Electric Fence Perimeters for Bears: Moving Away from the Traditional Grotto

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Abstract

Jersey Zoo, headquarters of the Durrell Wildlife Conservation Trust, currently maintains 1.1 spectacled bears *Tremarctos ornatus*. During the 18 month building process for a new mixed species exhibit for our bears, the pair resided in temporary accommodation until their new exhibit was completed. In an effort to minimise expense and yet provide a large and complex environment for the temporary housing of our bears, we decided to convert a paddock enclosure previously occupied by Przewalski's horses *Equus przewalskii*. The dilapidated chain link perimeter of the horse paddock was removed and replaced with a 1.5m high electric fence which formed the primary barrier for housing the spectacled bears. The bears were habituated to the fence and managed so successfully in this environment that the decision was made to modify the construction of the perimeter for our new enclosure to include electric fencing, resulting in a significant cost savings.

This paper will describe our experiences managing spectacled bears using electric fence perimeters. It is intended to highlight the advantages of using electric fencing as a safe and inexpensive alternative to traditional "hard" perimeters. Bear species have historically been considered large, dangerous, and destructive. Housing has therefore reflected this perception and given rise to the barren "bear grotto" still seen in many zoos of today. Construction of bear accommodation is costly. However electric fencing may provide an economical perimeter providing some zoos with the opportunity to replace existing grottoes considered too expensive to replace or renovate in the past. Furthermore, when a smaller portion of a limited budget is used in the construction of a perimeter, more resources are left over to apply to other aspects of an enclosure allowing for the development of larger, more stimulating, and more diverse bear accommodation.

Introduction

The Jersey Zoo, headquarters of the Durrell Wildlife Conservation Trust, was founded by Gerald Durrell in 1959 to be a "zoo with a difference", where conservation and captive breeding were the focus. The Jersey Wildlife Preservation Trust was set up in 1963 and has since developed into an internationally recognised conservation organisation. In 1999 we changed our name to the Durrell Wildlife Conservation Trust in respect for our late founder. Our mission statement is simple, Saving Species World wide.

In recent years, the Jersey Zoo has been successful in managing the spectacled bear, *Tremarctos ornatus*, in enclosures which have electric fence perimeters. The Jersey Zoo began working with the spectacled bear in 1963. During that time we have had two breeding

pairs - first a male, Pedro (International Studbook #22), and his mate, a female, Petrona (International Studbook #42) and now our current pair, Wolfgang (International Studbook #248) and Barbara (International Studbook #232). From 1970 until 1997 our spectacled bears lived in a 263m^2 traditionally styled enclosure (Bloxam, 1975). The enclosure was a grassed landscaped exhibit surrounded by high concrete walls with inlet public viewing windows and a water moated front. By 1997, this bear enclosure had clearly become out of kilter with the progressive style of the rest of the zoo's large mammal enclosures. By example, both our gorilla compound and our orang-utan enclosure are expansive, complex, landscaped exhibits, clearly different from our old bear enclosure. As a result, construction began for a new, 1,700m^2 (18,300ft^2) multi-species exhibit, which we have called First Impressions. In June 1999 our pair of bears were moved into this environment along with eight ring-tailed coatis *Nasua nasua* and a pair of short-clawed otters *Aonyx cinerea*. For details of the design of First Impressions, see Cowan, Darwent, and Riva, 1999. As the old bear accommodation had to be demolished during the building process for First Impressions, Barbara and Wolfgang had to be moved into temporary accommodation. This paper will focus primarily on the 18 month period when Barbara and Wolfgang were held in this environment.

Description of Enclosure and Perimeter

In an effort to minimise expense and yet provide a large and complex environment for the temporary housing of our bears, we decided to convert a 1,300m^2 (14,000ft^2) paddock enclosure previously occupied by Przewalski's horses *Equus przewalskii*. The enclosure itself consisted of an outdoor grassed area which was divisible into two sections by way of a sliding gate. The enclosure was furnished with several large climbing trees, boulders, wood piles, a wood chip pit, fire hose hammock, pools and three sleeping crates. Because this was temporary housing for the bears, there was no internal accommodation where we could secure the bears inside. Therefore, the cleaning and feeding regime was managed simply by shifting the animals on one side of the gate or the other.

