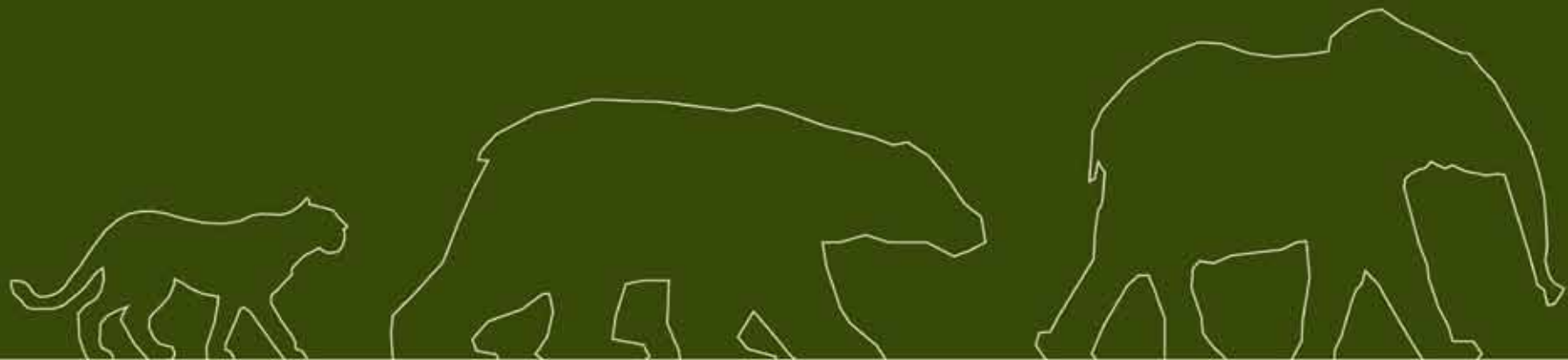
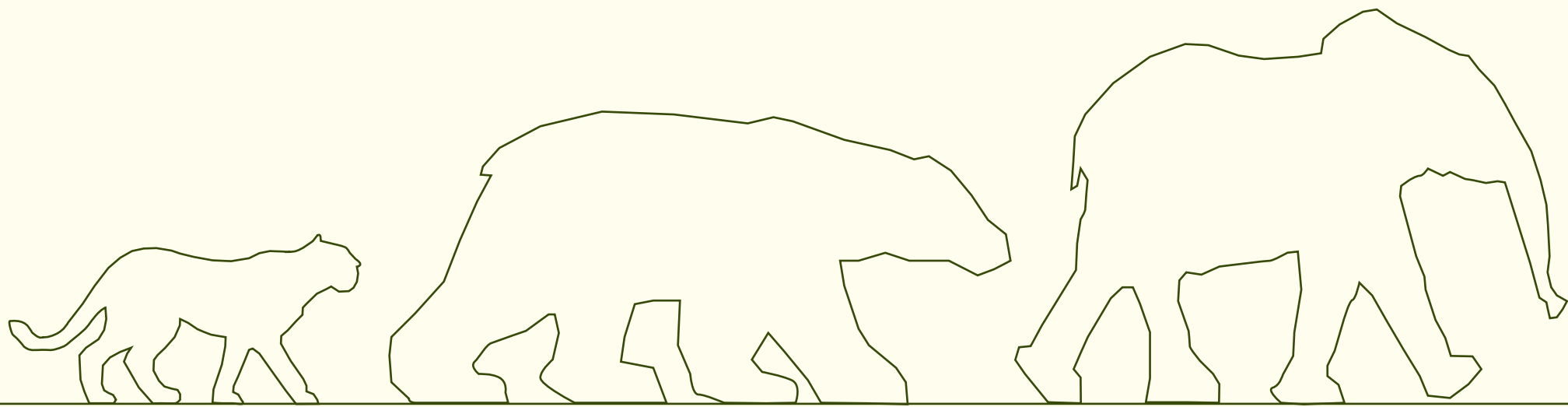


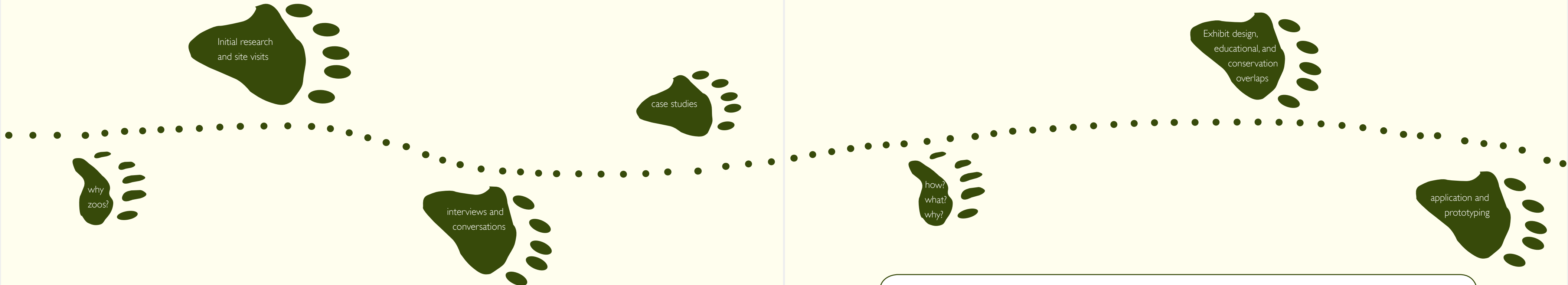
Communicating Conservation:

*Employing Interactives To Instigate Visitors' Journey
From Empathy to Action in Zoological Experiences*





