Analysis of *Panthera leo* Habitat Design and Construction at The Wild Animal Sanctuary in Keenesburg, CO.

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Amongst the perpetual farms and natural grasses rolling across the Eastern plains of Colorado there is a refuge for exotic beasts and their admirers. The sanctuary here has been perfecting the creation of lion (*Panthera leo*) habitats for nearly 33 years (Craig 2013). Senior staff at The Wild Animal Sanctuary reveals how to make an efficient, safe, and fulfilling lion habitat in accordance with Colorado law and USDA standards. In a personal interview conducted in the summer of 2013 Teresa Kempf, who is senior animal care staff unveiled technique and design of the habitats on site. Unlocked down to the details the most spacious exotic animal sanctuary in the United States now shares valuable knowledge to encourage the best animal welfare.

Originally this sanctuary went by a different name and was located in Boulder, CO, where the founder Pat Craig was living as a 19 year old man (Craig 2013). Due to land constraints and crowding by local businesses the sanctuary was moved away from the mountains and into the plains. During contemplation of location the sanctuary staff considered many other places, ranging from California to Tennessee. Environment was the largest contributor for the settlement of the sanctuary. Qualities such as insect inhabitants, including tick populations, and catalysts for chemical reactions like rust on fences were subjects with the largest impact on location. Insects are not just a problem for annoyance reasons but also prove to be very effective and dangerous pathogen vectors for housed animals (Derraik 2004).

Once the decision was made to stay within the state of Colorado the variance in topography was another conundrum. Mountains pose issues for all contained animals with emergencies such as fires, which would require more maintenance of controlled burns, and less opportunity for expansion. The eastern plains of Colorado are easily manipulated to meet sanctuary needs. In this environment the staff has planted grasses which grow in clumps and discourages fire dispersal. While there are over 300 animals at The Wild Animal Sanctuary of varying species, the Eastern plains of Colorado happen to be a great environment for lions. This specific spot of Keenesburg happens to be in a ‘bowl’ or depression in topography which makes it very difficult for a tornado to traverse. Reaching above and beyond the Association of Zoos and Aquariums, there are emergency plans on file in case a fire, tornado, or financial crisis ensues (*The Association Standards and Related Policies* 2009).

Wintertime in Colorado does pose its welfare challenges even though most of the animals love to romp in the snow. Design and construction of enclosures provide plenty of comfortable retirement space at a stable 60 degrees Fahrenheit all year round. This way the animals can warm up in the winter and cool off in the summer. Lions kept in captivity must have protection if the temperature drops below 50 degrees Fahrenheit (*The Accreditation Standards and Related Policies* 2009). For every one lion in a habitat there is provided one den. Even though African lions are immensely social creatures, this habitat setup allows for escape for each lion if a skirmish was to arise within the habitat. An underground den is located 30 ft. below the ground with a width of at least 30 ft., and an entrance length of 40 ft. These dens are composed of layers in order to better endure weathering. The inside of the den (where the
lion has direct contact) is concrete, after the concrete is a plastic waterproof lining, still moving in an outward direction the structure is supported by chain link fencing, and finally covered in a concrete/dirt mixture. The entrances of each den is prebuilt from donated construction round pipe from an old highway project in Colorado known as ‘T-REX’. This round pipe always has an interior minimum of three feet in diameter. These sections of tubing and other similar premade construction pieces consisting of different shapes are set up around the habitat for climbing, privacy, and shade.

Along with water shade is a valuable rarity in the plains. There are no naturally growing trees in the lion habitats at the sanctuary. Here the staff does their best to encourage tree growth by planting, adding protective fencing, and frequent watering. Against their best efforts many trees die due to toxic lion urine and desire to chew leaves. Though these exotic animal experts have not given up the battle for living shade, the sanctuary highly recommends the concrete structures. These are ideal because they do not require staining against the elements, decay is very slow, they are heavy (even for large animals), and they provide strong shelter from the destructive wind of the plains.