The dilapidated chain link perimeter of the horse paddock was removed and replaced with a 1.5 meter high electric fence. This fence formed the primary barrier for housing the spectacled bears. The old chain link fence proved to be quite useful in the creation of the new electric boundary as it was buried just below ground level along the internal circumference of the enclosure. This provided a dig barrier as well as a good "earthing" mechanism for the new perimeter. Meaning, no matter how dry the earth became, when a bear stood near the fence line, they were sufficiently "grounded", due to the buried chain mesh, so that touching the fence resulted in a full shock. The nine electric lines were all "live" and a live "outrigger" (white electrifed tape positioned approximately one foot inside the electric fence line) was placed at bear nose height along the internal circumference of the fence. The outrigger was important in the psychology of managing the bears in this area and will be discussed in greater detail in the next section. A simple post and rail secondary barrier was used to keep the public back from the electric fence line.

The fence was power by a standard agricultural energiser which produced a charge of 6,000-8,000 volts, at 0.5 amps per second. The energiser ran from mains power but was equipped with a battery backup system which could potentially run the perimeter for up to two weeks if case of an electrical failure. Also, an audible alarm and pulse light beacon were features of this particular energiser, which automatically activated if the fence charge dropped below 3,000 volts.

The Psychology of Electric Fence Perimeters

Electric fencing is a psychological barrier not a physical one. The shock received from the fence is not sufficient to incapacitate a bear. An electric fence is meant to work by addressing the "thinking" part of an animal, not the brute force strength part. Therefore, it is of the utmost importance to introduce bears (or any other species) to electric fencing prior to using it as a perimeter. In this way, bears have the chance to learn to respect the fence in a safe and controlled manner thus preventing the likelihood of a bear challenging an electric perimeter physically. A bear needs to be given the chance to learn it is not worth receiving a shock to challenge the fence. This is why electric fence training and enclosure design are of paramount importance.

Barbara and Wolfgang were trained to the electric fence perimeter by using a "training panel". The panel itself is made up of wires, electrified tape, mesh, and other materials used in the construction of the perimeter so that visually it resembles the fence line. The panel is secured inside one of the bear dens and brought "on-line" using a portable energiser. In our experience it has only taken a few shocks for Barbara and Wolfgang to learn how to recognise a panel. The first introduction usually occurs as follows: the bears come in to investigate the panel, receive a shock, and run to a "safe" area. After the initial shock, the bears usually do not understand what it is about the panel that has shocked them. Therefore, it is important when introducing bears to a panel for the first time, that the panel be positioned so that the bears have sufficient flight distance away from the panel after they receive a shock. They need time to recover from the experience and start thinking again. Within a few more explorations of the panel, the bears will work out what exactly is causing the experience. Although electric fence training usually progresses very quickly, we have usually left a panel in place for over a week just to make sure the bears truly understand about electric lines before introducing them to an electric perimeter outside. The final stage of electric fence training is to bait a panel with the bears favourite food. When the bears stop trying to get the food, we are confident that they are ready to be introduced to an electric perimeter.

However, even after electric fence training, it is not uncommon for the bears to touch the electric perimeter once or twice after they have been given access to their outside area. The occasional bear-perimeter contact almost always occurs between a bear's nose and the outrigger tape, described earlier. Because the outrigger is made from white electrified tape, it is pliable and can flutter in the wind. The colour and movement of the tape create a visual cue to the bears - it starts them thinking and acts as a warning signal that the bear is approaching an area it really does not want to be in.