Thesis Timeline



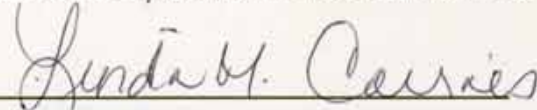
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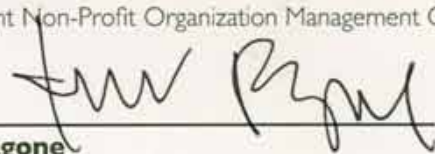
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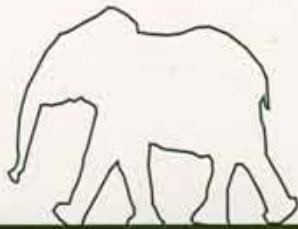

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Abstract

This project explores the various ways that conservation issues are communicated in zoos. 78% of respondents in a survey included zoos and aquariums as a primary source to learn what conservation actions they can take to help environmental conservation efforts. How can zoos and aquariums be as effective as possible at delivering what their visitors are looking for?

At present the majority of messages about conservation are communicated through text panels, and are often missed by visitors. Research, interviews, case studies, and surveys yielded a supportive argument for incorporating mechanical interactives as a means to communicate conservation ideas. This thesis explores and builds upon those ideas in a prototype using images of polar bear habitats.

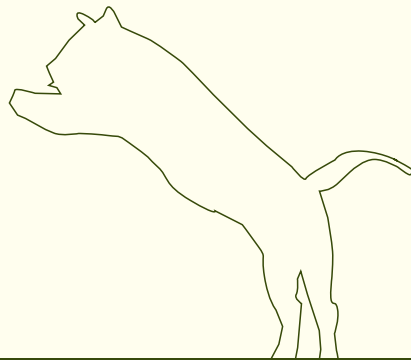


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Why Zoos?

Every kind of informal learning institution has the potential to affect how visitors see and experience the world around them, museums and zoos in particular. Zoos, however, according to visitors, have an additional responsibility to not only educate visitors about their collections, but also to demonstrate to their visitors how they can help conservation efforts for the animals they come to see and the environments in which they live. Each year over **700 million people visit zoos and aquariums** around the world (WAZA 2011). With this magnitude of visitorship, no other kind of institution has the ability to impact the planet so tremendously.



Introduction

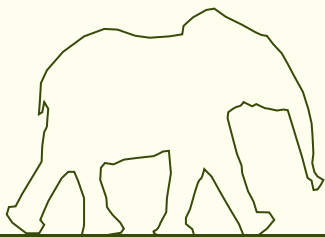
Problem Statement

In order to preserve endangered species and the environments in which they live, zoos are constantly working to communicate messages of conservation as effectively as possible. Current exhibits are now including not only educational information, but also steps visitors can take to help specific species and their environments (O'Conner 2010). Several studies done by the Association of Zoos and Aquariums, and many institutions across the country, have researched every aspect of the visitor's experience and how they are affected by their visit to a zoo or aquarium. Visitors create strong emotional bonds with animals, (Vining 2003), and often times even empathize. The question is: **how can zoos capitalize on visitor empathy** to initiate a change in the visitor's conservation behavior? While these institutions have made immense progress in recent decades, new ways of communicating important messages about animal and environmental conservation could be pushed even further.

“There is a particular relationship between animals and their visitors,” wrote renowned Swiss zoologist H. Hediger in 1969. He believed that man's role was not only as experimenter, but also to be a part of the experimental process. Zoos have transcended beyond passive experiences, however there is still a need for zoos and aquariums “to be more experiential and engaging,” (O'Conner 2010). Since conservation is the most important issue in zoos, (WAZA 2011), why not incorporate the visitor in that experimental process? This could be a way to bridge the gap between visitor expectations and institutional agendas (Ross et al 2005). Studies show that visitors do care about the animals they come to see, that they want to help conservation efforts, and that they respond well to informal learning experiences that incorporate multisensory design. However at present, many visitors may conceptually “care” about animals, but they are not engaged enough to actually take action to care for them (Smith 2011).

Mission Statement

This thesis will explore and utilize the research of public and professional interest in multi-sensory educational interactives to communicate messages of animal and environmental conservation that could bring about a proactive behavioral change within visitors. The project will objectively look at the various concepts zoos and aquariums are communicating at present and the various media in which those concepts are conveyed. This thesis will also investigate the affect of conservation messages as interpreted by the animal on exhibit through employing their survival needs as empathetic connections to their visitors. By facilitating an active empathetic experience, zoos and aquariums will be able to link visitors' emotions to an immediate understanding of what actions they can take to help save endangered animals and their habitats. The research supporting this thesis proposes the incorporation of **interactive exhibit elements** to directly engage visitors in an experience about the conservation needs of the animal they come to see.



Part I

Who Are Zoos and Aquariums Talking To?

5 Types of Visitors

The informal education field incorporates the use of several learning styles for its numerous kinds of visitors. Targeting messages to the right audience can be extremely difficult, expensive, and time consuming. However it is important that zoos and aquariums consider who their visitors are and their learning styles in order to engage them effectively (O'Conner 2010). A three-year study by the Association of Zoos and Aquariums funded by the National Science Foundation, acquired important statistics about who visitors to zoos and aquariums are, and what those institutions' impact on them was. These studies deduced millions of annual visitors into five distinct categories based on their motivations for visiting (Falk 2006).

