healthy.

Diet: Providing the elephant natural foraging opportunities and access to live vegetation improves nutritional health and thus improves nails and pads that are thin, cracked and soft due to nutritional deficiencies.

Free choice access to the indoor facility means that elephants spend a majority of time on natural substrate. Freedom of movement, without being confined by chains or gates, also promotes foot health. Although each elephant is an individual, on average the elephants that live at the Sanctuary walk 3 - 15 miles each day.
(<http://www.elephants.com/questions.htm>)

2. Joints

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The effects of exercise in improving arthritic conditions in people are well-known. Exercise promotes weight loss and builds muscle strength, both of which relieve pressure on degenerated joints. Exercise also promotes blood flow to the joints, which is necessary for joint health.

The same is true for elephants who have regained the ability to walk, climb and have restored range of motion to joints damaged by years of confinement, inactivity and standing on hard substrates in the zoo or circus.

3. Sleep and Body Condition

Elephants in zoos and circuses have only hard flat surfaces to lie down on and develop pressure sores on their heads and hips from lying on these unyielding surfaces. Tusk problems from wear on concrete are also prevalent. Eventually, elephants stop lying down, making the decision that it is more painful to lie down and get up again than it is to continue standing and bearing weight on diseased feet and joints. (Roocroft, 2005).

When elephants are given access to natural habitats and substrates, they can find and make places to sleep that are comfortable, often for the first time in decades. They can comfortably take weight off, therefore improving quality of essential sleep (and thereby health) while healing ulcerated areas of skin and promoting tusk health.

At TES, elephants are given 24-hour access to the outdoors. At PAWS, a state-of-the-art, dirt-floored barn allows Asian elephants to dig out sleeping areas while also providing enrichment opportunities for dusting, digging and playing.

4. Psychology/Sociality

Case studies (below) show that when elephants are freed from fear-based systems of domination, released from performing daily training behaviors and routines, and are given space and freedom of choice for activities and associations, psychology improves, stereotypic behaviors and aggression decreases, and close bonds/friendships between elephants are able to form.

The Elephant Sanctuary has submitted comments separately and in more detail. What follows here are brief case studies of elephants at both sanctuaries and the effect that their change in living conditions has had on their health.

C. **Case Studies: the PAWS Experience**

Excerpted from personal communication with Jackie Gai, DVM, Nov. 2006

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Winky at Detroit - abscess center pad, right front foot.



Winky at PAWS – Abscess right Front foot has healed.

Winky and Wanda: Older female Asian elephants from Detroit Zoo. They arrived with moderate degenerative joint disease (arthritis), especially Wanda, who had reduced range of motion in her wrists and moved slowly and stiffly. They had been on high doses of anti-inflammatory medication at the zoo. Since being at PAWS, both elephants have shown some improvement in range of motion, have lost weight (they also had problems with obesity), and have gained muscle tone through increased mobility and activity. They also require lower doses of pain relievers (anti-inflammatory medications) to maintain comfort. When Wanda arrived, she had an exaggerated head-rolling behavior at times - there is a decrease in this behavior and she is socializing well with the other elephants.

Rebecca: Upon arrival from the circus, she was in fair but not ideal body condition. She was lethargic and mentally dull. After receiving medical treatment for her ailments, she gained weight and vitality. She is very active exploring the habitat at ARK, and has gained excellent muscle tone. She is also bright and alert, and well socialized with the others.

Minnie: Upon arrival from the circus with Rebecca, she was also somewhat lethargic and dull with a tendency toward obesity. With access to the large habitat at PAWS and the ability to swim in the lake, she has gained increased muscle tone and has improved range of motion in her joints.

Annie: I was not at PAWS when Annie arrived from the Milwaukee Zoo many years ago but began working with her at PAWS in Galt in 2001. When her long-time companion Tammy died, she seemed very depressed. She did not play, and would stand in one place for a long time. After she was moved to the big habitat at ARK and introduced to the other elephants, there was a brief period of adjustment and then a huge improvement in her apparent emotional state. She began exploring the habitat and wanting to be close to the other elephants. She also has lost fat and gained muscle tone.

