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Smart Stimulation: Zoo Conservation for 21st Century Zoos

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HONORS THESIS

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I. INTRODUCTION

According to a 1992 survey, "an estimated 102 million people, more than attend professional football, baseball, and basketball games combined, visit 162 accredited North American zoos and aquariums each year" (2). People frequent zoos for a variety of reasons, from entertaining children for a few hours, to learning about the wildlife which inhabits their region and foreign places. Regardless of intent, once at the zoo, visitors are presented with a unique opportunity to learn about conservation and the plights of endangered species. It is the job of zoo directors, keepers, staff, and volunteers to get people thinking about conservation while having an enjoyable family outing. Zoos can furthermore be designed to feature activities and habitats that aid in both conservation and education. Conservation efforts at zoos cannot be effective without first getting people to the zoo and second keeping their interest in the animals. Both animals and people must be stimulated in order for interest to remain and conservation efforts to be effective.

In order to show how ideas of conservation and education at zoos can come together, two examples have been chosen. As an example zoo, the Cougar Mountain Zoo is a small, non-profit zoo that focuses on endangered species and their conservation. They aim to educate all who come in to the zoo about any animal in it, and try to get people excited about both the animals and their conservation. The Cougar Mountain Zoo became the proud home of two Bengal Tiger cubs in May 2007. These cubs, along with other members of the Bengal subspecies

and tigers as a whole, serve as an example endangered species for which there are many conservation efforts.

Tigers

Tigers (*Panthera tigris*) are the biggest wild cat, and one of the largest predatory animals in the world. The tiger species is further subdivided into subspecies based on striping pattern, body size, skull characteristics, and fur coloration. There are nine generally accepted subspecies of tigers of which the Bali (*P. t. balica*), Caspian (*P. t. virgata*), and Javan (*P. t. sondaica*) are extinct subspecies, which vanished by the 1940s, 1970s, and 1980s respectively (7).

A.

B.

C.

D.

E.

F.

Figure I.1: Photos and drawings of the extinct tiger subspecies. A and B are pictures of the Bali tiger, extinct in 1940. C and D are of the Caspian tiger, extinct in 1970. E and F are of the Javan tiger, extinct in 1980.

Bengal (*P. t. tigris*), Amur or Siberian (*P. t. altaica*), Amoy or South China (*P. t. amoyensis*), Sumatran (*P. t. sumatrae*), Malayan (*P. t. jacksoni*), and Indochinese (*P. t. corbetti*) are the living subspecies, all of which are endangered, in some cases critically. The Malayan tiger has only recently been differentiated from the Indochinese tiger subspecies based on genetic analyses, not the previously discussed methods (7).

A.

B.

C.

D.

E.

F.

Figure I.2: Photos of current tiger subspecies. A shows the four colorations of the Bengal tiger. B shows the Amur or Siberian tiger. C shows the Amoy or South China tiger. D shows the Sumatran tiger. E shows the Malayan tiger. F shows the Indochinese tiger.

Tigers generally range from 200 to 750 pounds. For comparison, cheetahs are about 88 to 140 pounds, lions are about 500 pounds, and grizzly bears can be up to 1500 pounds. Tigers get larger the further north one travels. The Siberian tiger is by far the largest, normally from

500 to 750 pounds, and is about nine feet long, surpassing even the eight foot tall grizzly bear. Siberians have been documented to reach as much as 900 pounds, though not in recent years. Some researchers suggest that this is due to decreasing population sizes and genetic diversity. The Bengal tiger is the second largest, ranging from 450-500 pounds (10). To give an impression of how large this really is, Figure I.3 shows two adult Bengal tigers next to an adult man.

Figure I.3: A zoo keeper interacting with two full sized Bengal tigers. These 400-500 pound tigers dwarf an adult man.

The Indochinese is the next largest, at 330-420 pounds. South China tigers closely follow, at 280-390 pounds. The Malayan is slightly smaller than its parent, the Indochinese, at about 250 pounds. The Sumatran tigers are the smallest, usually around 220 to 286 pounds (10).

Bengal tigers are unique in that they have different fur colorings from recessive genes, much like human hair color. They express four color variations: Orange (orange fur with black stripes and a white belly), Royal White (white fur with black stripes), Golden (light orange fur with cinnamon stripes), and Snow White (all white fur with very faint stripes). All four colorations are shown in Figure I.4. Orange is the most common, with a worldwide captive population of about 10,000. Royal White follows, with a captive population of 400. Golden has only about 100 in captivity, while Snow White has only about 50 in captivity. The three recessive colorations (Royal White, Golden, and Snow White) are extremely rare in the wild, and have not been spotted with enough frequency in the last century to accurately estimate their wild populations (14).

A.

B.

C.

D.

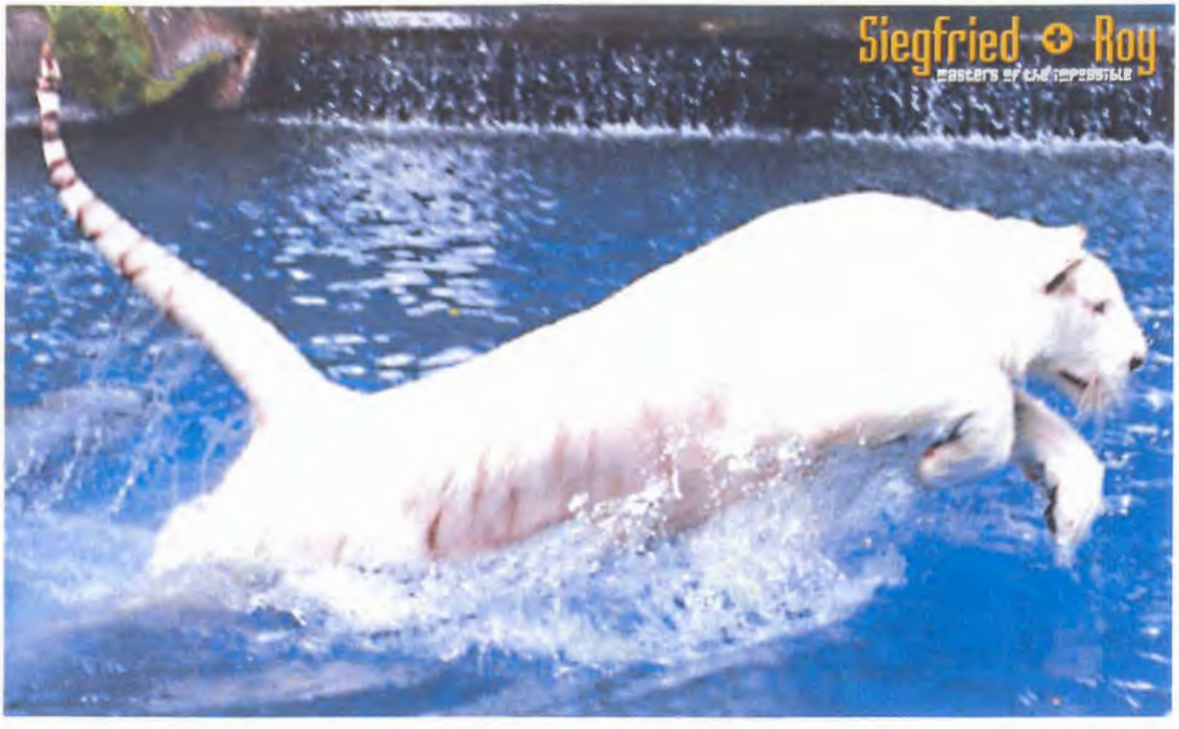
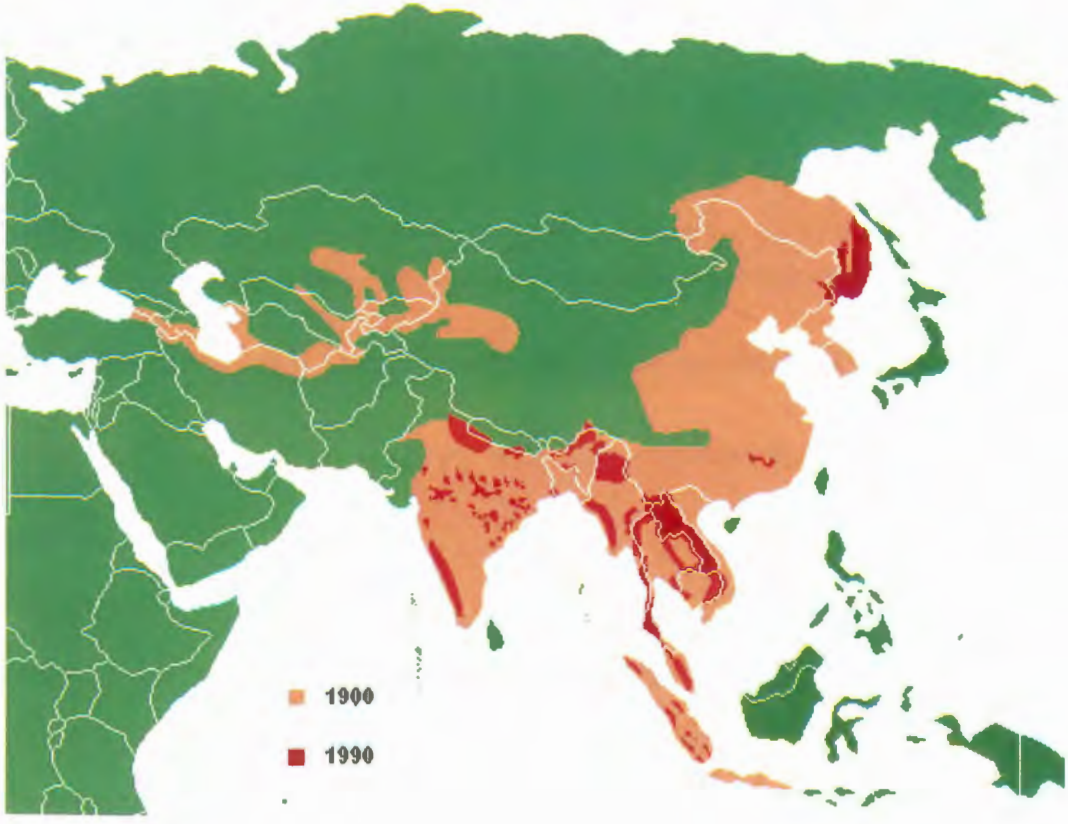
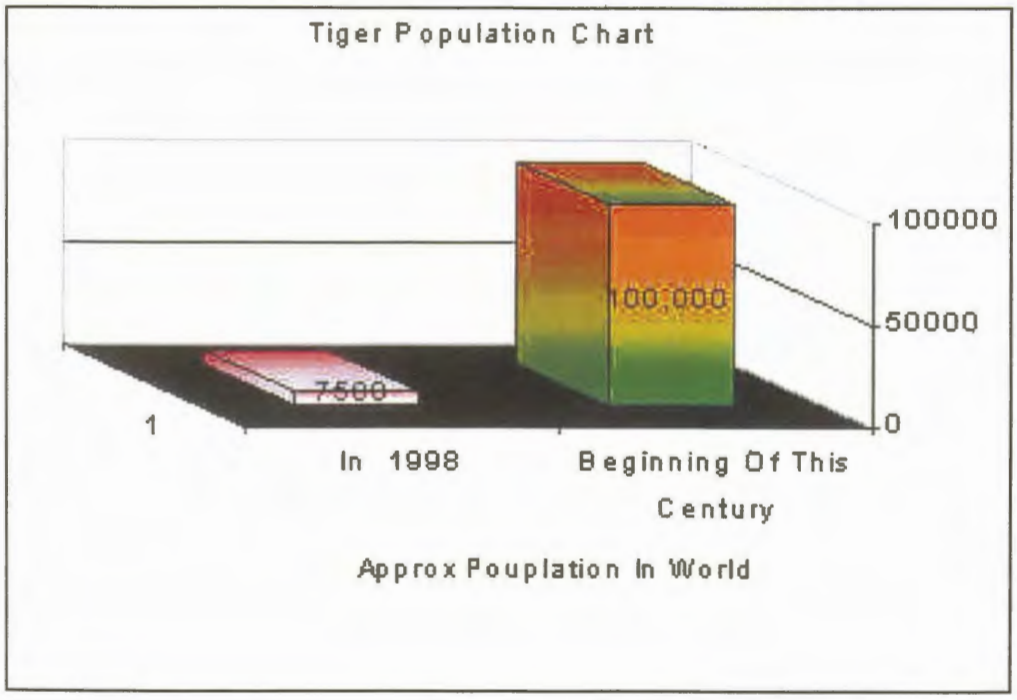


Figure I.4: The four colorations of Bengal tigers are shown, in descending order of population sizes. A shows the dominant, orange coloration. B shows a Golden Bengal tiger. C shows a Royal White Bengal tiger. D shows the Snow White coloration.