The most dominant kinds of the more than 1,800 visitors sampled at zoos and aquariums around the country are “Explorers” and “Facilitators”, each one at just over 16% of total visitor population. The next closest category is “Professional/Hobbyists”, at 10% of visitors. The study also found that these three groups were the most likely to show

Explorers- individuals who are curiosity driven and seek to learn more about whatever they might encounter at that institution

Facilitators- focused on primarily enabling the experience and learning of others in their accompanying social group

Professional/Hobbyists- feel a close tie between the institution's content and their own professional or hobbyist passions

Experience Seekers- derive satisfaction from the fact of visiting a particular important site

Spiritual Pilgrims- seek a contemplative and/or restorative experience

significant positive change in their attitudes towards conservation. (Falk et al 2007) The conclusion of the study called for the need for zoos and aquariums to create more challenging experiences and social opportunities for the two most common kinds of visitors. Targeting conservation activities and messages to these audiences would seem most effective when developing new methods of interactive communication.

Communicating messages to all visitors is important; however instead of thinking demographically and communicating to the most common kinds of visitors, why not explore the idea of communicating effectively to the most common kinds of **visitor motivations?** Appealing to visitors' motivations would entice them to further engage with the exhibit, thus spending more time with the interpretive material. Visitors who spend more time in an exhibit are more likely to learn a greater amount from the interpretive material about the animals and messages being conveyed in that environment (Ross and Lukas 2005).

Individual Versus Group Experiences

Since the “facilitator” is someone who is more interested in the learning of others, it is important to consider that in informal learning scenarios, a large majority of visitors experience those institutions as a family. Families are one of many kinds of social groups at a zoo or aquarium. According to a study at the *Great Ape House* at the Lincoln Park zoo, nearly 35% of visitors in that exhibit were adults with children, (presumably a family-type group). 30% were adults without children, and fewer than 10% of the visitors were alone. Although this was an example of only one exhibit at one zoo, it can be derived that most experiences at zoos and aquariums involve a social group with more than one individual. Professionals have written about the importance of designing to create a social experience. Understanding the role of the social processes of learning are essential to understanding the nature of learning in museums (Falk 2007). Most comments visitors make about the exhibits they see are less based on exhibit content and more so based with the goal of gaining interest from or making conversation with others in their group (Dingfelder, 2009).

“Explorers- individuals who are curiosity driven and seek to learn more about whatever they might encounter at that institution”

“Facilitators- focused on primarily enabling the experience and learning of others in their accompanying social group”

It could be said that not only are solitary informal learning experiences rare, but are almost an unnatural way to experience learning in an atmosphere such as a museum, zoo, or aquarium.

Some zoos are designing exhibits with multiple users in mind, such as the interactives developed by Quatrefoil Associates for the Smithsonian National Zoological Park *Elephant Trails* exhibit. A simple large-scale pivot table demonstrates the lack of elephant “safety zones” near African villages. The moving tabletop, although not heavy, has an approximate four-foot diameter that makes it almost too large for one person to manipulate. Two individuals have to negotiate with each other to move the pieces, (which represent elephants), into the safety zones. Multiple people are involved, a dialogue will most likely occur, and more than one person will come away with the knowledge that there are very few elephant safety zones left in the wild. Multi-user experiences permit more people to engage with what informal learning institutions would like to convey, and are more likely to bring about a better understanding of a topic, and ideally initiate a more effective change of behavior.

Who Are Zoos and Aquariums Talking To?

What Are Visitors’ Pre-existing Knowledge and Expectations?

Visitors that enter a zoo or aquarium possess higher-than-expected knowledge about basic ecological concepts (Falk et al 2007). They also sometimes are simply looking for a diversion or entertainment (Ross and Lukas 2005). Studies have shown that even though visitors are aware of basic ecological and conservation issues, they look to zoos and aquariums to tell them what they can do to help. (O’Conner 2010). **Visitors trust zoos and aquariums** to be effective messengers of conservation. (Stowell, 2010). Since zoos recognize that visitors look to them for how they can help conservation efforts, they have responded by establishing methods that empower visitors to make positive changes in their own lives.

In 2004 the “Measuring Mission Project” was launched at the Philadelphia Zoo to measure the effectiveness in influencing conservation knowledge, attitudes, and behavior within visitors. The zoo’s conservation goal was to enable visitors to shift

from being observers of conservation efforts to becoming leaders of conservation efforts. The zoo’s *Footprints Conservation Initiative* is a comprehensive approach to addressing global climate change and impacting visitors’ conservation behaviors. The campus wide interpretive panels inform visitors what the zoo is doing to “protect, preserve, sustain, and conserve” the environment (Philadelphia Zoo, 2011). Interpretive graphics tell visitors where the zoo has used recycled materials, how it has implemented geo-thermal systems to heat animal and human environments, and where soy based inks were used instead of toxic alternatives. Many other zoos are leading by example to show their visitors how they implement conservation ideas in everyday activities. The Bronx zoo implemented an “Eco-Restroom”, to which 90% of visitors responded positively (Johnson, 2007). 100 individuals completed a survey that was intended to measure to what degree the public looks to zoos and aquariums as environmental role models. Results concluded that

78% of respondents included zoos and aquariums as a primary source they look towards to learn about what they can do to help with animal and environmental conservation efforts (Mosley, 2011). ■

How Are Visitors Being Communicated To?

Exhibit designers and educators in all kinds of informal learning institutions are aware that most of their visitors come for enjoyment, but also engage in non-sequential, self-paced, voluntary learning, defined as Free-Choice Learning (Falk and Dierking 1998). Methods of educating through free-choice learning often include the usage of interpretive graphic panels, tactile elements, interactives, and multimedia elements. These elements can be very engaging; however in zoos and aquariums, the animal collection is typically the most important object with which visitors want to engage. It can prove extremely difficult to integrate any of these free-choice learning media into an already immensely stimulating environment; so as not lose visitors’ interest nor detract from their experience with the animals. The objective of effective interpretation is **not to compete with the animals**, but to enhance the visitors’ experience.