In general, the elephants have improved in their overall body condition (increased muscle tone) with the ability to swim, and to walk long distances on varying terrain. They all lie down to sleep, which is critically important to get weight off of their joints and feet. Most of the elephants have shown some increase in mobility and joint flexibility. There have

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been no "miracle cures", as these are all older elephants with moderate to significant degenerative joint disease - an irreversible condition - but there definitely have been improvements in overall mobility.

“One of the biggest benefits I have observed is in apparent emotional/mental health. They have freedom of choice of how to spend their day, and I have seen less stereotypic behavior and brighter, more active elephants. Most have some degree of the common foot problems that plague captive elephants such as nail abscesses and, as in the case of degenerative joint disease, these problems have been chronic and long-standing for many years prior to coming to PAWS. The lesions are treated with regular foot care, and many have improved or resolved. Foot pads (soles) that were thick, hard, and prone to cracking are now more supple. Foot pads that were thin and friable are tougher but supple and healthy.” – Jackie Gai, PAWS Vet,

D. Case Studies: The Elephant Sanctuary

Jenny: An Asian elephant who performed with the circus for 26 years before coming to the Sanctuary. She sustained an injury to her left rear knee in an attack by a bull elephant, which went untreated and became permanent, was severely underweight and had developed chronic foot rot, which is life threatening if untreated. When she arrived at the sanctuary, her foot pads and nails had become severely overgrown. “Her pads were spongy and had numerous infected tracks, 1-inch wide and several inches deep. Her cuticles were 1 inch long, dry and cracked. Several nails were 2-4 inches overgrown; five nails were severely infected and appeared to be sloughing. The heels of her pads were dry and split with deep cracks.

The deteriorated condition of Jenny’s feet appeared to be causing her extreme pain. Her behavior pattern after arrival was to lie down every 20-30 minutes to avoid the pain she experienced while standing. At every opportunity Jenny would submerge in one of the ponds or creek. . . Her daily activity [at the sanctuary] included mud bath excavation, spring water swims, digging, dusting, napping, grazing, foraging and tree felling. Over the course of each day Jenny walked many miles, repeatedly submerged herself in fresh water, and moved several hundred pounds of earth and vegetation. . . “

Foot health was restored within 1 year. No further trimming was necessary after the first 6 weeks. Pads and nails were healthy and supple until her death at age 34 this year.

Tarra: Performed in circuses and zoos. Before coming to the Sanctuary, she suffered from periodic arthritis in her right wrist. Since coming to the Sanctuary she has been extremely active, walking miles each day, traversing steep hills and swimming in ponds and streams, and her arthritis has cleared up. She is 32 years old.

Shirley: Age 58, performed for 30 years with the circus. Her leg was broken when she was attacked by another elephant but, despite her injury, she had to continue performing with the circus for almost two more years. Later, she was sold to a zoo where she lived alone for 23 years. Because she was crippled and living alone, the zoo allowed her to

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retire to the Sanctuary. When she arrived, her permanent leg injury caused her to limp and wear her nails and foot pads unevenly. Her skin was dry, with layers of dead skin built up on her head and back. She also had several burn scars, which she received when the circus ship, on which she was traveling, caught fire and sank. Today, Shirley is one of the Sanctuary's oldest elephants yet she is very active. She has no problems moving about the habitat with the members of the herd and, as a result of her activity, her nails and pads do not need trimming and she appears to have no discomfort on her crippled leg.

Bunny: 54, lived alone in a zoo for 45 years. Due to the hard-packed earth in her yard and concrete floor of her barn, Bunny suffered from foot infections for nearly 20 years. When she arrived at the Sanctuary, her foot pads and nails had been over-trimmed, causing the pads to be dangerously thin and the nails weak. The first step was to allow her pads and nails to grow out. She was given twice-daily foot soaks – with apple cider vinegar rather than Epson salt, the zoo industry standard – and homeopathic remedies. Within six months, the foot infections that had plagued her for 20 years finally healed. Moving her from concrete and hard-packed dirt to more yielding natural surfaces not only allowed her feet to recover but also prevented the problems from recurring – problems that could have eventually taken her life. Bunny recovered from her debilitating foot disease within 6 months of her arrival in 1999 and has not experienced any foot problems since.

Sissy:, 38, lived in several zoos over a 30-year period, most of that time alone. She came to the Sanctuary after being brutally beaten by her keepers at the El Paso Zoo. While at the zoo, Sissy had a chronic split nail, the result of improper foot trimming. After she arrived at the Sanctuary, her split nail was allowed to grow out. Within six months, with proper corrective trimming, her split nail healed and did not reoccur.