Historically, tigers inhabited most of Asia, from the Caspian Sea to the Chinese coast, and from Russia down through the Sunda Islands. Their wild populations have been reduced from at least 100,000 animals in 1900 to 7000 or less in 1990, and have further decreased since (7).

A.





B.

Figure I.5: The historic and current range of tigers. A shows a map of the ranges in both 1900 and 1990. B shows a graph of how the populations have changed over the past century.

Ancient populations were much larger than those even in the 1900s. Marco Polo, in his travels around Asia and Europe, commented on large tiger populations. He says that in the Amu province of China,

> "The tigers are so numerous, that the inhabitants, from apprehension of their ravages, cannot venture to sleep at night out of towns; and those who navigate rivers dare not go to rest with their boats moored near the banks. These animals have been known to plunge into the water, swim to the vessel, and drag the men out" (5, page 211).

Currently, Bengal tigers are the most numerous, ranging from 3200 to 4500 in the wild, closely followed by the Indochinese tiger whose populations are roughly 1200 to 1800. The newest subspecies, Malayan, has between 300 and 500 members alive. Siberian and Sumatran tigers

are equally endangered, ranging from 400 to 500 in the wild. Only about 50 South China tigers exist today, and none have been seen in the wild for over 20 years (7).

The decrease in the global population is mainly due to factors including habitat loss, fragmentation, and hunting, specifically for medicinal purposes (7). While tigers have been hunted for their parts for thousands of years, the 20th century saw a large increase in Western and Chinese demand for tiger holistic cures, leading to devastation of the species. The Chinese harvest tiger parts for a wide range of uses, from remedies for mild aches and pains to cures for pimples, asthma, and even laziness. Products include tiger wine, whiskers, and tiger bone products. Many people in China are pushing for the abolition of the current ban on domestic tiger part trade, to the horror of many conservationists (8).

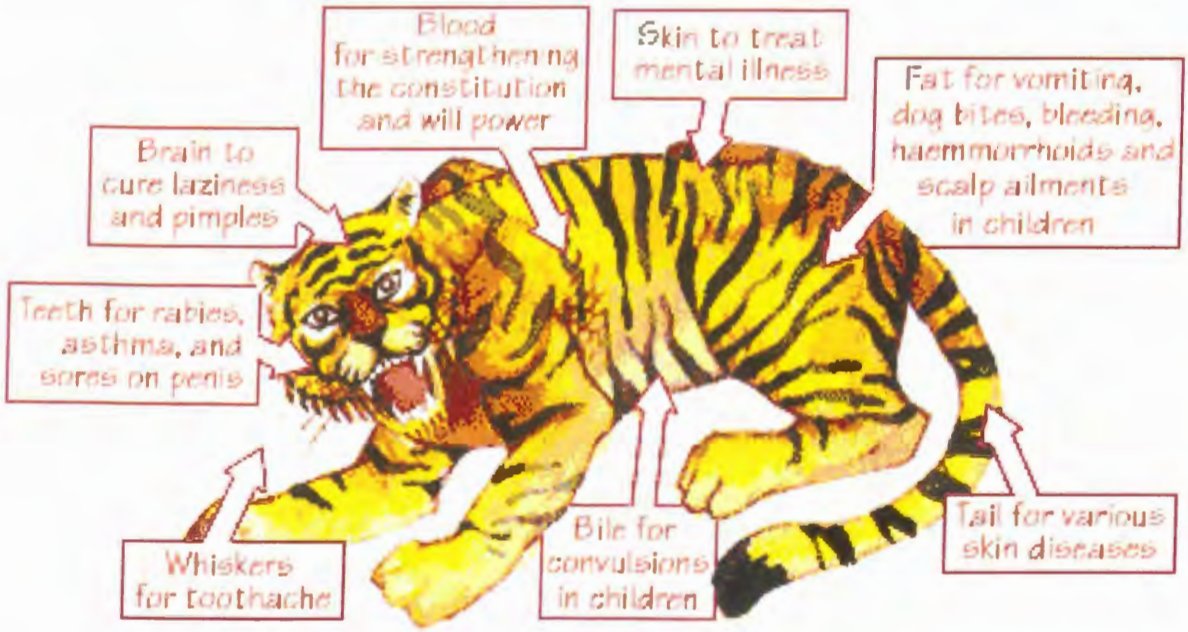


Figure I.6: Diagram of medicinal uses of different tiger parts.

China is also pushing hard to begin reintroducing tigers to the wild from captive breeding programs, though this appears to still be years off. One goal was to release 600 captive-bred Siberian tigers to the wild in time for the 2008 Olympic Games, however this is not realistic and probably will not happen (3).

In order for tigers to survive extinction, drastic action must be taken. Subspecies survival is based on conservation of wild and captive populations, with either one or both remaining large enough over a 200 year planning period to avoid extinction. In captivity, about 175 individuals of each subspecies are needed to ensure their survival and genetic diversity (2). Preservation of suitable habitat, movements of tigers among isolated subpopulations, death from human and natural causes, and other random variables all affect the wild population size. Zoo population size is limited by the management of reproduction and mortality in captivity and the allocation of space for captive animals. Essentially, both the wild and captive populations need to be closely monitored and guided in order to save Bengal colorations, each subspecies, and tigers as a whole. Much of the problem stems from a lack of education and involvement among the general human population. Zoos are a perfect conduit for this, as they can properly care for and breed tigers, helping the subspecies population problems, as well as attracting people and gaining their interest. People become more involved when they experience the wonder of tigers and other endangered species in person. Also, zoos can formally and informally educate people both about the animals and how to help the species survive (6).

Cougar Mountain Zoo

Cougar Mountain Zoo is located in Issaquah, WA, east of Seattle and Bellevue along the I-90 corridor. It is a small sized, non-profit zoo. All of the funding for programs, enclosures, animals, and products come directly from admissions, donations, and gift store sales. The majority of its animals are endangered species, such as lemurs, tigers, Formosan elk, and macaws.

Figure I.7: An image is shown of the sign for Cougar Mountain Zoo.

At the Cougar Mountain Zoo there is a program for college students interested in zoology, zoo keeping, biology, and other animal sciences where students become a "Keeper Aide Intern." The author participated in this program for the summer of 2007. This involves doing basically what the keepers do, under their direction. Docents also spend a certain amount of time in the education department, answering questions, helping with tours and

birthday parties, and encouraging zoo visitors to learn about the animals and their conservation.

A.

B.

C.

Figure I.8: The author as a docent at Cougar Mountain Zoo. A shows her cleaning a cage with B immediately following that task, in the Bird area. C shows her cleaning the hay pad in the reindeer enclosure.

Cougar Mountain Zoo is committed to educating people about conservation and its endangered species. Lectures and tours are given daily to inform patrons, and all enclosures have signs which describe both the animals inside and general information about the species. All zoo staff, including interns and volunteers, are expected to be able to answer any questions from visitors about the animals, habitats, the zoo in general, and the global plight of the animals in terms of conservation (14).

Cougar Mountain Zoo is the proud new home of two male Bengal tigers, Taj and Almós, who were born in April 11th and May 3rd, 2007 respectively at a tiger preserve in Florida (14).

A.

B. 

C.

Figure I.9: Taj and Almós are shown as they first appeared to the public. A shows both tigers playing together. B shoes Almós, the Royal White Bengal tiger cub, while C shows Taj the Golden Bengal Tiger. All three pictures were taken when the tigers were first shown to the public, when Almós was 7 weeks old, and Taj was 11 weeks old.

The tiger cubs came to Cougar Mountain Zoo in the middle of May 2007, and were first on display to the public in June. As cubs, they were first raised in an indoor nursery, not available to the public. They were brought out at specific times during the day for playtime in a small pen with their keepers. The public was able to view the tigers at this point.

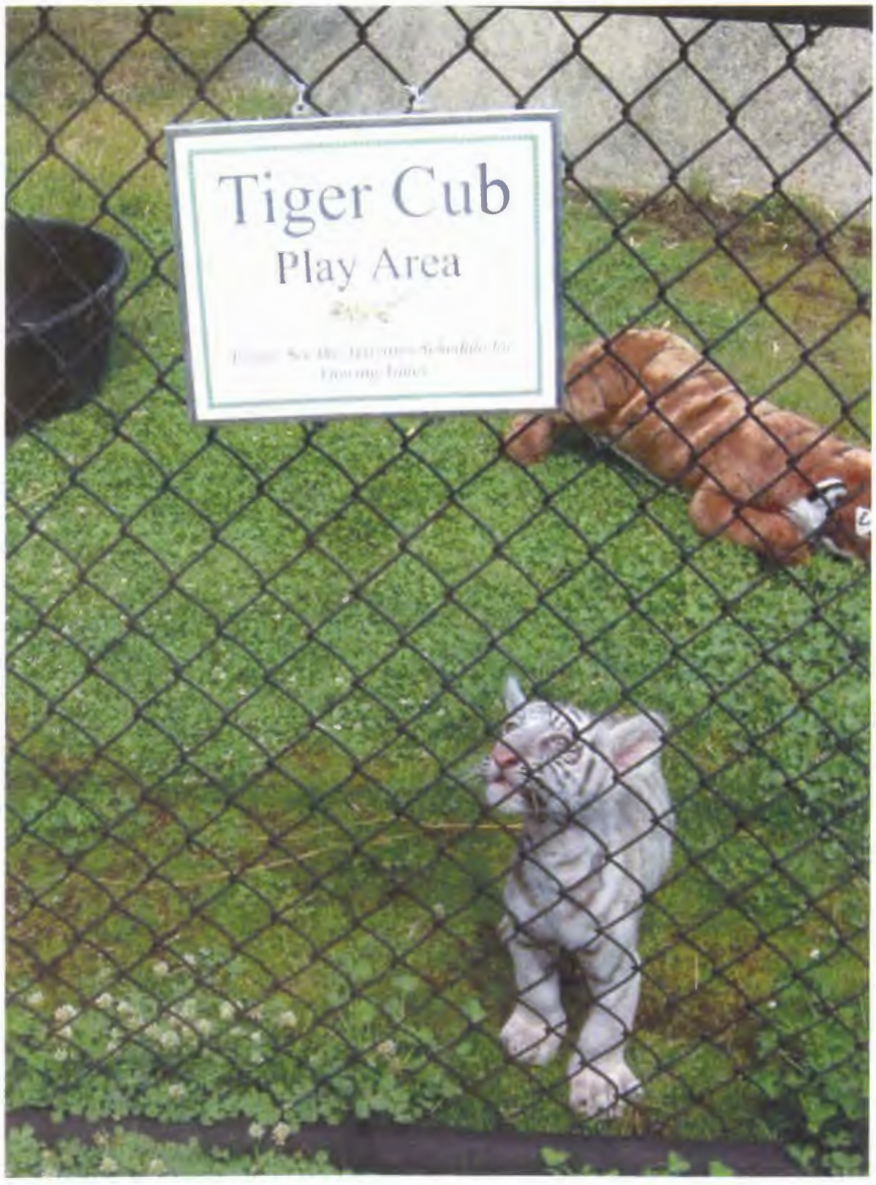


Figure I.10: Almós playing in the tiger playpen at Cougar Mountain Zoo.