Current Interpretive Methods for Informing Visitors About Animal Collections

Trends in zoological exhibit design and education methods tend to focus on multiple audiences, cultural interpretation, storytelling, and staffing exhibits with well-trained interpreters (O’Conner 2010).

Examples of **cultural interpretation** and storytelling have in some cases been taken to the extreme. The rich immersive environments do, however, satisfy the “entertainment” that many visitors seek, (Ross and Lukas 2005). One such

example would be the authentic Tundra Buggy from Churchill, Manitoba, at the Maryland Zoo polar bear exhibit. Another example would be the transportive atmosphere of *Animal Planet Australia: Wild Extremes* at the National Aquarium in Baltimore. Both of these environments are completely immersive and offer a window into those parts of the world. Visitors can climb inside the 15-foot tall Tundra Buggy that overlooks the entire exhibit and explore polar bear biofacts, such as pelts and teeth. At the National Aquarium, visitors are transported

to the other side of the world with roaring waterfalls, lush vegetation, intense visual stimulation, free flying birds, and stunningly naturalistic exhibits. However, could these fantastic environments be so mesmerizing that the important messages about conservation are lost in the background?

Several zoos and aquariums now incorporate **contextual background** such as the *Giant Panda Habitat* at the Smithsonian National Zoological Park. This exhibit focuses less on the

How Are Visitors Being Communicated To?

specific animal collections and emphasizes more on interpretation of the complexity of panda conservation issues. **Cultural interpretation** describes the sights and sounds of wildlife in China and tells the story of the conservationists who work there to help save pandas. Several highly designed graphic panels and aesthetically beautiful backdrops of vernacular images radiate educational messages from several yards away. In the “experience zone” the zoo hopes to build an emotional relationship between visitors and pandas by bringing visitors and animals within inches of each other to establish a much greater interest and compassion (Bitgood 1999).

One of the most common forms of cultural and animal interpretation is the use of education staff, **volunteers and guides**. On any given day numerous volunteers are stationed through out zoos and aquariums with the primary goal of facilitating dialogue as an interface between visitors and animals. Having well trained exhibit interpreters is an excellent way to connect visitors to the animals (O’Conner

2010). However, studies have shown that although visitors rate educational volunteer experiences very highly, they do not always interact with zoo volunteers or staff (Wagner et al 2009; Kelsey 2006). Educational volunteers and staff may be the most successful way to attract visitors to an exhibit, but **important messages can be left out** in those interactions.

A study in 2006 conducted at the Monterey Bay Aquarium investigated to what degree volunteers communicated ideas of conservation during their interactions with aquarium visitors. The results concluded with positive and negative findings. Guides demonstrated excellent ability in modeling how to care for wildlife. They used emotive language and created a warm and inviting learning atmosphere (Kelsey 2006). Guides also used promotional tools to help facilitate conversation; such as *Seafood Watch* cards that tell visitors what fish are in danger of being over harvested. The study also found that those cards were one of the only conservation tools

that volunteers utilized. Overall, the general findings for the guides at the aquarium were that they spoke too infrequently about possible conservation actions. When asked why, guides said they found that **conservation is a difficult subject to work into conversation**. Other guides said they were afraid of pushing a topic that visitors seemed familiar with, and that they did not want to seem “too preachy”. The study also found that guides frequently used “mini-scripts” that were repeated several times throughout the day. Dr. Kelsey also found that “many guides recognize conservation as a missing gap in their guide training.” (This model has presumably been rectified since its discovery five years ago.) As it is unfair to allow one institution’s example to represent all other educational volunteer experiences, it must be acknowledged that this issue may exist in other zoos and aquariums and that it should remain a factor in conservation training with staff and volunteers.

Interpretive Methods for Informing Visitors about Conservation Messages

Institutions accredited by the Association of Zoos and Aquariums must abide by strict husbandry and conservation guidelines about the care and conservation of their animals, and often explore several methods to interpret those issues. Methods often include graphic panels, multimedia presentations, educational volunteers, and one zoo will even be using Muppet characters to convey conservation messages. The main idea about communicating conservation messages is “making a true emotional connection with the guests. If we can connect on an emotional level with our guests, they are more likely to make a lifelong change in their behaviors” (Dixon 2010). **Do current methods of conservation interpretation work towards establishing and utilizing that emotional connection?** Or is there a gap between animal and visitor relationships?

According to interviews at five institutions, interpretive graphics are the most frequent means of informing visitors about conservation. Often

times there are many, many messages to read. It would be interesting to know the average amount of signage that visitors are asked to read on a given visit to a zoo or aquarium. **How much are visitors expected to read?** Zoos and aquariums face a major challenge in incorporating interpretive graphics that are subtle, informative, and poignant in environments where tens of graphics might be competing for only a few hundred square feet of space. So much information to read quickly becomes over-stimulating and can lead to fatigue. Making sure that visitors are most receptive to what they do read is difficult and vital to effective communication.