Winkie: 40, lived in a zoo before coming to the Sanctuary. For over 30 years, she was kept indoors, on chains six months of the year because of the cold weather. She underwent exploratory surgery for a problematic toe in which the vet, suspecting that a foreign object was embedded in the foot, cut her foot to the bone. The surgery was extensive but failed to produce any foreign objects. It was later determined that Winkie's problem was not an object in her foot but an infection in one of the bones of her foot. Due to an antiquated elephant exhibit, a lack of funds to rehabilitate the exhibit and a request by the USDA to improve the exhibit or relocate their elephants, the zoo sent Winkie to the Sanctuary. Upon arrival at the Sanctuary, it was determined that Winkie suffered from osteoarthritis and osteomyelitis (bone infections in her feet). After several months of foot soaks, the infection was no longer active.

Delhi, 60, performed in the circus for more than 50 years. For 30 of those years, she was trained and leased to circuses by the Hawthorn Corp. In 2003, Delhi became the first elephant ever to be confiscated by the USDA because a Hawthorn Corp. employee soaked her feet in full-strength formaldehyde, causing severe chemical burns. She nearly died from this mistreatment. Delhi arrived at the Sanctuary crippled, her life expectancy questionable. After several months she began to recover and, after 16 months, she no

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longer needed hospice care. **Although she continues to suffer from osteomyelitis, the disease process has slowed dramatically and she is extremely active, walking miles each day exploring the habitat. When the weather is good, she spends all day and night outside. Due to her environment and diet, her health is good and the advancement of her osteomyelitis has slowed considerably.**

Zula: 31, African elephant. Zula lived in a wild animal park and was moved to the Sanctuary with her companion Tange because the director felt that the park facilities were inadequate for them. Zula arrived at the Sanctuary with a history of hip problems. After several months of increased activity, Zula's range of motion improved and she is now navigating terrain that she was incapable of navigating in the past.

Section VIII: Media and Public Attitudes

Over the last few years, there has been a paradigm shift in the public's perception of keeping elephants in zoos. In response, the media's coverage and attitudes regarding this highly controversial topic have shifted as well. Increasingly, members of both the public and the media are questioning the adequacy of current standards for elephants kept in U.S. zoos. Just last month, the *Seattle Post-Intelligencer's* Editorial Board wrote, "The zoo's idea of its elephants serving as ambassadors to people would make more sense if the exhibit honored their wild relatives' need for spacious habitat." In May, they wrote, "Seattle's elephants receive great care, but that's not enough. They deserve more space." In October 2006, the *Delaware News Journal* wrote, "It is a story that is being repeated across the country. As more was learned about these great creatures, it became clear quarters were too small and the indoor cement floors of northern zoos can lead to foot infections that can kill elephants."

This contentious issue has become a heated national debate with some of the most prominent media in the U.S., such as *Time Magazine*, *USA Today*, the *New York Times Magazine*, the *Los Angeles Times*, and the *Wall Street Journal* weighing in and bringing the dispute to the American public. A November 17, 2006 *Wall Street Journal* article reported,

Twenty years ago, in Atlanta, Mr. Theison briefly had charge of an elephant whose feet were so diseased that the only comfort he could offer was an epsom-salts soak. "That was neglect," he says. "If an elephant Tash's age has foot problems, then that elephant's in the care of somebody who doesn't know about elephants."

But on foot-care know-how, aficionados hotly disagree. The call for a federal elephant-foot regulation first came from a California group called In Defense of Animals . . . It claimed in a petition that elephants live to 70 and can jog 50 miles in a day, but that in zoos they hardly move at all and therefore get bad feet and die young.

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In this view, zoos simply kill elephants. Some experts tend to agree. "A zoo really isn't conducive to the health of elephants, and the feet are a large part of it," says Blair Csuti, an Oregon zoologist who organized the first North American conference on elephant foot-care in 1998. "You just have to accept this as a chronic condition because you're not going to cure it."

While zoos continue to deceive the public through inaccurate and misleading statements to the media that elephants in their facilities are happy and healthy, medical records, zoo industry insiders, and world renowned elephant experts are providing evidence to the contrary.