In September, the cubs were moved to their permanent home. This enclosure features a small splashing pool (a larger pool will be built for them in the future, once they are larger), some logs and other raised terrain, and a private, indoor area for relaxation, safety from the elements, and sleep. As the tigers grow and revenue comes in, the habitat will be expanded to one acre and feature a glass pool for swimming and diving.

Figure I.11: Photograph of the tiger enclosure at Cougar Mountain Zoo.

The tigers also have a large array of personal toys (usually in twos because they do not share well), including balls, sticks, ropes, and even stuffed tiger companions. The two boys have been together since the zoo staff picked them out, and they will remain together at the Cougar Mountain Zoo for the rest of their lives.

A.

B.

Figure I.12: Pictures of the cubs playing with some of their toys, as they grew up. A shows Almós with a stuffed tiger. B shows Taj relaxing in a play pool with some toys.

Taj and Almós have grown at an incredible rate, going from just a few pounds at birth to over 100 pounds in September. They will reach their full size of 500 or more pounds in just a year and a half. The keepers physically interacted with the cubs from birth, forming a bond which will last for the rest of their 15 to 20 year lives. Once they were put in their enclosure, the keepers still went in to play with the tigers; however this behavior stopped once they were about 100 pounds. While these boys are no real threat to the keepers, they are still encouraged to act like tigers, so this is for the keepers' own safety. A tiger may be playing with a person, but tiger-play is very different from people-play, especially because they have large teeth and 20 claws. Furthermore, tigers can take down prey up to three times their body weight, so a 50 pound tiger cub could feasibly take down a 150 pound keeper. The cubs will not be bred at Cougar Mountain Zoo due to funding and spatial issues, instead helping tiger conservation by acting as "ambassadors" for their species to the public.

A. 

B.

C.

Figure I.13: Taj and Almós in their habitat. A shows both boys together, while B and C show Almós and Taj, respectively.

II. ZOOS AND CONSERVATION

The key to successful conservation programs at zoos is active animals. Variety is the spice of life for animals as well as humans. Once the animals are active, people are more interested, and consequently get more involved. The changes zoos have made in the past 30 years or so have been very beneficial to the animals' mental health. Many studies have shown that happy, well-kept animals are much more likely to be successful in breeding and, in the case of predatory animals like tigers, less likely to attack their keepers and other humans. There are many ways to make animals happy and active. Adding toys and objects for playtime give the animals something fun to do, while designing habitats with natural environments in mind make the zoo seem more surreal. When visitors feel they are in another place, watching the animals behave as they would in the wild, they are more entertained and become more interested in messages of conservation. Socialization, both with humans and other animals, has been found to be crucial to healthy development of animals and bond formation with their keepers. The main theme of 21st century zoo conservation is that happy zoo animals make for happy zoo patrons (11).

In terms of getting people involved in conservation, many schools of thought have come and gone. The current method of conservation through zoos has its roots in the 1970s. During this time, new studies on both endangered species and education changed how zoos approach conservation. Some of the changes include: altering habitats to be more natural and including more than one animal per exhibit, adding daily enrichments to help the animals' mental and physical health, and socializing the animals with humans from birth so that they are unafraid and are less stressed by being in a zoo (11).

What is an Enrichment and Why is it Important?

Daily and weekly enrichments for animals serve as a great way to spice up the animals' lives, generate more interest, and host special events for people to watch. An enrichment technically is anything which stimulates the animals' senses, body, and/or mind. Enrichments are also variously known as behavioral enrichment, behavioral engineering, animal enrichment, and environmental enrichment. Variety is the spice of life, for animals as well as humans. Enrichments are something that can be part of a routine, completely random, or somewhere in between. They range from toys with treats or smells, hidden tasty delights, altering the landscaping of the enclosure, training the animals to perform certain behaviors, and even interactions with humans through encounters. The purpose of enrichments is to provide captive animals with opportunities to display a range of species-appropriate behaviors and to make behavioral choices that give them some control over their lives. While individual keepers and zoos have worked hard to improve the quality of life of their animals for decades, it has become mainstream in the past 5 to 10 years. This new focus on animal welfare has led to an approach to enrichments that is very scientific, systematic, and coordinated. Enrichments aim to improve the psychological and physiological well-being of captive animals through environmental stimuli that help meet the animals' mental and physical needs. They may also have specific, conservation-related goals, such as increasing the reproductive success of endangered species in captivity (1).

Great enrichments are beneficial to the animals, the zoo visitors, and the keepers. They must add variety to the animals' lives without deterring other natural or key behaviors. The first step in beginning an enrichment program is learning about the animal's behavior in the wild. Using behaviors like how an animal forages or hunts for food are a good place to start when introducing an enrichment. Hiding tasty treats around the enclosure stimulates the animal, as it must seek out the food, and keeps the animals moving all around the enclosure, giving viewers a better experience. Scents are also frequently used in animals with acute senses of smell, such as tigers. These smells can come from pheromones or habitat pieces from other animals' enclosures, like tree branches (1).

Figure II.1: An example of scent-based enrichments. Here, a tiger at the Honolulu Zoo is shown smelling wood scented by a llama. The llama used the branch as a scratching post, which was then given to the tigers.

Some natural activities are undesirable, for a variety of reasons. Very aggressive and excessively predatory behavior can be very dangerous to keepers, so they are discouraged through enrichments. One way to deter aggression is to train the animal and have its keepers act more as a mother while the animal is young. This teaches the animal limits and appropriate submissiveness, while still encouraging natural activities. These types of behaviors also do not go over well with visitors. While visitors want to see the animal act naturally, they generally do

not want to feel threatened or excessively scared. Furthermore, many of these behaviors stress the animals and are detrimental to their health in a zoo environment (1).

Good enrichments also do not detract from an animal's natural habits. Most animals are creatures of routine, especially in zoos. This helps relax the animal, and give it a sense of control. If an animal knows that it gets fed and its enclosure cleaned in the morning, for example, it will be more willing to participate in the proper behavior for these activities. It also will be less anxious through these activities because it knows when these occur. If an enrichment interrupts a routine too much or stimulates the animal such that it does not perform normal, required tasks, the enrichment really does no good. Keepers need to make sure that the animals still engage in other normal activities, like sleeping, scratching, swimming, playing with others, mating, etc. with the enrichments added. Giving enrichments at a certain time of day manages this problem. It ensures that the animals have time for other activities, but still allows them time for playing with something new. This activity draws in people. By advertizing animal excitement at a certain time of day, more people will come to the enclosure to see that activity. Consequently, this time is also particularly useful to give a brief lecture about the animals and answer any questions visitors may have (1).

Toys and Object Enrichments

To make life interesting, keepers use novel stimuli to keep the animals engaged and happy. This is very similar to giving children new toys once the old ones become boring. An example of an object enrichment, especially on hot days, involves making popsicles out of fruit

or vegetables and juice for herbivores, or meat and blood for carnivores. The commonalities between animal and child development have been explored by animal behaviorist Francoise Wemelsfelder. She has investigated how enrichments can help improve the ability to learn, cope with challenging situations, and reproduce normally. She is also is a strong proponent of the concept that animals are agents of their own well-being, not passive responders to their environment (12). The happiness of the animals increases by having some control over their lives. In fact, many children's toys are now being used as enrichments, especially for primates. For example, the lemurs at Cougar Mountain Zoo are frequently given children's puzzle toys with some smell or food on or in them, and the tigers routinely play with stuffed tigers, like what is sold in the gift shop.

Figure II.2: A red-bellied tamarin is shown exploring a Little Tikes Busy Box. This photo was taken at the Philadelphia Zoo.

Because of this interest and popularity of using toys as enrichments, research is being done on what causes certain toys stimulate certain animals. This is leading to the development of new, species-specific enrichment objects (1). Many of these objects become regular parts of their animals' enclosures. This idea has led to further development and design of zoo habitats.

Habitat Enrichments

As late as the 1970s, zoo habitats were sterile steel and concrete or glass boxes. Animals were mostly confined alone, and consequently were unable to interact with others, both of the

same species and humans. They also were unable to live with anything similar to their natural environment. This type of enclosure is harmful to the animals' mental and physical health. They cannot maintain their natural, instinctual behaviors, nor can they properly develop socially. It is a terribly lonely and boring way to live. Zoo patrons clearly recognize this, and consequently they become more uninterested in zoos and conservation. One key factor most zoo goers want to see is how the animal behaves in the wild. When the animal has nothing resembling its natural environment, most of its wild behaviors are not applicable and not seen. But when the habitat allows for diverse behaviors, both the animals and the visitors are much happier and enjoy their experience more. However, this barren type of habitat has become largely replaced with a more ecological approach. Many zoos starting in the 1970s began to make the enclosures more natural by adding plants and other structures meant to resemble the native landscape of the animals. Today, many zoos have extremely lush environments. The bars and walls have been replaced with moats and other such barriers to keep the animals from escaping and giving a more open, friendly appearance to visitors. Lush habitats of this kind also make the enclosures give the visitors an experience more like being in the wild with the animals (11).

A.

B.

Figure II.3: The difference between the old style of zoo habitats, i.e. 1970s and earlier, and the more current zoo design. A shows a barren, concrete and bar enclosure, while B shows a lush, natural environment more common today.

Animals are also kept with at least one other member of their species, if not several. This is very prominent when zookeepers wish the animals to breed. In these cases, a mating pair may be separated from the rest of their group, but still within visual and sometimes auditory contact. These types of environments are much healthier for the animals, and consequently have better breeding rates. It makes the animals more active, which consequently keeps the interest of the zoo patrons better, causing them to stay longer and even return more frequently. Once the people are interested, they will be more willing to learn about the animals and how to help the species survive (11).

Another way to enrich a habitat is by bringing in new objects. These can simply be something novel or can be recycled from another enclosure. Either way, the animals have something different to explore. When the objects are from another habitat, new smells are brought with it, which are particularly interesting to animals like tigers with acute olfactory organs. These smells stimulate the animal, and also cause normal wild behaviors, like re-scenting the area. Tigers use smells and markings from their claws to designate their territories. Bringing in new objects for them to scent allows people to see this normally elusive behavior (1). Although more elaborate, some zoos are even implementing habitat rotation with a series of walkways or tunnels. Periodically, animals are moved in groups between different habitats. While keeping the original set of animals together, the animals get new and interesting places

to explore. This can be seen at the Point Defiance Zoo in Tacoma, where a series of tunnels connects three habitats and allows keepers to rotate animals, including their Sumatran tiger, between enclosures.

Exhibits are now designed so that the animals have control over some aspects of their lives. Even small changes can make a difference, like adding places for the animals to dig, scratch, or swim. This gives the opportunity to perform natural activities and arrange their habitat as desired. For tigers, having areas to scent and scratch is very important as it allows them to express a very natural and important behavior. Another key enrichment for tigers is adding places for them to swim or at least splash in the water. Tigers love to swim and will even dive underwater and swim for objects, such as food. This is a great way to both surprise and entertain the public, while allowing the tigers a place to relax, cool off, and play (1).

A.