In 2006 the Wildlife Conservation Society did a study to learn about visitors’ connotations with specific animals in order to more appropriately target the information the zoo would share through graphic interpretation. It turns out that through opportunistic sampling of 316 visitors, connotations about animals such as dolphins, sharks, zebras, and cheetahs were different than what some research

groups thought they would be. Using semantic differential techniques, WCS asked visitors to rate animals on a seven-point Likert scale featuring word pairs that visitors would associate with the animal, such as “endangered/plentiful”. Results for the cheetah concluded that visitors found the animal to be strong, intelligent, and endangered. Grevy’s zebra, however, was seen as friendly, passive, and harmless (Fraser et al 2006). These results enabled the WCS to build upon visitors’ assumptions. Since the public already perceived the cheetah to be endangered, researches learned that messages could now incorporate ideas like hunting strategies. Since the public did not associate Grevy’s zebra to be endangered, it became necessary to change exhibit messages about that animal to inform the public that it was more than “friendly, passive, and harmless,” and that it is indeed, in fear of extinction. Semantic differential surveys could be an extremely effective way to specify conservation messages.

How Are Visitors Being Communicated To?

It would seem to be most wise to employ surveys similar to the WCS study in order to help specify conservation messages. Pursuing such a planning and evaluation process will ensure the right messages are selected and therefore most effective (Falk 2009). Zoos are asking a lot of visitors when presenting them with so many conservation messages and a plethora of **interpretive graphics**; therefore it is most important that the information visitors are asked to read is as effective and influential as possible.

In addition to graphic panels as a way to talk about conservation, many zoos and aquariums are moving towards the use of **multimedia**. Examples include movies, touch screen interactives, and video kiosks. Some institutions, such as the Vancouver Aquarium, are providing visitors with iPods and video on demand to cover conservation topics. Terry O’Conner, former manager of conservation education at Woodland Park Zoo, acknowledged a need for zoos and aquariums to make technology family-friendly and to get visitors to engage with

each other (O’Conner 2010). The North Carolina Zoo provides a successful example of this. In the middle of a large sidewalk intersection the zoo has constructed a shady hut with benches and a large touch screen television where visitors can take a break. Visitors are presented with multiple three to five minute videos on topics ranging from conservation to zoo exhibit design. Visitors stayed the entire duration of the film and conversed about the topic with their group. The use of multimedia created a passive learning experience, but in this context it was successful- visitors were able to select a film relevant to their own interest, the content of the videos was targeted and concise, the physical surroundings encouraged visitors to linger, and visitors continued to talk about the topic afterwards.

Other examples of multimedia include 4-D theater experiences, such as the McNeil Avian Center at the Philadelphia Zoo. Visitors have a multi-sensory experience while they learn about Otis the oriole. Otis migrates from the Delaware Valley to Central America. Visitors experience a simulation of some of

the dangers the bird must face in order to make his journey, such as bad weather and loud disorienting urban environments. The 4-D theater is free with general admission, accessible to all visitors, and particularly engaging for children. The experience is informative about migratory patterns and teaches viewers about the amazing things birds can do. Conservation messages include saving horseshoe crabs in order to feed the Red Knot birds, and strong allusions are made that birds are losing their habitat to new construction, however that concept is not directly stated. The attractive four-dimensional qualities of the theatrical presentation could be detracting from conservation messages. Many zoos and aquariums include 4-D theaters, such as the North Carolina Zoo, Georgia Aquarium, Camden Aquarium, Vancouver Aquarium, Detroit Zoo, Cincinnati Zoo, and many others. However many of these theaters are also revenue-generating forms of entertainment and require more expensive ticket upgrades. **Are Zoos and aquariums letting lucrative multisensory thrills take priority over conservation messages?**

Several zoos and aquariums now include multimedia, video, touch screen, and other technological components. Although these tools can assist in the delivery of important conservation messages, there is a danger of relying too heavily on the attractiveness of technology if the overall experience detracts from the main messages zoos and aquariums are trying to communicate. Another concept to consider is that most visitors to zoos and aquariums are “explorers” and “facilitators” (Falk et al 2007). **Are aesthetics and technology stimulating enough** to impact their motivation to help conserve endangered animals and their habitats?

The Philadelphia Zoo will soon be implementing a new method to actively engaging children, adults, “explorers”, “facilitators”, and the like in late spring 2011. The zoo will be launching an educational program based on the Jim Henson Muppets that will run through the summer. Seven puppets represent species ranging from the extinct dodo bird to the golden lion tamarin, and a harlequin frog. The master puppeteers give the animals a life, a voice, and a

point of view. The aim for the project is to engage younger audiences in the importance of preserving the endangered species we have now so they do not become extinct like “Didi” the lead dodo bird.

Volunteers at zoos and aquariums are also an engaging and typically ubiquitous feature in many institutions. The study “Why Zoos and Aquariums Matter” confirmed that live interpretation is the most effective way to reach guests with a conservation message (O’Conner 2010). However, as previously mentioned, volunteers frequently recite fabricated “mini-scripts” and leave out important messages (Kelsey 2006). One might assume that similar scenarios exist at other free-choice learning sites that rely on volunteers. Conservation is a complex topic and can be difficult to incorporate, especially with children, a core variable in typical visitor dynamics. Volunteers are often the first ones to facilitate a moment of wonder and awe for many visitors. There are many issues the volunteer must be ready for, such as the safety of the animal with which he or she is working, quickly and correctly

responding to visitors’ questions, and retaining their interest. Volunteers are an essential and valuable part of education about animals, however institutions must be aware of the amount of expectations volunteers already live up to and surpass in their ability to be the primary vehicles for delivering conservation messages.