As mentioned before, water is not common for Keenesburg, Colorado. Nevertheless each lion is supplied with at least 50 gallons of water which is located near a fence as to assist with replenishment. Amongst the many animals at The Wild Animal Sanctuary there are other animals which naturally enjoy water features more than lions, and the water play budget is currently for the other animals. In the future if there is enough money, the sanctuary feels the ideal lion habitat would allow the lions an area to play in a water feature. This water feature would have to be at least 20ft by 20ft. In addition to a water bowl the lions all have a food bowl, even though they prefer to eat spread out. Food is provided in specific areas, sometimes man made, behind a hill at least five feet at the apex which provides privacy from the peering public. Generally this means they are eating wet and slimy meat which has come into contact with the natural plains. With this in mind the staff is very aware of what is being applied to the ground by people. Staff is constantly removing items which visitors have lost into a habitat and never use chemicals to remove weeds. Thistles and other spiky weeds are regularly removed from all habitats. Even the smallest foreign items (those being not intentionally placed by the staff) are removed throughout the day. Daily habitat maintenance is required. The goal is to always have a physically and chemically safe environment for the lions.

The sanctuary has limited the number of entrances and will continue to do so in order to keep the animals more comfortable. Along the entrance there are more than ten various posted signs explaining safety standards expected of visitors, this is another component enforced by Animal and Plant Health Inspection Service (Animal Care Inspection Guide 2013). Also the visitors are only allowed on a walkway which runs through the whole sanctuary and the habitats upon pillars, which has a minimum height of 20 ft. off of the ground. This part of the design is often overlooked by visitors. In accordance with the United States Department of Agriculture (USDA) section for Animal and Plant Health Inspection Service (APHIS) these dangerous animals are adequately kept our of visitors’ contact; on average the people here are 35 feet above the lions (Animal Care Inspection Guide 2013). By placing the mass amounts of strange and loud people above the lions and other animals, The Wild Animal Sanctuary has removed the direct threat of territory challenge. In this way the visitors are placed into the sky which is a neutral zone. Being at eye level with a wild animal is the most dangerous place to be. From this distance it becomes very difficult for people to intimidate or provoke these wild animals. On this walkway visitors can take pictures, view, point, and admire without disturbing the animals. There are rules explicitly given by the sanctuary welcome center to ensure ideal homes for the animals. The
visitors are not to run, yell, smoke, or dangle items over the railing in order to keep all of the animals happy and healthy.

The walkway is made of a steel frame upon wooden donated utility/telephone poles. The walkway pieces are built on ground level and raised into place when the walkway is extended. This technique requires less time and less machinery inside each habitat. The staff is always anxious to diminish the stress applied to their lifelong animal guests.

The donated telephone poles are also used to as a fence in the lion habitats, see Figure 1. Fencing has proven to be the most effective barrier for lions in artificial and natural obstacle tests (Gabriele 2013). Poles are placed at least every eight feet and support a combination of chain link and field fencing. Of the 8 ft. tall lion fencing the lower four feet of fence is made of three inch by six inch rectangles while the top half of the fence has six inch by six inch square holes. Chain link is only applied as a last resort, because it reduces visibility, it is costly, and difficult to manipulate. APHIS does not have any regulations for engineering application, nor materials (Animal Care Inspection Guide 2013). Both types of fencing are pulled with a loader upon application. This fence design allows for more protective care of the animal care staff with the lower portion of the fencing being too small for lion paws and jaws to fit through. Additionally the extra-large poles and field fencing breaks wind patterns and reduced vortex/twister motions.

The primary fence in any animal habitat at the sanctuary is most interior and is electrified. These hot wires are set at 6.3J, which is healthy compared with people whom receive cardiac arrest at 10-50 joules. (TASER Device Frequently Asked Questions 2013) The secondary fence is built the same way as the primary but lacks electricity and is placed six feet exterior to the primary fence, though the USDA only requires a three foot space (Animal Care Inspection Guide 2013). This gap allows staff to adjust water and food away from animal contact.

The secondary fence is only applied to areas in between people and the animals. For example, adjacent lion habitats will only have a primary fence. If the primary fence was to give out for any reason the secondary fence is also built to encompass a pride of fully grown lions. In addition to reducing the chances of escape, the lions are given ample space, so they will never feel the desire to expand and explore outside of their habitat. Roughly each lion is given five acres of living space (not including underground dens) on average. With abundant space and tall fences there is no need for cantilevers or other extensions to keep the animals in. The gates allowing staff through the fence are built with hinges on one side and chains and locks on the other. The chains and padlocks are sturdy enough to withstand 1,000 lbs. of force at minimum.