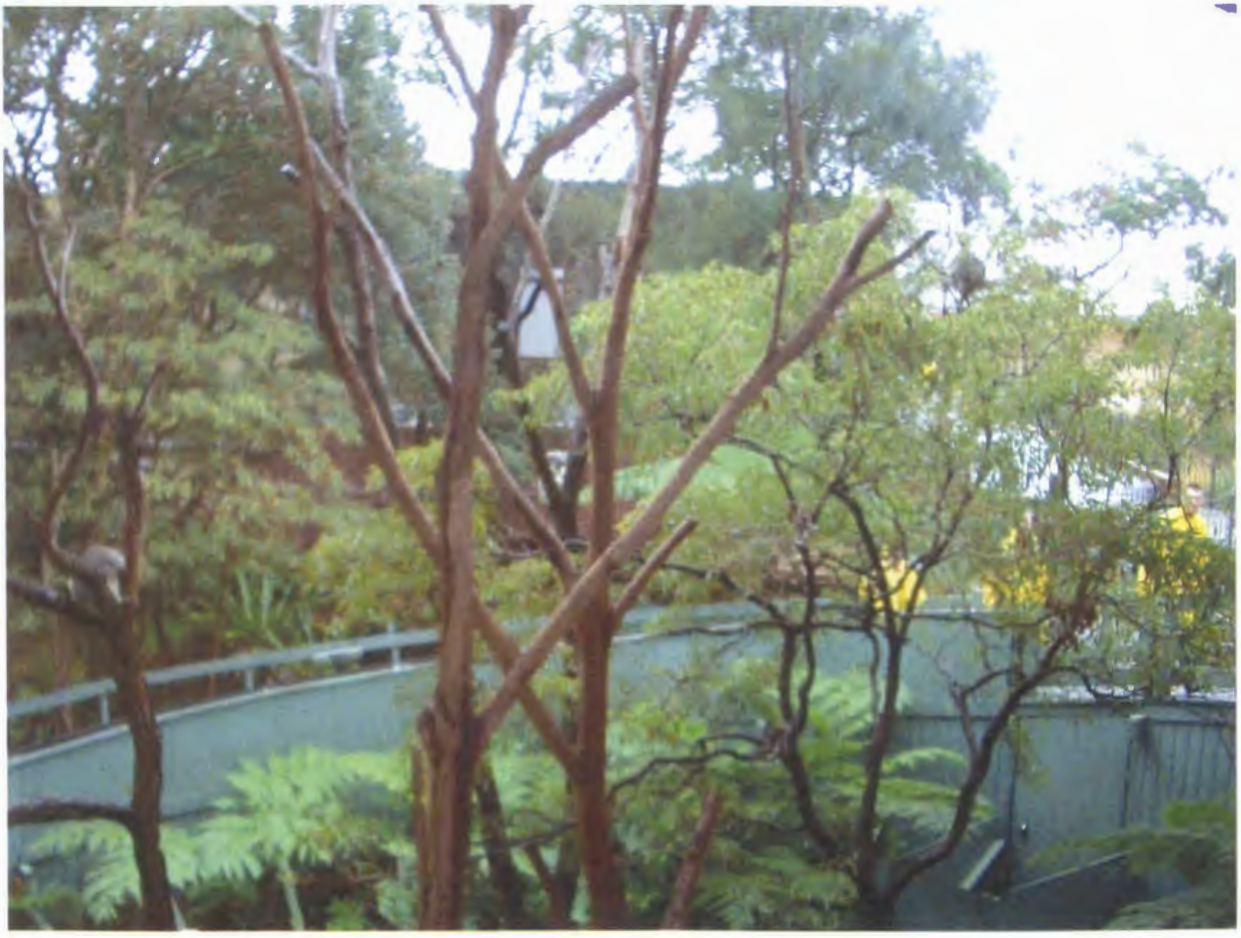
B.

C. 

Figure II.4: Tigers love to swim, as shown by these animals. A shows Taj as a cub splashing in the small pool of their play area. B shows Almós playing in the larger pool temporarily in their enclosure, snapping at Taj to keep him out. C shows a Royal White Bengal tiger diving for a treat in a large pool.

While lush, natural environments are desirable for zoos, a balance must be found between being ecologically correct and having too many places for the animal to hide from the public. Animals of outdoor zoos in particular need to relax sheltered from the natural elements, like heat, rain, wind, and even snow. However, if there is too much plant life and covered areas, the animals may choose to hide all the time. This deters the public from staying, and disappoints many people. A zoo can only be effective in conservation if people get interested

in its animals through seeing them. However, humans are a large stressor in animals' lives, so they must be given places to retreat and relax. Thus, each zoo must find a balance between what the public wants to see and what is best for the animals (2).

A. 

B.

Figure II.5: The koala enclosure at the Taronga Park Zoo in Sydney, Australia. At first glance in A, hardly any can be seen because they are sleeping in their trees. But B shows a close up of a koala hanging out in its favorite perch in the same enclosure.

Human Socialization for Enrichments

Human socialization for zoo animals is crucial to creating meaningful enrichments. If the animals are not comfortable around people, they tend to hide, even with tempting treats present. When the animals are properly socialized, they are unafraid of their human keepers and audiences. This will eventually lead to curiosity and interest, and even enjoyment when visitors come. When properly socialized, some animals will actively interact with humans, watching others just as they are being watched. Human socialization lowers the daily stress of

animals at zoos. With many sounds, smells, and sights, a zoo can be a very confusing place to live. Strange noises made by people, smells of human food, and other animals nearby can be very detrimental to the animal's mental health. Frequently, this will cause the animals to hide in their refuges, disappointing the patrons and causing disinterest as previously discussed. (1).

At Cougar Mountain Zoo, all animals are socialized to improve their quality of life. The tigers regularly interact with people and take great pleasure in "stalking" and "pouncing" at viewers in a playful manner that is encouraged by the keepers. This is normal tiger behavior that people enjoy seeing, but is not too aggressive or destructive to the bond formed between the keepers and the tigers. This interaction gives the animals something to do, rather than simply spending their lives in a cage, cut off from the rest of the world.

A. 

B. 

Figure II.6: Healthy, playful behavior of tiger cubs, like stalking and pouncing at keepers, are shown in these photos. Photo A shows Taj biting at the pant leg of a keeper. B shows Almós behind a bush, waiting to pounce on the keeper coming around it. Both of these behaviors are natural tiger instincts, and are encouraged by the zoo staff. They pose no real threat to the keepers, but once the tigers reach about 100 pounds, the keepers will no longer play with the cubs in this manner, because it becomes more dangerous for the people.

Being socialized makes interactions with keepers much more enjoyable and pleasant for all parties involved. The keepers can handle, feed, and clean the enclosures daily, as well as performing routine check-ups for medical needs. Sedation for these examinations is very hard on the animals and can be dangerous. Keepers and veterinarians try to avoid doing this whenever possible. Training and socialization is an easy way to make the animal comfortable with normal procedures, and makes it easier on the keepers as well. It also makes these

procedures an enrichment activity via interaction. The animals get a chance to socialize and strengthen the bond with their keepers and enjoy some TLC (1).

As the animals become more comfortable with people, they relax and behave naturally. This allows viewers to see wild animals performing natural behaviors, making enrichments more effective. It also gets people more excited about the animals and consequently conservation. A cycle of reinforcement occurs; the animals are comfortable with people so they behave naturally, the people enjoy watching active animals so they spend more time watching, which in turn makes the animals more comfortable with people, repeating the process (1). Enrichments further aid in this cycle by encouraging the animals to be active and social. But without proper socialization, enrichments are ineffective.

Figure II.7: The cycle of socialization is depicted. When animals are comfortable with people, enrichments become more effective, the people get more excited from these active animals, and consequently watch more. This also encourages more people to watch and makes the animals more comfortable with people again.

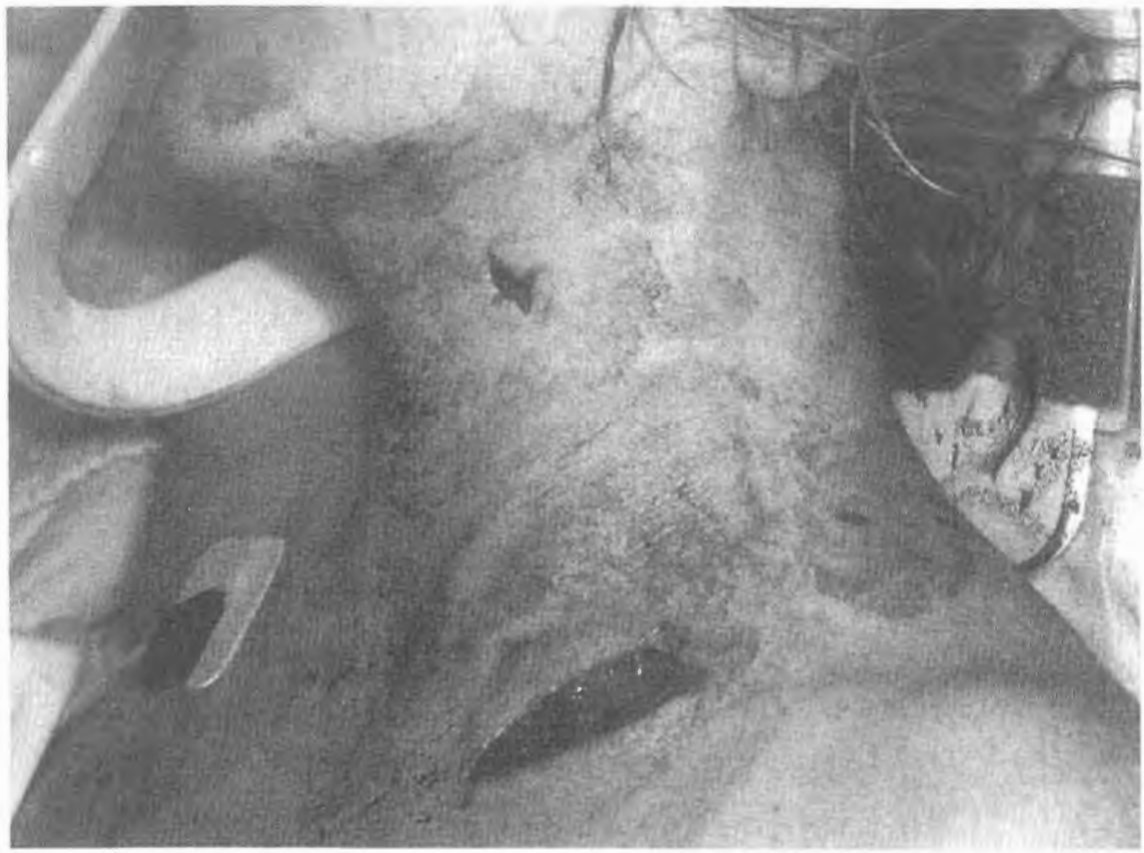
Negative Aspects of Socialization

Socialization does not come without its costs. While the vast majority of tigers in captivity never attack anyone, tigers are large, aggressive animals, and should be treated as such. An increased number of tigers, as well as other wild animals, are being kept as pets or in "private" zoos and have caused an increase in the number of attacks on humans. Less than ten percent of the estimated 5000 to 7000 captive tigers in the United States are kept in

professional zoos and sanctuaries. The rest live in unlicensed and unregulated "private" zoos, which can lead to mistreatment and mismanagement of the animals. In these situations, attacks are more frequent, especially by large, predatory animals (9).

Tigers are ambush predators, stalking and attacking from behind. They frequently bite the neck in order to suffocate larger prey. Attacks on humans follow this pattern, as seen in 2007 at a private zoo in Minnesota. In this instance, a woman was attacked by a 700 pound Siberian tiger while cleaning the enclosure. She was first bitten on the neck and then held on the ground for thirty seconds. The animal then attacked her legs. She stayed conscious throughout the ordeal. This is one of three known attacks at this particular zoo.

A.