It is difficult to measure the effectiveness of these particular methods of communication in talking about conservation. The 2007 study “Why Zoos and Aquariums Matter” proved that overall visitors are impacted about conservation after their visit, but now the question is **how do zoos and aquariums inform and inspire visitors about what they can do?** Many institutions already model sustainability and ask visitors to take any number of actions such as save rainforests, donate money and vote for animal rights, and buy more responsibly. These suggestions are valid, but so is the likelihood of overwhelming the visitor to the point that they disregard any message. As many zoos and aquariums know, many visitors come for

How Are Visitors Being Communicated To?

enjoyment, not to be preached to (Ross and Lukas 2005; Mosley 2011). That being said, 54% of visitors in the 2007 AZA study still said they were prompted to reconsider their role in conservation actions and to see themselves as part of that solution (Falk et al 2007). Zoos and aquariums are modeling everyday sustainable practices and telling visitors what they can do. They are also establishing emotional connections between animals and visitors while communicating countless conservation messages through graphics, multimedia, and volunteers. But how can these institutions not just inform the visitor, but also include them, as **Hediger wrote, “as a part of the experimental process?”**

This thesis hypothesizes that there could be layers of conservation messages that are currently being bypassed by loftier, more global scale actions that zoos and aquariums are already communicating. However many of these actions are not immediate. Providing a layer of immediate action that evokes an individual scaled action instead of primarily a community scaled action would most likely tap



Quintessential visitor empathy at the Camden Aquarium.

into visitor empathy by establishing a personal connection and allowing visitors to discover a personal action they can take. What kinds of potential **intermediary messages** could encourage visitors to become more active about messages zoos and aquariums are already communicating? An example of this should ideally be something that visitors can do at the zoo, at the moment of their visit, while they are empathetically engaged. **Capitalizing on empathy** could lead to positive and immediate changes in proactive behavior towards conservation efforts. The most logical vehicle for doing this is animal itself, the source of visitor emotion at zoos and aquariums. Its needs and behaviors could provide visitors with a message and an action that could be demonstrated on site to capture that “moment of engagement” and strengthen the connection between the visitor’s experience, animal on exhibit, and desired conservation outcomes. ■

Part 3

Case Studies



Madagascar!
Bronx Zoo



Big Cat Falls
Philadelphia Zoo



Great Ape House
Lincoln Park Zoo

Objective case studies and a survey were conducted to observe and specify what visitors are interested in at zoos and aquariums. Exhibits include *Madagascar!* at the Bronx Zoo, *Big Cat Falls* at the Philadelphia Zoo, and the *Great Ape House* at the Lincoln Park Zoo, (prior to its 2004 renovation). These exhibits were chosen because they incorporate **extensive conservation messages** and have **won prestigious exhibit awards** from the **Association of Zoos and Aquariums**. In addition an electronic survey was sent to 100 individuals who have visited zoos in the past. The survey inquired about their interests in conservation, various learning activities, and the obligations they perceive zoos and aquariums to have.

AZA Significant Achievement Award Winner, 2009

Madagascar! brings visitors into contact with some of the rarest animals in the world. The zoo took on a complete restoration of the pre-existing Lion House. Extensive formative and summative evaluations were conducted about the exhibit during development and since its opening in 2009 (Lovelace et al 2007; Randi Korn et al 2009). Of primary importance is that the exhibit showed that many visitors gained the following new knowledge- ideas and beliefs about enhanced environmental concern for the island of Madagascar; knowledge that the island is under threat; why conservationists are there; and what they are doing to help. Statistically significant facts are that the exhibition successfully accomplishes its eight objectives. One of the most ambitious objectives was that “visitors will personally engage in the scientific process [through inquiry based approaches] and explore the work of individual scientists” (Randi Korn et al 2009). Throughout the exhibit there are several opportunities to engage visitors of all ages to closely examine the exotic animals and their habitats. 75% of visitors who went through the exhibit

reported engaging in some kind of scientific activity. Activities that visitors reported doing included “looking, watching, observing, counting, comparing, contrasting, and guessing.” This is tremendous, however did these activities help visitors learn what they could do to help the animals’ environment? Only 14% of visitors believed that he or she could do anything to protect the island (Randi Korn et al 2009). The only example cited in the evaluation



Engaging in the scientific processes.

of what visitors said they knew to do was to give money. Visitors look to zoos to model how they can help the environment, (O’Conner 2010), and they do want to become proactive. Visitors’ desire to help Madagascar doubled after visiting the exhibit (Randi Korn et al 2009), but they do not seem to know what to do next.

Research conducted during the development of the exhibit informed the Bronx Zoo that its visitors knew very little about Madagascar. **Being informed about an issue must occur before one can take action about it.** With this in mind, the zoo decided the primary goal of the exhibit was to inform their visitors about animals and habitats in that part of the world and what situations they are in. Although knowledge does not necessarily influence behavior, it is generally perceived as a precursor to action. In this case, and conservation action was not the primary goal of *Madagascar!*. However, the exhibit was successful at

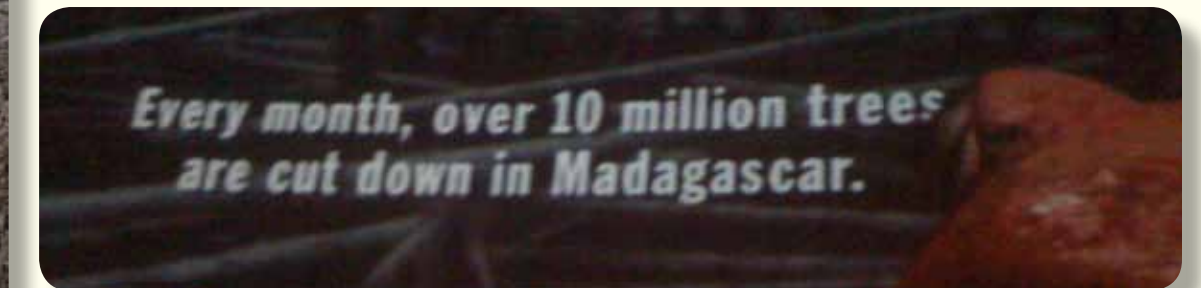
informing visitors about the existence and challenges the island faces. This crucial step is the first part of bringing about a behavioral change in conservation efforts for that part of the world.