Behaviour and Management

During the initial introduction to the electric fence line, Barbara and Wolfgang were very cautious of the perimeter. Over time, the bears became more and more relaxed with the electric fence and became comfortable being reasonably close to the perimeter. One of the splash pools in the enclosure was located within 2 meters of the perimeter and both bears because very relaxed about using this feature of their enclosure despite its close proximity to the electric fence line. However, in general the bears preferred to stay at least a meter away from the fence. This behaviour was seen through the wearing of grass - the grass near the

fence was not nearly as grazed down as the grass in the rest of the enclosure. Also, we did experience what appeared to be some "testing of the fence", particularly by the male bear. He was most often seen exploring the electric tape outrigger with his upper lip. It was if he was using the hairs just on the end of his lip to test if the fence was still on. Occasionally he would miscalculate his lip's proximity to the fence and receive a shock, resulting in his speedy departure to a more friendly part of his enclosure. We are unsure as to whether Wolfgang was able to sense the pulse of the fence current or if he had the ability the hear the "ticking" sound of the energiser. However, during the 18 months that Barbara and Wolfgang were in this temporary environment, there were occasions when the perimeter fence had to be turned off (to remove vegetation, repair a line, etc.). In none of these occasions did either bear appear to be aware that the fence was temporarily off.

The "respect" Barbara and Wolfgang developed for the fence line was impressive. At the time we had Barbara and Wolfgang in this area, we were having to administer oral contraceptives to Barbara on a weekly basis. Therefore, we had to have a way to confidently and accurately provide Barbara with this medication. Prior to their move into temporary accommodation, giving Barbara her oral contraceptive was achieved using a spoon full of honey offered through a slide covered with a grill. In the temporary accommodation we used a spring gate system to facilitate medicating Barbara. The system consisted of a swing gate on the "keeper side" of the perimeter, with four horizontally stacked springs running across the width of the gate on the "bear side" of the perimeter. An electric current passed through the four springs. Keepers were able to open the gate, disconnect the top spring and medicate over the remaining live springs. We found this system to be extremely successful for medicating the bears as well as providing for safe close management when necessary.

A further test of the behaviour of the bears around the fence line came when it was necessary to dart the bears in this area. Barbara and Wolfgang have been darted enough in their years to recognise a dart gun immediately. Normally when preparing to dart an animal, our first course of action is to secure the animal into its internal accommodation. In this temporary environment, we were forced to carry out the darting procedures while Barbara and Wolfgang were in their outside area - secured only with the electric fence perimeter. Neither bear on either darting occasion, made any attempt to physically challenge the fence line in an effort to avoid the dart.

Drawbacks of Electric Perimeters

Every captive situation is different, every individual animal is different, and electric fencing is not appropriate in every situation and for every species. The age and temperament of an animal may make a substantial amount of difference to behaviour and success or failure of an electric perimeter. Barbara and Wolfgang were approximately 13 years old when they were first kept in an environment with an electric perimeter. However, following the move of Barbara and Wolfgang to First Impressions, we successfully accommodated a four year old male spectacled bear in the same converted horse paddock enclosure.

Enclosure design and fence design are extremely important when considering using electric fences as a primary barrier. The proposed enclosure has to be large enough and the social structure of the animals has to be stable enough to allow the animals to feel comfortable inside the enclosure. If an animal perceives the threat inside its enclosure as greater than the threat of the fence line, then the animal may consider challenging the fence

line physically. Therefore, animals under stress due to an overcrowded or inappropriate social situation, are probably not be good candidates to consider housing in an enclosure with an electric perimeter.

Electric fences have to be designed by professionals, with the experience and knowledge necessary to create fences suitable for the containment of exotic animals. It takes a lot more than just dropping in a couple of poles and slinging a couple of live wires around to build an electric fence. The staff who will be managing the animals behind electric fencing require training. Animal staff need to be taught how the fence operates, its daily upkeep, what to do if it goes down, and most importantly, not to panic if the fence goes off for a few minutes. If animals have been properly trained to an electric fence, then there should be no need for staff to run around in a blind panic worried that bears behind electric fencing are going to come crashing through the perimeter if, on the off chance, the fence line goes down for a few minutes. And finally, electric fences have to be maintained - voltage must be checked daily and vegetation must be cleared on a regular basis. The maintenance of an electric fence does not require a large investment of time, however, an electric fence is not the type of barrier that may be constructed and forgotten about for the next ten years.