This heightened public awareness of the poor condition of elephants in zoos has created a mandate for the USDA to act to insure that the welfare of elephants in captivity in the U.S. is greatly improved.

Section IX: Conclusion

This document has presented the scientific evidence indicating that **elephants in zoos suffer from a high-rate of painful, chronic and frequently degenerative health disorders that are directly attributable to the inadequate captive environment.** Among the most prevalent health disorders identified in IDA's survey were:

- Foot disease: 62 percent of elephants
- Joint Disease: 42 percent of elephants
- Body Lesions (including pressure sores from lying on concrete: 60 percent of elephants
- Tusk Injuries: 36 percent of elephants
- Aggression: 28 percent of elephants

In addition, **reproductive disorders are prevalent, affecting 21 percent** of females in IDA's survey. Disturbingly, 65 percent of pregnancies recorded during IDA's survey period (2000-2006) ended in stillbirth and other complications.

Referring to the high prevalence of foot disease in captive elephants, C. James Mahoney, veterinarian and primate specialist who has also treated and observed elephants in India, wrote: "***Any other disease with an incidence of 50 percent or more within a population would be looked upon as a catastrophe, the likes of which the world would have never seen!***" (Comments on USDA Docket No. APHIS-2006-0044, "Captive Elephant Welfare", Dec. 2006)

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The zoo industry has been allowed to ignore these health problems for far too long.

The overwhelming scientific evidence indicates that zoos are not providing adequate space and conditions for elephants in accordance with the Animal Welfare Act.

Overwhelming public support for improving conditions for captive elephants exists as well, and the more than 2000 comments that have been submitted to APHIS on this issue to date are testimony to this fact. The prevalence of this issue in the national and international media is evidence of public concern as well.

Action on the part of USDA to address the intolerable and unacceptable suffering of elephants under the agency's purview is long overdue.

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<http://www.elephantvoices.org/index.php?topic=facts>

<http://www.elephanttrust.org>

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MASTER LIST OF EXHIBITS

EXHIBIT A: Medical Records

Abilene Zoo
Brec's Baton Rouge
Cameron Park Zoo
Cleveland Zoo
Dallas Zoo
Detroit Zoo
Dickerson Park Zoo
El Paso Zoo
Fresno Zoo
Greenville Zoo
Honolulu Zoo
Lee Richardson Zoo
Los Angeles Zoo
Louisville Zoo
Miami Zoo
Milwaukee Zoo
Memphis Zoo
National Zoo
North Carolina Zoo
Oklahoma Zoo
Oregon Zoo
Pt. Defiance Zoo
Reid Park Zoo
Riverbanks Zoo
Roger Williams Park Zoo
Rosamond Gifford Zoo
San Francisco Zoo
Seneca Park Zoo
Six Flags Marine World
St. Louis Zoo
Topeka Zoo
Tulsa Zoo
Woodland Park Zoo
Virginia Zoo

EXHIBIT B: Charts

Findings of IDA's Survey of Zoo Medical Records
Zoo Elephant Exhibits in IDA's Survey: Size, Composition, Elephants
Elephant Deaths at Facilities Accredited by the Association of Zoos and Aquariums - 2000 to Present*
Elephant Suffering Notable Joint and Foot Disorders Prior to Death from 2000 – present
Demographic Data on Asian and African AZA/SSP Elephant Populations

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EXHIBIT C: Select Elephant Management Manuals