Specific examples that help visitors learn about the condition of the exotic habitat include the effective use of view-scopes and looped videos in the lemur



Tools that helped visitors engage in the scientific processes.

area. The view-scopes create vantage points that emphasize the importance of trees for lemur communication and survival, while nearby a looped video shows the impending threat of forests being clear-cut. The exhibit also includes several intimate moments with rare animals, and the environment is transportive, engaging, and fun. These are two of the three components related to conservation motivation (Wagner et al 2009). *Madagascar!* successfully educates and engages visitors, and motivates visitors to want to change their behaviors. ■



Conservation related messages projected onto the walls, approximately five seconds every one every one to two minutes.

Through interaction and observation of visitors in this exhibit, it is clear to see that visitors are excited by immersive environments, receptive to concise and minimal multimedia and graphic interpretation, and are primarily interested in proximity to exotic animals. Summative evaluation results also concluded that 75% of visitors were willing to, and did, participate in a scientific action, proving visitors are interested in more than a passive experience.

AZA Top Exhibit Award Winner, 2007

In 2004 the Philadelphia Zoo launched the “Measuring Mission” project as a means to measure conservation outcomes within its visitors. The project identified five desired conservation outcomes for the visitor- conservation motivation; conservation knowledge; pro-conservation consumer skills; conservation attitudes and values; and readiness to take conservation action. The zoo examined these outcomes in four realms of visitor experience- quality of exhibits; quality of staff; level of engagement; and the quality of conservation education (Wagner et al 2009). The study identified nine strategies that comprise a conceptual formula for successfully instilling conservation motivation within visitors, all of which relate to exhibit design and training of staff and volunteers. Strategies included providing proximity to rare animals, fun experiences, and learning exactly how to help preserve the animals and natural habitats.

The methods developed from the “Measuring Mission” project were applied in the development of

Big Cat Falls and measured in a summative evaluation against visitors’ overall zoo experience before and after the opening of *Big Cat Falls*. In a previous study from 2004, visitors rated the level of engagement the lowest of the four realms of visitor experiences. After the opening of the exhibit in 2007, visitors rated their level of engagement significantly greater, ($M= 3.78$, $SD= 0.75$ in 2007, where as $M=3.53$, $SD= 0.80$ in 2004). A consistent basis of varying forms of interpretation aided to greatly increase the visitor’s desire to engage with the exhibit and over all zoo experience.

The exhibit begins with push-button interpretive graphics that demonstrate the “umbrella concept” and importance of lions as an integral part of the African savannah. Visitors are immediately engaged and prepared for more forms of interpretation throughout their visit. These forms include the graphic panels with touchable icons, short films, computerized games, several educational staff and volunteers, and the incorporation of animal environments throughout the exhibit such as catwalks above the

visitors. Three educational pavilions, (represented as Africa, America, and Asia), connect viewing areas that feature spectacular unimpeded large glass window-walls into animal habitats. These expansive windows allow visitors to come within inches of the animals. The window-walls are located through out the exhibit. As visitors venture through, they also discover multiple vantage points. Often visitors linger for several mintues, watching the big cats.



Tactile and audio elements immediately engage visitors.

Proximity to animals often yields stronger emotional connections, deeper empathy, and more learning opportunities. (Vining 2003, Falk 2007, Bitgood, 1992).

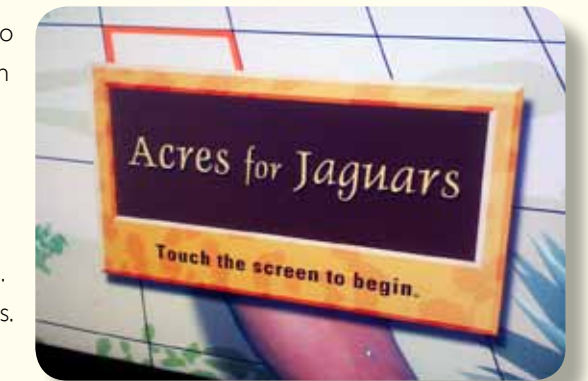
When moving between the five big cat exhibits, volunteers are often present in the interstitial spaces. One of the two buildings visitors pass through is



Several volunteers share fun facts with visitors.

the *Buck Base Camp* research station, a family friendly electronic interactive area where visitors can choose to learn what dangers big cats face, such as hunting and loss of habitat. This area was not the only area, but seemed to be the primary location for communicating messages of animal and environmental conservation. As is often an issue with technological exhibits, many of the computers are frequently out of order. On a day when all the interactives were operational, visitors were observed over a thirty-minute period. Three of twenty four people engaged with the eight computer interactives; two of whom were a father and a daughter who were frustrated that a photo-interactive did not provide a printed copy for them to take home. The other was a boy who interacted with a touch screen, only to walk away two seconds later when the screen filled with lengthy text about what conservationists were doing to help lions in Africa. The intention was good and the voice and feel of the computer interactives were attractive to children. However, much of the text seemed geared for adults. Children were attracted, and then overwhelmed. Adults did not appear attracted, and therefore missed

many messages the exhibit was trying to convey. One exhibit, “Acres for Jaguars”, engaged visitors in a touch screen computer game to move jaguars to protected areas, and asked for money to help purchase land in that protected area. Upon successfully inserting my dollar on the third try, it was very awkward over hearing other visitors say “why do they want another dollar?” How many other visitors avoid such interactives because of a similar sensation? Overall, only two of the groups spent more than 15 seconds in the exhibit. Most families walked through without stopping. Visitor



Computer stations feel out of place and are rarely used.

comments included “Come on honey, we’re not playing with computers, you can do that at home,” and “this is just exhibits and stuff, let’s go see the animals.” It is apparent that zoo **visitors want to engage with the animals they pay to see**, not technological scientific learning activities similar to what they can do at home.