Cost Effective Perimeters

So what is the bottom line value to using an electric fence as a primary barrier? At the Durrell Wildlife Conservation Trust, we have an International Training Programme that brings people from all over the world to the Jersey Zoo to learn about captive breeding and conservation of endangered species. Many of our trainees come from South East Asia and other countries where bears are still kept in overcrowded, small, barren pits. However, many of these zoos do not have the money to build new bear accommodation. Bears have historically been considered large, dangerous, and destructive. Housing has therefore reflected this perception and given rise to the bear grotto still seen in many zoos of today. It is expensive to build bear accommodation. Traditional barriers for bear enclosures have included wet and dry moats, smooth concrete walls, and weld mesh fencing with some type of anti-climbing device attached (usually electric fencing). The cost of building these types of barriers have expensive price tags. By example, the construction of bear-proof wet and dry moats may cost over $500 (£300) per meter, between $300-$500 (£200-£300) per meter for concrete walls, between $100-$250 (£60-£150) per meter for weld mesh fencing, and only $5-$100 (£3-£60) per meter for electric fencing - a significantly cheaper alternative (adapted from Venables, 1996).

In Jersey, the building of our new bear enclosure, First Impressions, was well underway when we discovered how successful an electric fence perimeter could be with our spectacled bears. The original barrier for First Impressions was designed to be a water moat around three quarters of the exhibit with a 3 meter high concrete wall along the rear perimeter. Due to the success of managing the bears with electric fencing, we made the decision to replace the proposed rear concrete wall of First Impressions with electric fencing. This resulted in an estimated savings of about $160,000 (£100,000) (Venables, pers. com.) - a significant portion of the $1.92 million (£1.2 million) budget for the development. Therefore, it is clear that electric fences may provide an economical perimeter, providing some zoos with the opportunity to replace existing grottoes considered too expensive to replace or renovate in the past. Furthermore when a smaller portion of a limited budget is used in the construction of a perimeter, more resources are left over to apply to other more important

aspects of an enclosure which benefit the animals more directly. This allows for the development of larger, more stimulating, and more diverse bear accommodation.

Conclusion

Whereas our experience using electric fences as a perimeter for bears at the Jersey Zoo extends only to the spectacled bear, electric fence perimeters have been used successfully with many other species of bears, including European brown *U. arctos* and polar bears *U. maritimus*. By example, Thoiry Zoo and Safari Park in France had a historical problem with a group of polar bears, in this case hybrids, but with all the physical size and attributes of *U. maritimus*. The three females had spent 25 years in a typical concrete pit with a pool. The management longed to improve things for the bears but a new polar bear enclosure, even a small one, was beyond their financial reach. Their objective was to give the bears a large piece of forest (Venables and Lucas, 1999).

Andrew Venables designed an electric fence as the primary barrier for a 7,000m^2 (75,300ft^2) new polar bear area which contained a natural pool, earth, trees and shrubs. There was a small house constructed to allow for close management of the species when necessary. The fence was very similar to the one used in Jersey with spectacled bears. However, for polar bears, some physical strength was added to the electric fence by incorporating 4 inch square weld mesh "deer fencing" which could withstand a shoulder charge from a polar bear should boisterous play be in close proximity to the fence line (Venables, pers. com.). The cost for this enclosure, largely as a result of the fence used, was remarkably low, at around $56,000 (£35,000) for all works and materials (Venables and Lucas, 1999).

This paper highlights only a few examples of where and how electric fences have been effective in the containment of bear species. Animal managers are constantly striving to provide species with more stimulating environments in captivity. Unfortunately, financial resources will always be a limiting factor in everything we strive to accomplish. Electric fence perimeters may help to bridge the gap by providing a cost effective way to, quite literally, get captive bears out of the bear pits they have been living in for far too long.

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