Brec's Baton Rouge Elephant Management Policy

Dallas Zoo Foot Care Policy

Honolulu Zoo Elephant Management Policy

Louisville Zoo Elephant Manual

Milwaukee County Zoo Elephant Care Manual

Rosamond Gifford Zoo Elephant Care Policy

EXHIBIT D: SCIENTIFIC PAPERS

See below

EXHIBIT E: AZA DOCUMENTS

- Principles of Elephant Management – 2001
- Recommended Elephant Preshipment Guidelines, Elephant Species Survival Plan – 2003 (4)
- Acquisition/Disposition Policy – 2000 (5)
- AZA Population Management Plan Handbook (Wiese, Willis) (23)
- Transport Guidelines for Elephants – Dec. 2002 (2)
- Quarantine Guidelines for Elephants – Feb. 2003 (2)
- Guidelines for Comprehensive Elephant Health Monitoring Program – Feb. 2003 (6)
- Elephant Necropsy Protocol – Jan. 2003 (12)
- Recommendations for EEHV (Herpes Virus) Testing and Transport of Elephants – Sept. 2002 (2)
- AZA Standards for Elephant Management and Care – (adopted 21 Mar. 2001, updated 5 May 2003) (14)
- AZA Elephant TAG Regional Collection Plan – Draft Oct. 2003 (41)
- AZA Animal Welfare Committee (from web site) (21)
- AZA Elephant TAG/SSP Pathology Adviser Report – 2002 – Update on Elephant Herpes Virus Cases, Update on TB cases and mortality (2)
- Survey Results: AZA Directors' Elephant Workshop, 2005
- Technical Report on Demographic Analyses and Modeling of The North American African Elephant Population (Faust, L), 2005
- Technical Report on Demographic Analyses and Modeling of The North American Asian Elephant Population (Faust, L), 2005
- AZA/IUCN SSC African Elephant Specialist Group Meeting, June 13, 2005
- AZA Zoo Elephant Management: Challenges/Opportunities, PowerPoint Presentation, Undated
- AZA Elephant Public Relations: Key Messages
- Elephant Meeting, San Diego, CA, August 16, 2004
- AZA Strategic Management Strategic Planning Workshop
Dec. 5-7, 2004 Fort Worth, TX
 - 2005 Elephant Directors Meeting Outcome, Email from Kristin Vehrs to John Walczk, Jan. 27, 2005
 - Elephant Director's Meeting January 10-21, 2005
 - Oregon Zoo Web pages on Asian Elephant

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- St. Louis Zoo Web pages on Asian Elephant
- St. Louis Zoo, letter from Janet Powell, Director of Public Relations, Sept. 15, 2006
- Legal Correspondence between St. Louis Zoo and IDA
Letters from Lewis, Rice & Fingeresh, May 8, 2006, May 25, 2006
Letter from Christopher P. Cox, May 31, 2006

EXHIBIT F: MEDIA ARTICLES

INVENTORY OF SCIENTIFIC PAPERS

BEHAVIOR

Ostovar, K

Altruism in Elephants? (article)

Amara Conservation,

www.amaraconservation.org/new/new_2004_elephant_altruism.html

Hamilton, ID, et al

Behavioral reactions of elephants towards a dying and deceased matriarch

In Press

Applied Animal Behavior Science (2006) (16)

Rees, PA

The Introduction of a Captive Herd of Asian Elephants (*Elephas maximus*) to a Novel

Area

Ratel 27(4): 120-126.

Rees, PA

Asian Elephants (*Elephas maximus*) dust bathe in response to an increase in environmental temperature

Journal of Thermalbiology 27 (2002) 353-358 (6)

Rees, PA

Low environmental temperature causes an increase in stereotypic behavior in captive

Asian Elephants (*Elephas maximus*)

Journal of Thermalbiology 29 (2004) 37-43 (7)

Gruber, TM, et al

Variation in Stereotypic Behavior Related to Restraint in Circus Elephants

Zoo Biology, 19:209-221 (2000) (12)

Wilson, ML, et al

Stereotypic swaying and serum cortisol concentrations in three captive African elephants (*Loxodonta africana*)

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Animal Welfare, 2004, 13:39-43 (5)

Friend, Ted H.

Behavior of picketed circus elephants

Applied Animal Behaviour Science 62 (1999) 73-88 (16)

Friend, TH and Parker, Melissa

The effect of penning versus picketing on stereotypic behavior of circus elephants

Applied Animal Behaviour Science 64 (1999) 213-225 (13)

Williams, JL and Friend, TH

Behavior of Circus Elephants During Transport

JEMA, Vol. 14, No. 3, pp. 8-11 (4)

Cooper, J and Nicol, C

The 'coping' hypothesis of stereotypic behavior: a reply to Rushen

Animal Behavior, 1993, 45, 616-618

Cooper, J and Nicol, C

Stereotypic behaviour affects environmental preference in bank voles, *Clethrionomys glareous*

Animal Behavior, 1991, 41, 971-977 (7)

Dantzer, Robert

Behavioral, Physiological and Functional Aspects of Stereotyped Behavior: A Review and Re-Interpretation