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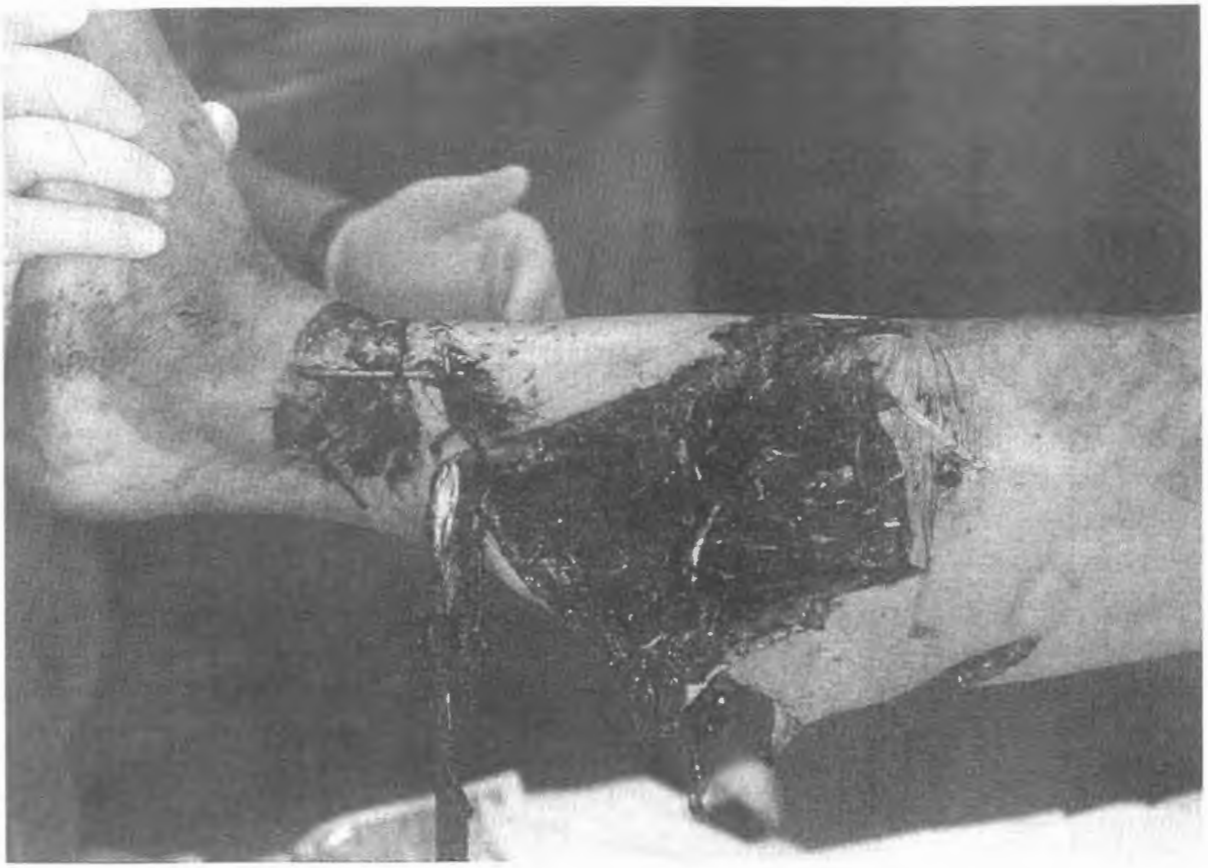


C. 

Figure II.8: Images from the tiger attack in Minnesota. A shows the wound to the neck of the woman. B and C show the subsequent wounds to the woman's leg, including the X-ray.

Attacks on humans such as this are rare, even in the wild, and is considered aberrant behavior. Most injuries to keepers are minor and come from playful tiger-like activity, such as small scratches and bites. These are normal, playful behavior and keepers are used to it. However, the keepers also draw a clear line between ordinary tiger play and overly aggressive behaviors. In these cases, the tiger usually intends to kill or cause severe harm to a person. Because tigers are such powerful predators, attacks on human result in serious injury or death. Tigers pose a large threat to humans because they are such powerful predators, especially in

combination with mishandling and being cared for by uncertified, untrained individuals. Captive tiger attacks on humans occur for many reasons including ill treatment, problems with the keeper, instinctual reactions to sudden movements, or for no apparent reason at all. Sometimes even well-funded, accredited zoos have attacks. Most problems are easily avoided with precautions and training for all parties involved. Forming a bond between tiger and keeper is crucial. Happy, entertained, and well fed tigers vary rarely attack humans (9).

While socialization is an important enrichment and leads to a healthy keeper-animal relationship, it can become a problem. In places where animals, particularly tigers, are bred with an ultimate goal of reintroduction to the wild, socialization is an undesirable trait. It is very dangerous to release animals like tigers that are comfortable with people. While the animal might not attack a person, it may try to interact or play with one, as it had in a zoo setting. This might sound like fun, until one remembers that tigers have 20 claws, large teeth, and well over 100 pounds on the average person. Most tiger breeding programs are many years away from reintroduction, so this is not a major concern as of yet. Most zoos prefer to maintain a healthy environment for both their tigers and their staff through interaction with humans (3).

Encounters as a Method of Socialization

Socialization and close interactions with humans can be very beneficial to animals, even tigers. Encounters are a direct interaction between a zoo animal and a patron, supervised by zoo keepers. They can take place inside an enclosure or behind a safe barrier, as with tigers. Encounters involve people in the animals' lives in a safe, controlled manner. These frequently

include a treat or some sort of object enrichment for the patron to give to the animal. This interaction gives the people a special thrill by being in contact with the animal, and gives the animal an incentive to interact with people. Reinforcing comfort around humans aids in the socialization of the animals and can be the most beneficial form. If a tiger is used to performing small tasks for rewards, it will be much more friendly and interesting for other viewers (1).

Encounters offer a very different type of enrichment. The animal gets the excitement of a new and different person, including all their smells. Encounters also are scheduled according to demand, so they are not part of a daily routine for the animals. They give a stimulating new experience, even if some of the behavior is trained. While training the animals is unnatural, research has shown that both natural and artificial approaches to enrichment are valid. It can help the animals to better interact with their keepers and the public, making for more interesting visits and happier animals. Training activities keep the animals from being bored, gives them much-needed exercise, and keeps them involved with their keepers. A healthy keeper-animal relationship is key to monitoring the animal's health and makes medical procedures easier (1). For example, when the tiger cubs at Cougar Mountain Zoo were young, they had to be moved between the nursery and their outdoor playpen. An easy way to accomplish this was to leash train the cubs, so that although they were contained at all times, the keepers could maintain control over the willful and playful cubs while transferring them. The cubs were also trained to sit still on a scale for weighing every day.

A. 

B.

Figure II.9: Taj and Almós are shown in A and B, respectively, with collars and leashes. This allowed the keepers to move them between their nursery and playpen safely and with minimal stress for everyone involved.

Training provides a safe way for encounters to take place. The animal performs special tasks, receives a reward for performing them correctly, and the person involved feels the thrill of interacting with a wild animal. Keepers can monitor the encounter to ensure that the animal does only what it is supposed to do. Most trained behaviors for encounters are simple, easy tasks for the animals to perform, like a cougar or tiger putting its paws up against the side of its enclosure to receive a piece of meat through a protective barrier. When visitors get to see animals perform and even handle them, adults become motivated to learn and children are actively engaged in a way that is impossible in the classroom. Encounters stimulate audiences

and get interested in conservation. They give people something for their money when they make a donation to the zoo. It also may get people to donate who normally would not due to the activity of the enrichment. Encounters make giving to the zoo exciting, fun, and safe (11).

Cougar Mountain Zoo Enrichments

Cougar Mountain Zoo has daily and random enrichments for all of its animals. It uses several types, following both the routine of the animals and bringing in new events. They use: object enrichments, habitat enrichments, human socialization, and encounters as a form of socialization. As previously discussed, these variations of enrichments help the animals remain physically, socially, and mentally healthy. The best way to see how these enrichments fit together is to follow a day in the life of the tigers at Cougar Mountain Zoo.

The tigers spend the night in their indoor retreat, which allows them warmth and shelter for the night. Their enclosure is cleaned in the morning while they are still in the shelter, for the keeper's protection and peace of mind.

Figure II.10: This photo shows the rear area of the tiger enclosure that has walls and a roof for shelter. The cubs are put in at night and released during the day.

In the morning, the tigers are fed their main meal of the day and their enclosure is cleaned. For this, they remain in the rear area with the exits closed. This keeps them from entering the main portion of their enclosure, preventing unwanted surprises to the keeper, and ensuring that the animals eat their own food. Once the keeper is finished and has left the enclosure, the tigers are allowed enter the rest of their habitat at will. For the rest of the morning, the tigers are left to do as they please. They frequently partake in activities like napping, playing with each other and their toys, scratching the logs, splashing in their pool of water, and other tiger-like

behaviors. The habitat itself is designed to allow the tigers to entertain themselves for hours, an example of habitat-enrichment.

Figure II.11: The tigers are shown here entertaining themselves by wrestling with each other.

Throughout the day, the keepers go about their daily business, frequently passing by the tiger enclosure. The animals are part of the zoo family, and are treated as such. For animals like tigers, the keepers served as their mothers while they were babies. As adults, they will continue to maintain this bond. Like family members, keepers talk to and interact with the tigers, saying hello and greeting each other. The tigers enjoy this contact, and it gives the keepers a chance to monitor the health and behavior of the tigers, while still going about other duties. Because the tigers are constantly in contact with their keepers, they are much more comfortable when

routine procedures must be carried out, like weighing and shots. It also keeps life interesting and social for the animals.

In the afternoon, a daily object enrichment and lecture occur at the same time. The keeper will give the tigers some kind of enrichment, like a special meat treat hidden around the enclosure, and while the tigers are interested and active, a lecture is given to the public about the tigers. The tigers get some excitement every day and the public gets more interested. During the lectures, people can be allowed in a special walkway by the tiger enclosure, where a single pane of Plexiglass separates the tigers from the audience. This is very exciting for both the tigers and the people, as the tigers enjoy coming up against the glass to rub against it and investigate the viewers. The tigers get to come close to new people, explore, and actively roam around their enclosure with this social enrichment. Because the tigers are socialized, their interest is frequently piqued by objects that people have with them, and take the opportunity to get closer and inspect. This gives the viewers a special thrill too, as they are actually interacting with the tiger, even through a plane of glass.

Figure II.12: Almós interacts with a woman through the Plexiglas of his enclosure wall.

The public also participates in encounters with the tigers frequently. These generally occur at specific times, but are scheduled only as people request. So while the tigers are constantly in contact with strangers through encounters, they do not occur with rigid regularity, unlike their other enrichments. This leads to a more interesting experience, and varies the daily routine. When a person donates a certain amount of money to the zoo, he or she can interact directly with the tigers. All the proceeds go directly to the Tiger Fund, which funds the tigers' daily and medical needs, as well as supporting tiger conservation worldwide. While they were cubs, the person could physically play with the tigers for an hour, in both the nursery and the

playpen. Once they got larger, however, people are not allowed into the enclosure, so they hand feed the tigers little treats with tongs through the enclosure wall. All of these activities are closely monitored by multiple keepers for the people's and animals' safety. These encounters spice up life for the tigers, while still maintaining a routine and familiarity. This is a great way for the patrons to interact and get excited about the tigers, and give back to the zoo. It encourages people to get involved in conservation.

The zoo closes at five o'clock pm, and the number of people viewing the tigers generally slows in the late afternoon. Around closing time, the keepers go through some final activities, checking on the animals in particular. The tigers are able to wind down after a day with a constant flow of people. They also usually to retreat to their rear, sheltered enclosure for the night. When the next day comes, they repeat the whole process.

Enrichments and Conservation

There is a cyclic relationship between enrichments and conservation. The animals become more active through entertaining enrichments, exhibiting more exciting behaviors. Animals moving around enclosures and acting naturally make them more fascinating to the public. People tend to stay longer to watch, taking a new interest in the species. With added interest comes inquisitiveness. By asking questions about the animals, people begin to care more and become invested in the animals' well being. Concern leads patrons to participate in conservation by informing others and giving time or money to conservation efforts. More

people to want to visit the zoo to watch, causing the zoos to put more money and time into enrichments and education programs. More enrichments mean more active animals again, restarting the cycle (1).