Another essential for a lion habitat, as described by The Wild Animal Sanctuary, is called a “lock out”. This is an area within the boundaries of the habitat that can be sectioned off to contain the animals safely and comfortably, see Figure 1. The best way to do this is to have an indoor section where the lions have a food bowl, water bowl, toys, and plenty of space. Even in these smaller enclosures animals are housed with full regard to Association of Zoos and Aquarium standards such as “Animals should be presented in a manner reflecting modern zoological practices in exhibit design, balancing animals’ functional welfare requirements with aesthetic and educational
considerations” (The Accreditation Standards and Related Policies 2009). Ideally, the dividing door between the two sections of the habitat should be a motorized guillotine style gate which can be controlled on the outside of the primary fence. This way the lions can be tempted into the smaller lock out, and closed in all the while animal care staff can observe. Lock outs are important for secure regular maintenance and cleaning of the two sections of the habitats. This division also allows the smaller lock out area to be worked inside of with the lions being barred to the larger portion of the habitat. This area of the enclosure is filled with at least five inches of cedar wood chips. This is for absorbency, smell, and to deter weeds from growing.

Above ground shelters are crucial areas for The Wild Animal Sanctuary as the plains are extremely sunny. These shelters can be made of many materials such as, wood, concrete, metal, or even straw. Especially for the plains, above ground shelters are best if they are partially buried or heavy enough to never be blown over. Straw is not as permanent as steel or concrete and therefore not used as frequently. This product does not produce mold, and rodents do not eat it. It is comfortable and is easy to manipulate. Straw is a helpful tool for building shelters for hiding and play, see Figure 2.

Interactive toys are always an important part of keeping a wild animal happy. A spacious habitat is great to have, but enrichment is still a necessity (Animal Welfare 2011). In this department plastic is allowed. The Wild Animal Sanctuary uses Boomer Balls for strength and longevity (Boomer Ball 2013). Boomer balls in spherical shapes provide a challenge for habitat design because, if they are placed in a habitat with a slope angled towards a hotwire then the toy will gravitate towards it. This makes the effort of a toy useless as the toy becomes dangerous. Moving the dirt in the habitat to create upward slopes to every primary fence eliminates this challenge. In addition to these plastic toys of varying shapes and sizes, the staff creates their own climbing structures, see Figure 3. Massive units utilizing telephone poles, chains, and concrete slabs create a jungle gym like space, as APHIS requires a climbing area for all cats (Animal Care Inspection Guide 2009). Giant wooden logs are also laid about for natural chewing, scratching, and climbing.

Like the toys, the habitats themselves are designed to be easily traded between the animals. If more land is acquired and it makes sense for a group of lions to be moved, the older habitat can easily house another group of lions, tigers, bears, and more. Lion habitats can be placed adjacent to any other type of large land animal as there are more interspecies conflicts than across species. Though it is encouraged to design your lion habitats grouped together because they are such a socially dependent species. The Wild Animal Sanctuary does not have habitats for solitary African lions due to their desire for a pride (Chasing Big Cats 2013). This requires many acres and makes land the determining factor of the creation of a habitat. There are special cases for the sanctuary in which an animal will have a unique habitat due to a preexisting condition. If a lion comes to the sanctuary with a bad declaw surgery, is blind, or
has never seen grass before, then a smaller one acre habitat is built. If the previously acquired obstacle cannot be overcome, then the animal will stay in a smaller habitat.

The goal of every design at The Wild Animal Sanctuary is to create a home where the animal will be happy and “not just survive, but thrive as independently as possible” (Kempf 2013). Both physiological and behavioral needs are always met to rid the animals of stress and allow them to be content, as stress has the largest impact on welfare (Broom 2010). Currently the animal care staff has hopes to provide more trees, and build more climbing/jumping stations along with shade structures. Though Pat Craig lives on site and is aware of every sound made through the night, the staff also dreams of having night cameras for the habitats. These experts design and construct lion habitats at one of the highest ranking sanctuaries in the country (The Wild Animal Sanctuary 2013). Even with all of this experience and knowledge The Wild Animal Sanctuary is still learning and striving to improve. Like the rest of the scientific community working in animal care we all learn from each other’s mistakes and always aim to improve the treatment of the animals.

References


Kempf, Teresa. Personal Interview. 2013