J. Anim. Sci. 1986. 62:1776-1786 (11)

Adams, J and Berg, JK

Behavior of female African Elephants (*Loxodonta africana*) in Captivity

Applied Animal Ethology, 6 (1980) 257-276 (19)

Rees, PA

Some Preliminary Evidence of the Social Facilitation of Mounting Behavior in a Juvenile Bull Asian Elephant (*Elephas maximus*)

Journal of Applied Animal Welfare Science, 7(1), 2004, pp. 49-58

CAPTIVE BREEDING

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Limitations of Captive Breeding in Endangered Species Recovery

Conservation Biology, Vol. 10, No. 2, April 1996, pp. 338-348 (11)

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CAPTIVE POPULATION/LIFESPAN

Wiese, RJ and Willis, K

Calculation of Longevity and Life Expectancy in Captive Elephants

Zoo Biology, 0:1-9 (2003) (9)

Wiese, RJ

Asian Elephants Are Not Self-Sustaining in North America

Zoo Biology, 19:299-309 (2000) (11)

Olson, D and Wiese, RJ

State of the North American African Elephant Population and Projections for the Future

Zoo Biology, 19:311-320 (2000) (12)

Rees, PA

Asian elephants in zoos face global extinction: should zoos accept the inevitable?

Oryx (2003), 37: 20-22 Cambridge Univ. Press (12)

COGNITION

Hart, B, et al

Cognitive behavior in Asian elephants: use and modification of branches for fly switching

Animal Behavior, 62, 839-847 (2001) (9)

Poole, J, et al

Elephants are capable of vocal learning

Nature, Vol. 434, 24 March 2005, pp. 455-56 (2)

Plotnik, JM, et al

Self-recognition in an Asian elephant

PNAS, November 7, 2006, Vol. 103, No. 45, pp. 17053-17057 (5)

COMMUNICATION

O'Connell-Rodwell, CE, et al

Wild elephant (*Loxodonta africana*) breeding herds respond to artificially transmitted

seismic stimuli

Behav. Ecol. Sociobiol., DOI 10.1007/s00265-005-0136-2 (9)

Why Elephants Communicate (1)

(www.elephantvoices.org/why_comm/main_why_comm.html)

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What Elephants Communicate (1)
(www.elephantvoices.org/what_comm/behavioural.html)

DIET

Codron, J., et al
Elephant (*Loxodonta africana*) Diets in Kruger National Park, South Africa: Spatial and Landscape Differences
Journal of Mammalogy, 87(1):27-34, 2006 (8)

Holdo, Ricardo M.
Termite Mounds as Nutrient-Rich Food Patches for Elephants
Biotropica, 36(2): 231-239 (9)

Bechert, Ursula
Elephant Nutrition
Animal Keeper's Forum, Vol. 20, No. 4, 1993 (1)

ENRICHMENT

Stoinski, TS, et al
A Preliminary Study of the Behavioral Effects of Feeding Enrichment on African Elephants
Zoo Biology, 19:485-493 (2000) (14)

Rees, PA
Are Elephant Enrichment Studies Missing the Point?
Int'l Zoo News, Vol. 47, No. 6, (2000), pp. 369-371 (2)

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Effects of Environmental Enrichment on Reproduction
Zoo Biology, 13:447-458 (1994)

Sevenich, M, et al
The Science of Animal Management: Evaluating the Effects of Training and Enrichment on Elephant Behavior
JEMA, Vol. 9, No. 3, pp. 201-205 (5)

Sambrook, TD and Buchanan-Smith, HM
Control and Complexity in Novel Object Enrichment
Animal Welfare 1997, 6:207-216 (10)

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Recognizing and Balancing the Benefits and Risks of Environmental Enrichment (abstract)

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1998 Proceedings AAZV and AAWV Joint Conference, pp. 380-382 (3)

Mellen, Jill and Sevenich MacPhee, Marty

Philosophy of Environmental Enrichment: Past, Present, and Future

Zoo Biology, 20:211-226 (2001) (16)

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Commentary: Improving Well-Being for Captive Giant Pandas: Theoretical and Practical Issues

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Wynne, Janna and Greer, Leah

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Radiographic Diagnosis of Lameness in African Elephants (*Loxodonta africana*)

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Dosage Requirements of Orally Administered Ibuprofen in African and Asian Elephants
(3 Dec. 2002)