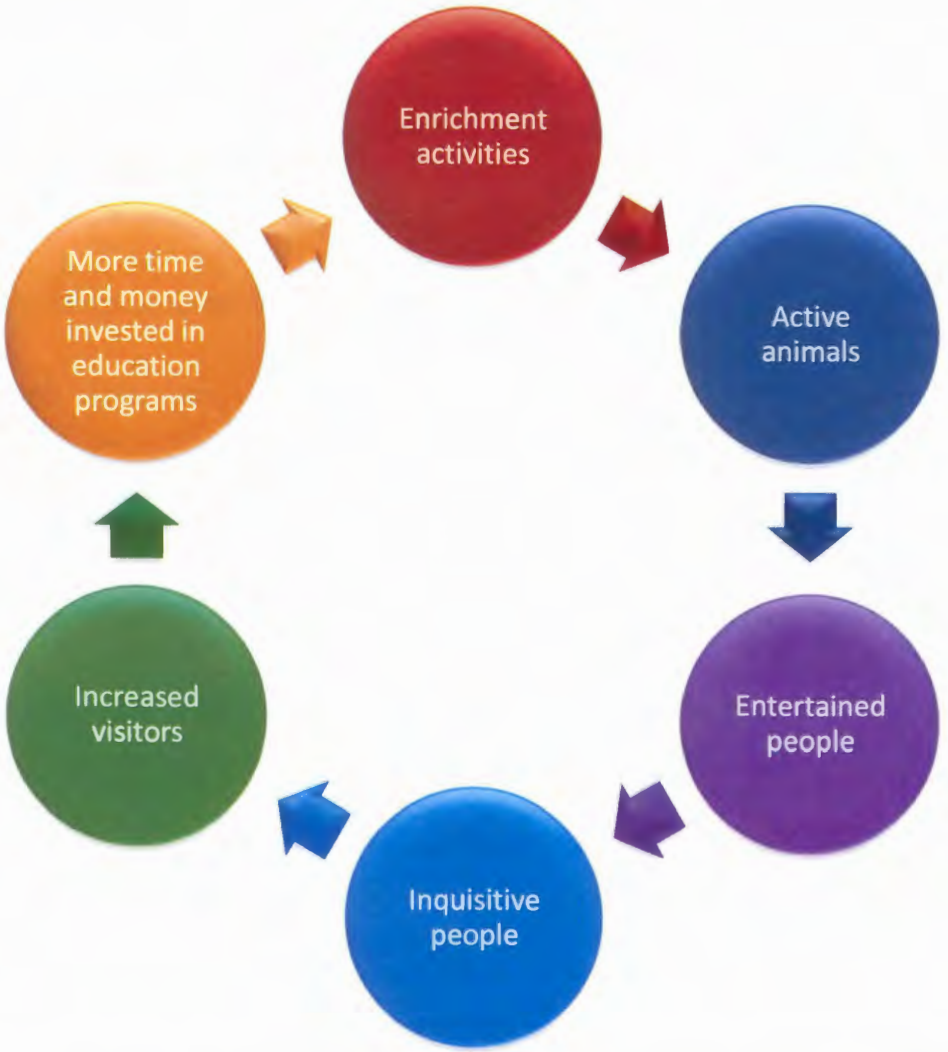


Figure II.13: The cycle of enrichments and zoo visitors in terms of increasing enrichments. All aspects are important and help in conservation and education.

Enrichments and socialization also decrease stress in animals. This could be a very easy solution to many reproductive and behavioral problems seen in zoos. Proper socialization and bond formation with keepers has been seen to decrease acts of aggression against the zoo

staff. This is not a fix-all solution though. Wild animals will always behave like wild animals. But, so long as precautionary methods are taken, zoos may see much happier, friendlier animals. Relaxed animals also may be more reproductively active. It has been shown that stressed animals are not as reproductively successful as their unstressed counterparts. Zoos with breeding programs appreciate the importance of relaxed, happy animals, especially because baby animals are a huge drawing factor for the public. As more people come to the zoo, conservation efforts become more effective, as previously discussed (1).

In some cases, what is right for conservation may not be what zoo patrons want. Zoos involved in breeding have to decide how many and which subspecies to have in captivity. One example is colorations of Bengal tigers. Even though inbreeding is bad for the subspecies, some zoos breed certain colors in order to draw in visitors. These zoos will staunchly defend their right to continue breeding in this manner, even though it is controversial. Cincinnati and Omaha Zoos are examples of holdouts. Both breed Royal White Bengal tigers specifically to increase zoo attendance. Many conservationists are concerned over the effect this has on the genetic diversity of the subspecies. However, the extra income from the patrons is used for conservation and other scientific research at the zoos. This controversial funding makes a large difference and is helping to save the species (2).

Captive breeding can only do so much. It cannot save natural habitats, ecosystems, or even all of the endangered species in the world. Many studies have shown what individual zoos

have known for years: "if animals in zoos do not behave normally and naturally in diverse and interesting ways, zoo visitors will not gain an appreciation for the natural world" (1). Enrichments are the answer to many problems in zoos: they improve the mental health of animals and entertain visitors. Without enrichments, conservation efforts at zoos would fail miserably.

Figure II.14: Taj and Almós wrestle amongst toys, keepers, and a fun, well-designed habitat.

III. ZOOS AND EDUCATION PROGRAMS

Ideally, education programs of zoos and aquariums should relate to people of all ages, backgrounds, and schooling levels. Messages of conservation would ideally be relatable by all members of society. There are widely different strategies for education, and in many cases a combinatorial approach is the most effective. Education programs include self-learning activities, interactive activities with zoo personnel and animals, formal lectures, follow-up activities, and even the media. Zoos frequently employ all of these tactics in order to appeal to people of all ages and backgrounds. Some focus more on formal education, while others, like the Cougar Mountain Zoo, prefer a more informal approach. Here, docents, volunteers, and zoo keepers are always present and available for answering questions. In fact, the zoo prides itself on always having at least one or two people wandering around the zoo with the sole purpose of answer questions from the public. The other types of education programs commonly found in zoos are also found at Cougar Mountain Zoo, especially tours, interactive materials, and the media.

Effective education programs always start with the animals. People do not want to learn about the animals if they are uninteresting and boring. Thus, enrichment and socialization activities pave the way for education to begin. Active, cute animals, like baby tigers, always draw in more visitors because their interest is perked. Once the animals are full of life and entertaining, visitors will be drawn in and interested in the messages about conservation.

Educational programs utilize this interest in order to inform people and then try to get them involved in conservation.

Forms of Education Programs at Zoos

Providing several forms of educative material makes learning more effective for a wider variety of people of various learning styles. Self-led learning is particularly common at zoos, as people will more frequently stop to read signs, rather than attend a lecture. This form of education also serves as a gateway for more in-depth material. Once people are interested in the subject, they will be more likely to participate in more formalized or comprehensive education programs. Creative methods vary from trivia-like signs near the habitats to habitat organization with animals from the same areas of the world grouped together. Simple changes like this teach people about the basics of the animals clearly and easily. Signs can be used to point out interesting details about both the animals and the habitats or region they are from. Guidebooks and other informational pamphlets are very common and useful. Visitors can read little blurbs while looking at the subject and enclosure. Fun facts and trivia help people become excited about the animals (11).

After students visit a zoo, follow up activities reinforce information learned. Zoo field trips make material much more interesting to students, because it is seen real life. Studies have shown that reiterating facts and information learned after an activity helps increase retention of the information over longer periods of time. Activities vary by level and teacher, ranging from simple writing assignments, to complex activities related to biology laboratories.

Assignments which require students to do further research can get them active and interested in conservation efforts. Signs or pamphlets about further reading and research at zoos are very helpful for those interested. This ensures that the people get accurate information while browsing at their leisure (11). After reading such devices, patrons frequently develop more questions, and may want to learn more. Docents and other zoo staff are particularly useful at this point, to further educate visitors.

Docents and information stations can be the most informative. These are frequently provided by zoo volunteers, and give the patrons a friendly, open way to learn about the animals. They also answer more complicated questions and educate about the zoo or conservation efforts. Many adults and teenagers can get involved in zoos and conservation by participating as docents and volunteers. For students interested in anything from animal conservation, biology, or horticulture to marketing, business, and education, zoos offer a great way to get involved, through volunteering, internships, and acting as a docent. One can learn more about a certain field before earning a degree in it or applying for paid positions. These internships can also give valuable experience in order to enter rigorous programs such as graduate studies in biology, zoo design or keeping, and even veterinary medicine (14).

Volunteers and docents often lead tours. Many different types of tours can be offered, aimed at school children or up to adults. Without being a conservational biologist or zoologist, people help educate others and are involved in conservation. Birthday parties at zoos give kids the chance to see the zoo and learn some fascinating information. Cougar Mountain Zoo offers

many guided tours and birthday parties. The people involved can participate in special activities while on the tour, such as take a photo surrounded by macaws. This gives yet another opportunity for adults and kids to ask questions about the animals and zoo, enhancing their learning and interest. People who have taken many tours may choose to get involved at the zoo by leading them.

The Media as a Portal for Information

The media is an excellent source of information for the masses about zoos and their animals. Newspaper articles, complete with pictures, let people know about events and new features at the zoo. Articles about the baby tigers at Cougar Mountain Zoo ran in the local papers and the Seattle Times. Updates on the tigers and events related to them continue periodically. These drew in hundreds of new visitors over the summer. People even began saving and comparing the pictures as the cubs grew up. Some inhabitants of the area had not even heard of Cougar Mountain Zoo before, and were drawn in as a result of the tiger publicity.

A.

THE ISSAQUAH PRESS

Cougar Mountain Zoo's two most recent additions, a 7-week-old Royal White Bengal tiger cub (left) and 10 week-old Golden Bengal, were introduced to news media Saturday by General Curator and Zoo Manager Robyn Barfoot after their arrival in Issaquah four weeks ago.

Tigers make Issaquah new home

B.

Tigers make Issaquah new home

Only Bengals in the state can be seen Wednesday

BY CHANTELLE LUEDEMANN

What originates from Asia, has two pairs of eyes, two striped tails, eight legs, big paws with big claws and the littlest roars you've ever heard?

Issaquah's newest residents — two Bengal tiger cubs.

After a journey of nearly 6,000 miles by plane, weeks of being indoors, hand fed and playing with staff, Cougar Mountain Zoo's newest additions are preparing for their first public appearance.

The pair arrived May 30 to enrich the zoo's growing collection of animals and be ambassadors for the conservation of tigers around the world.

"The plight of the tiger is tragic," said Robyn Barfoot, general curator and zoo manager. "For such an incredible and magnificent animal and predator their numbers are dwindling so rapidly."

The two cubs are the only examples of the Bengal tiger subspecies in Washington state. Woodland Park Zoo and Point Defiance Zoo and Aquarium both have tigers, but they are Sumatran tigers.

"With the addition of our two cubs, the Seattle area should be ready to go out and conserve tigers with how many we now have here," Barfoot said.

It is estimated there are fewer than 100 Golden Bengal tigers and about 400 Royal White Bengal tigers in existence worldwide, she said.

The tiger species is one of the most poached species on the planet due to eastern medicinal practices where almost all of the tiger can be used for healing, she added.

There are only about 3,400 to 6,750 tigers from six different endangered subspecies left in the world. Three subspecies of tigers are already extinct, the Javan, Balinese and Caspian tigers.

"Depending on who you talk to, it is estimated that tigers could become extinct within the next 10 years," Barfoot said. "These cubs are going to be instrumental in promoting conservation of all tiger species."

The older of the two cubs, a Golden Bengal, is about 10 weeks old and weighs about 21 pounds, while the younger, a Royal White Bengal, is about 7 weeks old and weighs about 12 pounds. Both tigers are male and should reach full growth, between 300 and 550 pounds, in about two and a half years.