In: A Cross-Species Approach to Pain and Analgesia, Ludders, JW, et al; Int'l Veterinary
Information Services (www.ivis.org), Ithaca, NY (3)

The Elephant's Foot: Prevention and Care of Foot Conditions in Captive Asian and
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Proceedings of the AAZV and AAWV Joint Conference, 1998, pp. 477-479 (3)

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Husbandry and Medical Considerations for Geriatric Elephants (abstract)
Conference proceeding: Elephants: Cultural, Behavioral, and Ecological Perspectives,
Davis, CA 2000 (2)

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Richman, LK, et al
Review of a Newly Recognized Disease of Elephants Caused by Endotheliotropic
Herpesviruses
Zoo Biology, 19:383-392 (2000) (10)

Dunker, Freeland and Rudovsky, Michelle
**Management and Treatment of a *Mycobacterium tuberculosis* Positive Elephant at the
San Francisco zoo**
Proceedings of the AAZV and AAWV Joint Conference, 1998, pp. 122-123 (2)

IMPORTATION

Hedges, S, et al
Why Inter-Country Loans Will Not Help Sumatra's Elephants
Zoo Biology, 25:235-246 (2006) (12)

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REPRODUCTION

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Aspects of the reproductive biology and breeding management of Asian elephants
(*Elephas maximus* and *Loxodonta africana*)

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Rasmussen, LE and Doyle Daves, G

Asian Bull Elephants: Flehmen-Like Responses to Extractable Components in Female
Elephant Estrous Urine

Science, Vol. 217, 9 July 1982, pp. 159-162 (4)

Brown, Janine L

Reproductive Endocrine Monitoring of Elephants: An Essential Tool for Assisting
Captive Management

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Ultrasonography of the Urogenital Tract in Elephants (*Loxodonta africana* and *Elephas
maximus*): An Important Tool for Assessing Male Reproductive Function

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Elephant Albumin: A Multipurpose Pheromone Shuttle

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A Survey of Asian Elephant Births from 1962-1998

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Smith, Andrew

Phoenix Zoo Mourns Ruby's Death

JEMA, Vol. 10, No. 2, pp. 141-145 (5)

Vidya, TNC and Sukumar, R. (see Sociality file)

Social and reproductive behavior in elephants

Current Science, Vol. 89, No. 7, 10 October 2005, pp. 1200-1207

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Lee, P
Female reproductive strategies: individual life histories (calf survivorship stats)

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In: The Amboseli Elephants: a long-term perspective on a long-lived species; Moss, CJ and Croze, H (eds); University of Chicago Press, Chicago, IL (2007)

SOCIALITY

Wittemyer, G, et al

The socioecology of elephants: analysis of the processes creating multitiered social structures

Animal Behavior, Vol. 69, Issue 6, pages 1357-1371 (2004) (15)

Weisz, I, et al

Research on Nocturnal Behavior of African Elephants at Schonbrunn Zoo

Int'l Zoo News, Vol. 47, No. 4, pp. 228-233 (2000) (6)

Brockett, RC, et al

Nocturnal Behavior in a Group of Unchained Female African Elephants

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Archie, E, et al

Dominance rank relationships among wild female African elephants, *Loxodonta africana*

Animal Behavior, 71:117-127, 2006 (11)

Burks, KD, et al

Comparison of Two Introduction Methods for African Elephants (*Loxodonta africana*)

Zoo Biology, Vol. 23, Issue 2, pp. 109-126, 2004 (18)

Bradshaw, GA, et al

Elephant Breakdown

Nature, Vol. 433, 24 Feb. 2005 (1)

Garai, ME and Kurt, F

The importance of socialisation to the well being of elephants

Zeitschrift des Kolner Zoo, Heft 2/2006 – 49 Jahrgang (7)

Foley, C

How baby elephants grow up in the wild (article)

Wildlife Conservation, Aug. 2002

Owens, D and Owens M

Comeback Kids, Elephant “single moms” are struggling to recreate family life after the traumatic years of poaching (article)

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Natural History, July/Aug. 2005

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Captive Breeding of Asian Elephants (*Elephas maximus*): The Importance of Producing Socially Competent Animals

In Hosetti, BB & Venkateshwarlu, M (eds), Trends in Wildlife Biodiversity, Conservation & Management Vol. 1, Daya Publishing House, Delhi, 2001, pp. 76-91