The two cubs are representatives of the color variation within the Bengal tiger subspecies. Barfoot said, adding that color variation, like when a human has blood hair, is a recessive gene trait.

Depending on the weather, Barfoot said they intend to reveal the cubs to zoo patrons sometime in the next week if the cubs are

COUGAR MOUNTAIN ZOO

ready.

"Their comfort and safety is our primary concern," she said.

However, during a photo session with the two's personal photographer, visitors were given a surprise sneak peek of the two cubs June 21.

"I love the tigers," said Stephanie McLaren, 5, of Issaquah, who came up to Barfoot, after seeing the tigers for the first time.

The McLarens weren't the only visitor that day, and

See TIGERS, Page A8

Figure III.1: The front page of the Issaquah Press on June 27th, 2007. A shows the title, while B is a close up of the sub-headline and the text on the front page.

TV programs bring attention to the animals and zoological conservation efforts, especially with reporting at the zoo or animals at the TV station. Cougar Mountain Zoo began a segment on Q13 News this summer by bringing in one or two animals from the zoo each week. It began with bringing in the baby tigers, while they were still small enough to be mobile, and expanded to other animals, like lemurs, African Crowned Cranes, and alpacas. A wide variety of people can be exposed to the animals this way, and become regular visitors of the zoo.

Education at Cougar Mountain Zoo

An example of how education efforts come together in a zoo is provided by Cougar Mountain Zoo. While the majority of the information given is informal, it can be just as effective, if not more so, than formal lectures. Patrons really enjoy the informative, question-based programs at Cougar Mountain Zoo, and can be more involved in conservation as a result. The zoo provides jumping off points for visitors, so that those who know very little about the animals or conservation and learn something, and then develop questions and insights on their own. The wide variety of educational programs at Cougar Mountain Zoo aim to help people learn about the animals and conversation. Here, signs, pamphlets, daily lectures, tours, the interactive Wildlife Tracks Library, and docents make the experience at the zoo both enjoyable and educational.

At Cougar Mountain Zoo, signs are available to help visitors navigate around the zoo, learn about the animals, discover new and interesting facts, explore conservation and volunteer opportunities, and everything in between. All enclosures at Cougar Mountain Zoo have signs describing what animals are inside, where they come from, and any other interesting facts.

Signs are also present to direct visitors and give general information about the zoo. At some of the larger enclosures, like the cougars and the tigers, trivia-like signs are present, in order to test the patrons' knowledge of the animals and also give fun, unique facts.

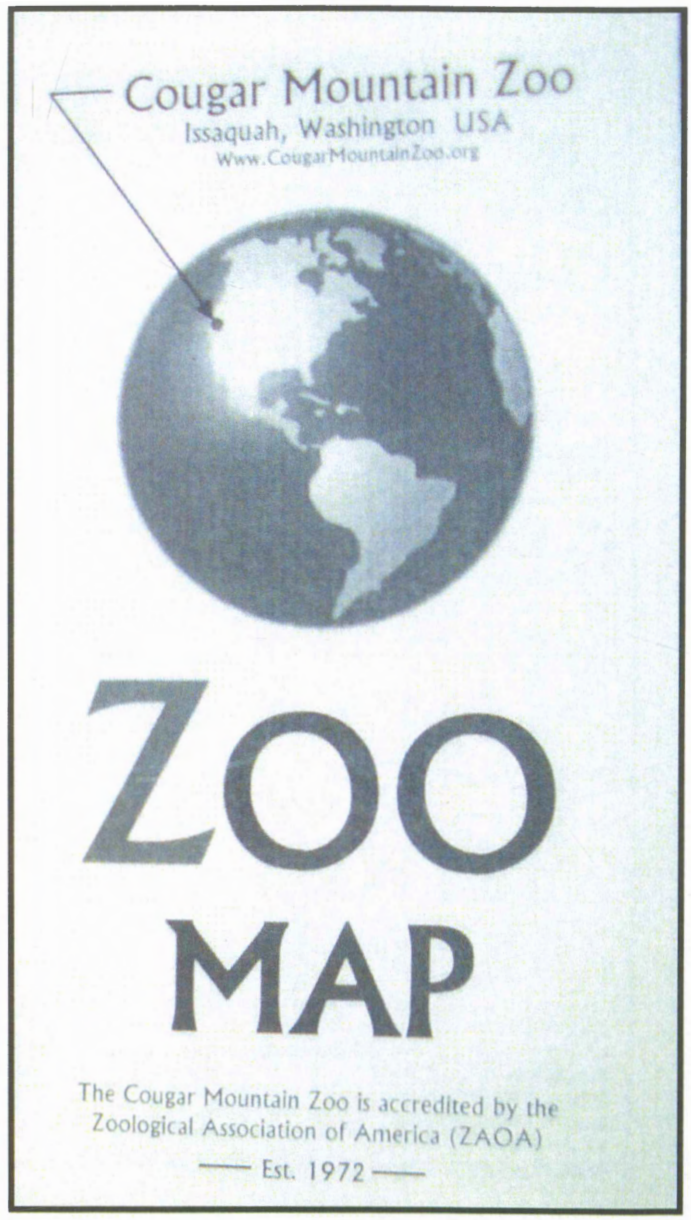
Figure III.2: The author beside the sign outside the tiger enclosure at Cougar Mountain Zoo.

Pamphlets are normally distributed when the patron enters the zoo, and serve as something the visitors can carry with them while exploring the zoo facilities. The most commonly used pamphlets are the Zoo Maps, which show where the animals are located, and the "Things to See and Do at the Zoo," which highlights features of the zoo to check out. Information about the zoo that a person wants can usually be found in pamphlet form near the entrance. This includes a timeline of notable events in the zoo's history, ways to get involved at the zoo through volunteering, ways to donate to the zoo and its causes, and finally how to host

a birthday party or tour group at the zoo. People, especially those with children who enjoy the zoo, find information about encounters and parties particularly useful.

A.

B.


Cougar Mountain Zoo
Issaquah, Washington USA
Www.CougarMountainZoo.org
ZOO
MAP
The Cougar Mountain Zoo is accredited by the
Zoological Association of America (ZAOA)
Est. 1972

C.

Figure III.3: A shows an example pamphlet of what to "See and Do" at Cougar Mountain Zoo. B shows an example Zoo Map, and C shows a pamphlet about how to volunteer at Cougar Mountain Zoo.

Upon entering the zoo, patrons are given a list of the lectures which are given every day. These include all the different "Worlds" of animals, such as the "World of Tigers," "World of Cougars," "World of Ratites," and the "world of Macaws." Each "World" has one lecture each day, at different times, so that a patron can visit any and all lectures he or she desires. Daily

lectures may sound formal, but the friendly, approachable nature of the keepers and staff leading the discussions lead to a very relaxed setting. The lectures are also question-based, and people of all ages and backgrounds are encouraged to participate in the discussion. Patrons frequently stay longer at these lectures to ask many questions and fully experience the animals at Cougar Mountain Zoo.

Figure III.4: Daily lectures handout given when zoo patrons enter Cougar Mountain Zoo.

Tours are led by zoo staff, like docents and keepers, and give an in-depth experience of the zoo. Generally arranged in groups, people tour the entire zoo with detailed information being given by the leader. Tours also are particularly thrilling, as people get to see the animals

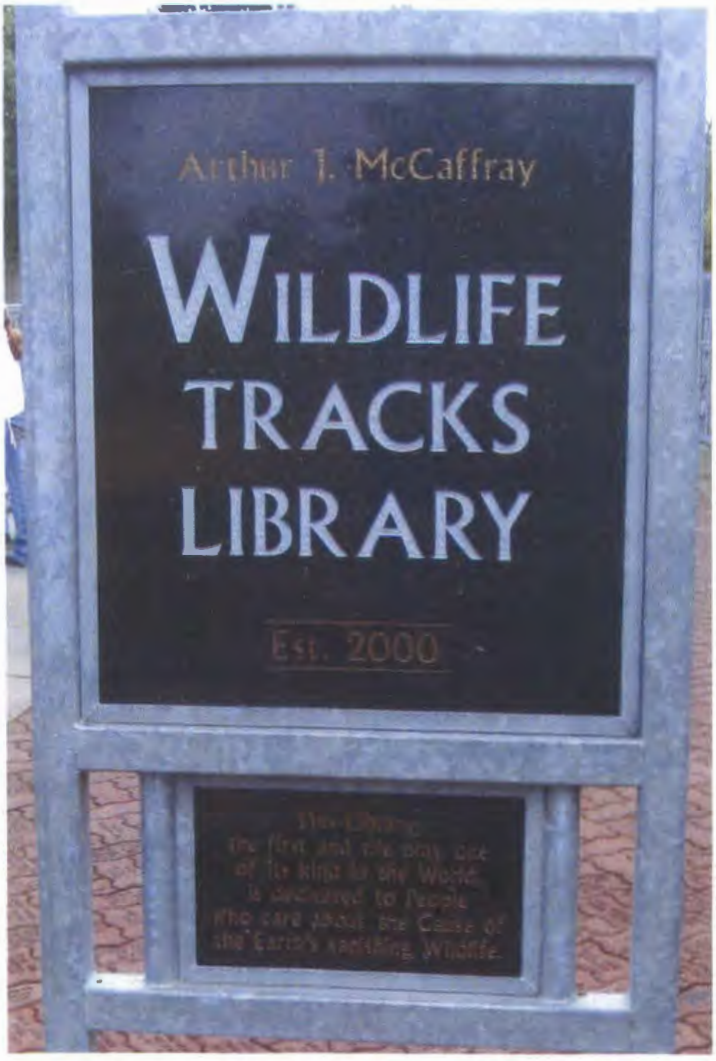
interact with a member of the zoo staff, and are usually more active and responsive with someone they know. Also, tours at Cougar Mountain Zoo include object enrichments for certain animals along the tour. During these, the docent or keeper will let a person or a few people give the enrichment, usually some tasty treat, to the animal. Most people who come to the zoo do not get this experience, and people find it to be very exciting and enjoyable. Tours are also included with every birthday party hosted at the zoo. In this case, the birthday boy or girl gets to hand feed the animals of certain exhibits, and also sit in a chair surrounded by macaws. This is a fun experience for children and adults alike, and many get excited about the animals and conservation because of these experiences. Tours also allow visitors a more interactive way to learn about the animals, by both experiencing the animals, and asking questions of the tour group leader.

Figure III.5: A zoo staff member (on the right in green) is talking to a tour by the tiger enclosure at Cougar Mountain Zoo.

The Wildlife Tracks Library at Cougar Mountain Zoo is fairly unique. It is a walkway that overlooks the Magic Forest portion of the zoo and great views of the surrounding area. On this path are signs featuring paw prints of wild and endangered animals on brick tablet signs. The first section includes the names of the animal beside its tracks or the outline of the animal. The second section has just the tracks, with the names listed on the back side of each tablet or just the outline of each animal. This allows visitors to first learn about different wildlife tracks and shapes of animals, and then test their knowledge. Many of the tracks belong to animals native to the northwest, allowing people to learn about what is around them. Some people even begin

to look for and recognize wildlife tracks while hiking and camping in the Pacific Northwest. Furthermore, people can purchase a tablet to be placed in the section, featuring the tracks of their choice of animal, and even add a special message. This is yet another way to contribute to education and the zoo. The Wildlife Tracks Library helps patrons learn something new and then reinforce that knowledge by either testing oneself or applying it to the real world.

A.



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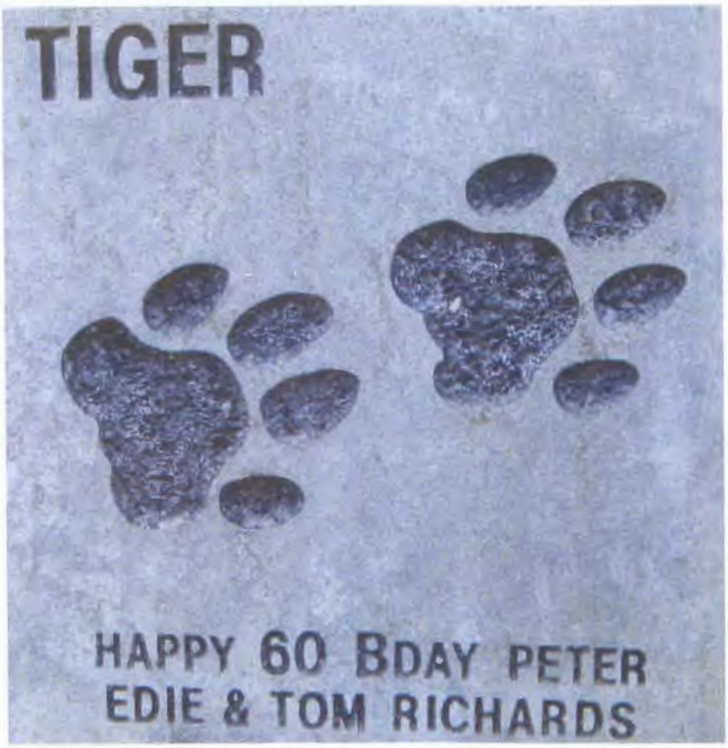

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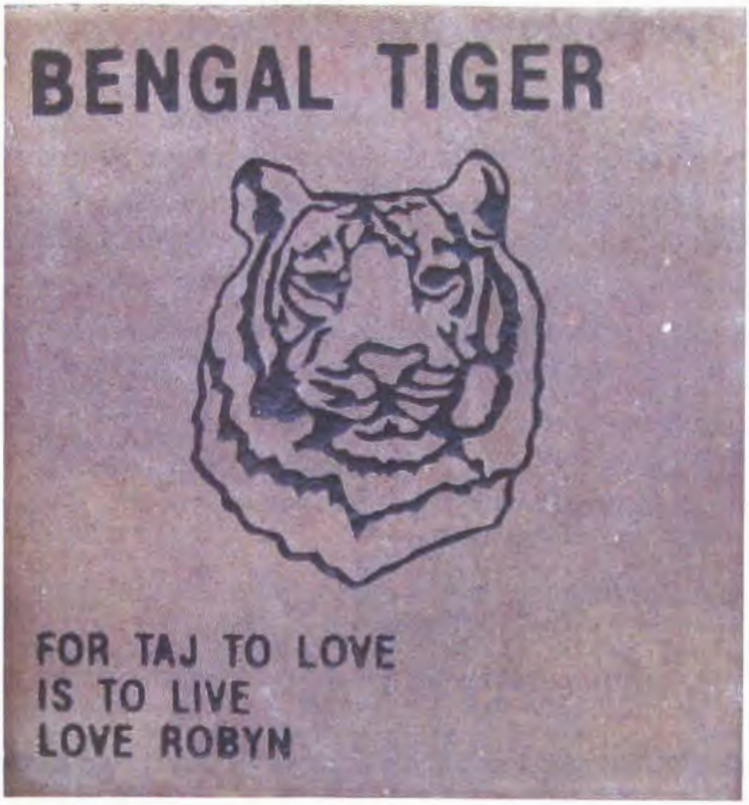
D.



E.

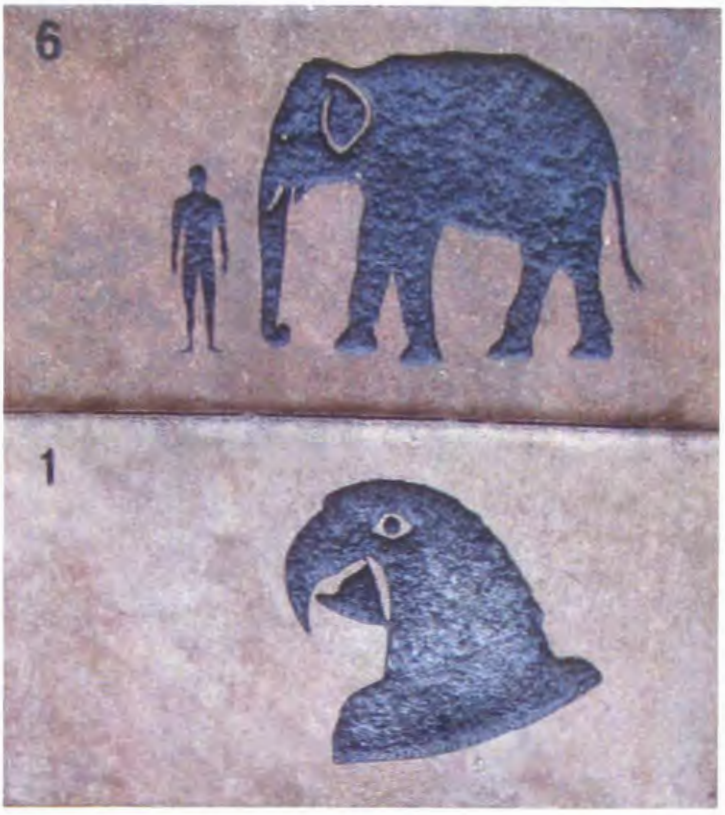


Figure III.6: A photograph of the Cougar Mountain Zoo Wildlife Tracks Library. A shows the walkway. B shows a close up of a tablet with the tracks and the animal. C shows example test

tablets, with just the tracks. D shows an example outline tablet that is labeled and E shows test outline tablets.

All zoo staff and volunteers are expected to answer any questions at any time, whether he or she is busy working or not. Docents are always wandering around to help people with zoo navigation and to provide information about the zoo, animals, and habitats. Many patrons enjoy this aspect of the zoo, as it makes the experience more personal and educational for children and adults alike. Zoo staff is expected to be knowledgeable about all areas of the zoo and its animals. If one docent does not know the answer to a particular question, she or he will find someone who does or exhaustively research the question until an answer is found for the visitor. Zoo policies such as this make conservation a more accessible field for the average zoo patron.

Figure III.7: A picture of the author as a docent at Cougar Mountain Zoo, clearing flowers from the tiger playpen.

Education Programs and Conservation

Education programs at zoos are paramount to perpetuating conservational efforts for endangered species. Without educational programs, a trip to the zoo is a fun outing, with no real consequence or learning. An afternoon with animals can be so much more than this. Zoos are a great real-world application for material learned in school. Students can see firsthand what they learn in biology and science classes, from animal anatomy and behavior to horticulture and engineering in zoo design. Interactive features give people a way to retain and more deeply understand the material they have learned while at the zoo. Features like the Wildlife Tracks Library can even help people to better understand the wild world around them. Tours and daily lectures programs are get people excited about animals, while still teaching them how to help. They can be the most effective way to get people involved in conservation, as they allow patrons to ask any questions they like, while watching interesting and active animals. Finally, docents and other zoo volunteers are particularly good, as they can help visitors with any problems or questions, from navigation of the zoo, to animal facts and conservation.

The way zoo education programs spread conservational messages is much like gears turning. Enrichments make active, happy animals, which is what people come to zoos to see. Zoos then get people interested in the animals by learning fun facts and draw people in with the offer of an experience unlike any other. Visitors in turn share these interesting facts and zoo information with others, getting more people enthralled with the animals. Without zoos, many people remain uninformed and unconcerned with the plights of endangered species. This

cyclical relationship is depicted in Figure III.4 below. Once educational programs get people excited about conservation, people become more interested. Visitors spread this information to others, drawing in new people to the zoo, and repeating the cycle. Zoo educational programs provide a jumping off point for people to get as involved in conservation as they desire.

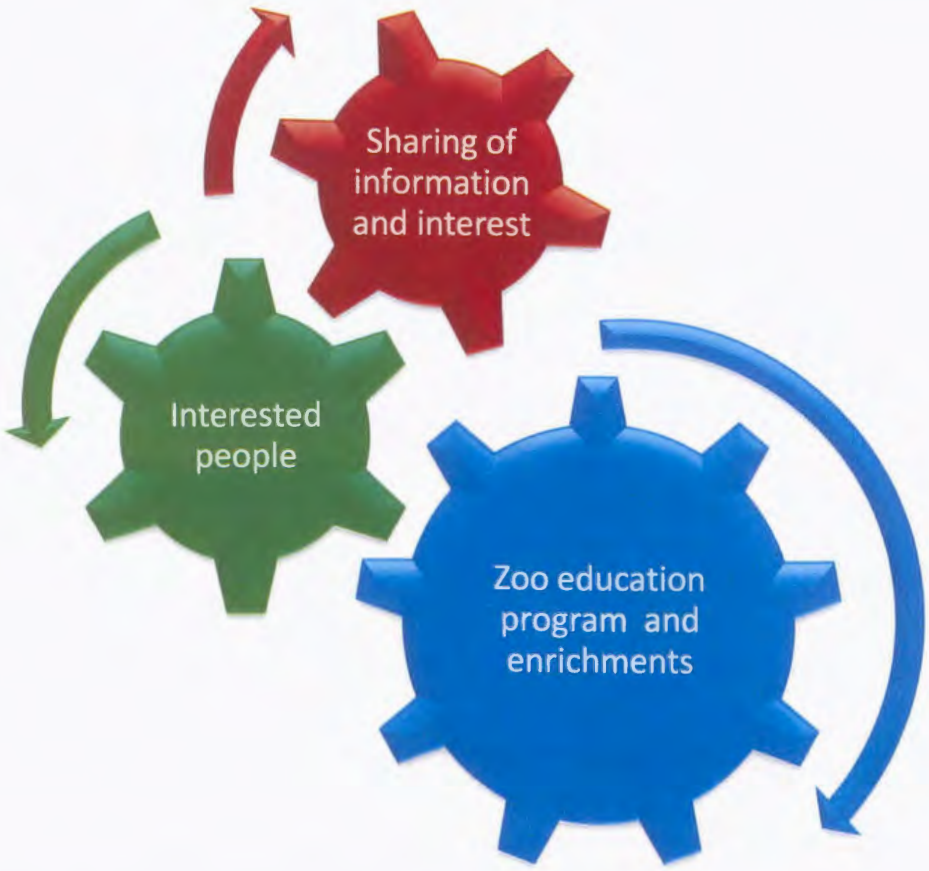


Figure III.8: The cyclical nature of education at zoos is depicted.

IV. CONCLUSION

Zoos are crucial to conservation efforts for endangered species such as tigers. Both formal and informal information must present at zoos for adequate learning to take place. In order to gain and keep viewers' interest, the animals and habitats need to be appealing, but natural. The best way to attain this is through enrichment and socialization programs for the animals. Active, naturally-behaving animals are fascinating to people, and get patrons to not only care about the survival of the species, but also ask questions and seek to educate themselves. Once people are engaged and learning, conservation efforts are much more effective, and the survival of the species becomes possible. In 2000, the American Zoo and Aquarium Association (AZA) recommended that in order for a zoo or aquarium to become accredited by the AZA, it must have a formalized enrichment program, exemplifying the newly elevated place of enrichments (1).

The key to saving endangered species is to get the attention of the general public and keep their interest. Zoos present an opportunity for this and more. They offer a sanctuary for species to live, while providing for their survival through breeding and research programs. Zoo keepers and staff are definitive resources on their animals, conservation efforts, and population issues in the wild. Zoo patrons, adults and children alike, can be entertained, fascinated, educated, and devoted to conservation through a single visit. The general public makes conservation efforts not only possible, but successful. Captive breeding and conservational programs can only go so far, without the support of people, efforts to halt the trade of tiger

parts fall on deaf ears. The tiger trade must be stopped for the wild populations to survive and recover. Zoo animals serve as ambassadors for their species, exciting people, while reinforcing their importance in the wild. Without these animals, conservation would be nonexistent. The future of tigers and all endangered species is in our hands. In this battle, how will you help?

Figure IV.1: Two Bengal tigers battle.

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