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Social Structure and Helping Behavior in Captive Elephants

Zoo Biology, 19:447-459 (2000)

Rasmussen, LEL and Krishnamurthy, V

How Chemical Signals Integrate Asian Elephant Society: The Known and the Unknown

Zoo Biology 19:405-423 (2000)

SPACE USAGE

Grainger, M., et al

Landscape heterogeneity and the use of space by elephants in the Kruger National Park, South Africa

African Journal of Ecology, 43, 369-375, 2005 (7)

Ntumi, CP, et al

Use of space and habitat by elephants (*Loxodonta africana*) in the Maputo Elephant Reserve, Mozambique

South African Journal of Wildlife Research, 35(2):139-146, 2005 (8)

Ros Clubb, Georgia Mason

Captivity effects on wide-ranging carnivores

Nature, Vol. 425, 2 Oct. 2003 (2)

TRAINING/MANAGEMENT

Kurt, Fred

History of management in captive elephants

Zeitschrift des Kolner Zoo, Heft 2/2006 – 49 Jahrgang, pp. 75-81 (8)

Laule, Gail and Whittaker, Margaret

Protected Contact – Beyond the Barrier

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Protected Contact at the Dallas Zoo: A Story of Conversion
JEMA, Vol. 10, No. 2, pp. 130-131

Lehnhardt, John
Elephant Handling – A Problem of Risk Management and Resource Allocation
AAZPA 1991 Annual Conference Proceedings, pp. 569-575 (7)

Chapple, P and Ridgway, D
Elephant Handling and Analysis of the Risks (includes Lenhardt response and Chapple/Ridgway reply)
JEMA, Vol. 11, No. 3, pp. 163-166

Kinzley, Colleen
Protected Contact Management of African Elephants at the Oakland Zoo
Animal Keeper's Forum, Vol. 21, No. 3, 1994 (reprinted in Everything You Should Know About Elephants, 1999, Performing Animal Welfare Society)

Schmid, Jeannette**
Hands Off, Hands On: Some Aspects of Keeping Elephants
Int'l Zoo News, Vol. 45, No. 8 (1998), pp. 476-486 (5)

Roocroft, Alan
Some Issues in Elephant Management – Part I; Solitary Confinement
Animal Keepers' Forum, vo. 18, No. 10, 1991, pp. 314-317 (and 348-349) (3)

Schanberger, A, et al
Discussion on Chaining, Electricity Continues
JEMA, Vol. 11, No. 3, pp. 160-161 (2001) (2)

Lenhardt, John
A New Approach to Chaining Elephants at the Calgary Zoo
Presentation to the Elephant Workshop, New Orleans, LA, Dec. 1984 (5)

Kinzley, Colleen
Improvement in Elephant Management at the Oakland Zoo
EMA Conference 2001 presentation (4)

Kinzley, Colleen
Right Here, Right Now: The Oakland Zoo Improves the Lives of Their Elephants
AZA Communique, February 2006, pp. 15-18 (4)

TRAINING/THEORY

Laule, G and Desmond, T

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Use of Positive Reinforcement Training in the Management of Species for Reproduction
Zoo Biology, 13:471-477 (1994) (7)

Hiby, EF, et al
Dog training methods: their use, effectiveness and interaction with behaviour and welfare
Animal Welfare (2004) 13:63-69 (7)

Archer, Trevor, Goren Nilsson, Lars (eds)
Aversion, Avoidance, and Anxiety: Perspectives on Aversively Motivated Behavior
Selected chapters:
▪ Historical Perspectives on the Study of Aversively Motivated Behavior: History and New Look (Overmier, BJ and Archer, T)
▪ Anxiety and Cognition: Theory and Research (Eysenck, MW)
▪ Aversively Motivated Behavior: Which Are the Perspectives? (Goran Nilsson, L and Archer, T)
Lawrence Erlbaum Associates, Publishers, Hillsdale, NJ 1989

Kleiman, DG, et al (eds)
Animal Learning and Husbandry Training (Mellen, JD and Ellis, S), pp. 88-92 (5)
In Wild Mammals in Captivity, Univ. of Chicago Press, Chicago, IL, 1996

WELFARE/STRESS

Bettinger, T, et al
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AZA Annual Conference Proceedings, 1997, pp. 88-90 (3)

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