Extraneous props and several computers in Buck Base Camp

“We’re not playing with computers, you can do that at home”

—visitor quote March 9, 2011

Visitors seemed to be overwhelmed with the amount of text on the screens, and seemed confused by extraneous exhibit props. The space was also very dark, and multiple children were overheard saying they did not like the dark space. This was also one of the final parts of the exhibit, where visitors tend to speed up and pay less attention to what is around them (Ross and Lukas, 2005). Exiting the space and moving towards the final part of the exhibit, visitors pass through a tiger viewing pavilion, and end their visit by walking past an interpretive graphic panel that prompts visitors to be active about conserving big cats by “thinking about wildlife when you vote, recycling, making small donations, and getting friends involved.” ■

Through interaction and observation of visitors in this exhibit, it is clear that visitors enjoy large unimpeded views, can be effectively engaged at the beginning of an exhibit, would prefer not to engage with multimedia/computer technology, and prefer not being inside a dark space when they could be outside. Staff and volunteers were able to engage nearly all visitors that passed by, and informed visitors about interesting facts, but rarely mentioned conservation efforts to help save the endangered cats. Based on observation alone, visitors rarely noticed and frequently passed by mostly all of the interpretive graphics that mentioned conservation.

Prior to Two Year Renovation in 2004

Over a twelve-month period between July 2000 and July 2001 a study of the *Great Ape House* was conducted to examine zoo visitor behavior and how visitors’ responses to the current exhibit could influence the design of the new *Great Ape House*. Surveyors employed the use of behavioral studies and post-occupancy evaluations to see what opportunities existed for improvement of the interpretive elements and the overall exhibit experience. Interpretive elements included video, identity labels, plastic molds, flat panel graphics, and bronze statues. Since the study was primarily focused on visitors’ opportunities for learning, the group focused on visitors’ attention to different kinds of the above interpretive materials (Ross and Lukas 2005). Overall time spent in the exhibit averaged 7 minutes and 23 seconds. Of this time, the average time spent with interpretive materials was 46 seconds. Once this was established, the team wanted to know how the visitors delegated their time between different interpretive materials.

Visitors spent the most time interacting with basic animal identification labels, (37.5 seconds average), plastic hand molds, (19.1 seconds average), and bronze sculptural heads, (17.2 seconds average). Both the plastic mold of ape hands and bronze head sculptures held visitors’ attention longer than the team had predicted. Understandably, visitors spent the most time looking at the apes. But when they were not looking at or reading about a specific animal, they were **engaged in a multisensory activity** that consisted of touching surfaces to investigate textures, and comparing their own limbs to that of the apes. This study strongly supports how three-dimensional objects and activities can be powerful tools of exhibit interpretation. Interpretive elements that require interaction are the most effective medium for holding visitors’ attention (Ross and Lukas 2005). It would be fascinating to explore this idea with conservation messages, especially since there is a connection between the amount of time visitors spend in an exhibit to how

much they learn (Falk 1993; Raphling & Serrel 1993; Borun, Chambers & Cleghorn, 1996). The study also found that visitors sped up as they worked their way through the exhibit. In the floor plan of this particular exhibit, conservation messages were at the end where visitors were moving fastest, and most likely missed the messages the *Great Ape House* had hoped to share. ■

The evaluation of visitors in this exhibit show that visitors are most interested in reading basic information labels about the animals they see, and afterwards were drawn to a multidimensional object over another graphic panel.



Lincoln Park Zoo, Great Ape House, (detail), Chicago, IL, 1973. Department of Architecture, The Art Institute of Chicago.

How Are Zoos and Aquariums Talking About Conservation?

A survey of 100 individuals who have visited a zoo in the past.

In order to further develop supportive information about theories derived through literary research and case studies, 100 individuals were asked to participate in a survey that was developed to determine what kinds of conservation messages they perceived from zoos and aquariums. The survey was developed through *Survey Monkey* and distributed by email. Since there were time and legal restrictions on acquiring information or email addresses from zoo visitors and members, the individuals who took this can be described within the following parameters-

- 100 respondents who have had direct experiences at zoos or aquariums in the past five years
- Are adults age 22-70
- Represent a variety of geographic locations, primarily in the Mid-Atlantic and Southern regions of the US
- Primarily families with children ten or younger
- Have a mix of annual household incomes ranging from below \$30,000 to above \$100,000
- Made up of students and primarily employed persons

Results were compiled through the *Survey Monkey* database. The server limited the maximum number of responses to 100 individuals. The intent was to target a representative sample of the public at large, not any specific audience. Restrictions for the online format limited the survey to ten questions. Since the primary objectives of the survey did not include demographic information, that information was not collected from survey participants.

The responses from this survey show that visitors are most interested in a combination of entertaining, educational, and interactive experiences, with a very strong preference for entertainment. Visitors are most interested in learning more about mega-fauna such as polar bears and large primates. Apart from watching animals, visitors also say they would be most likely to go towards a hands-on activity, similar to a science museum or children's museum.

55% of visitors believe zoos and aquariums have an obligation to show visitors what they can do.

Primary objectives included-

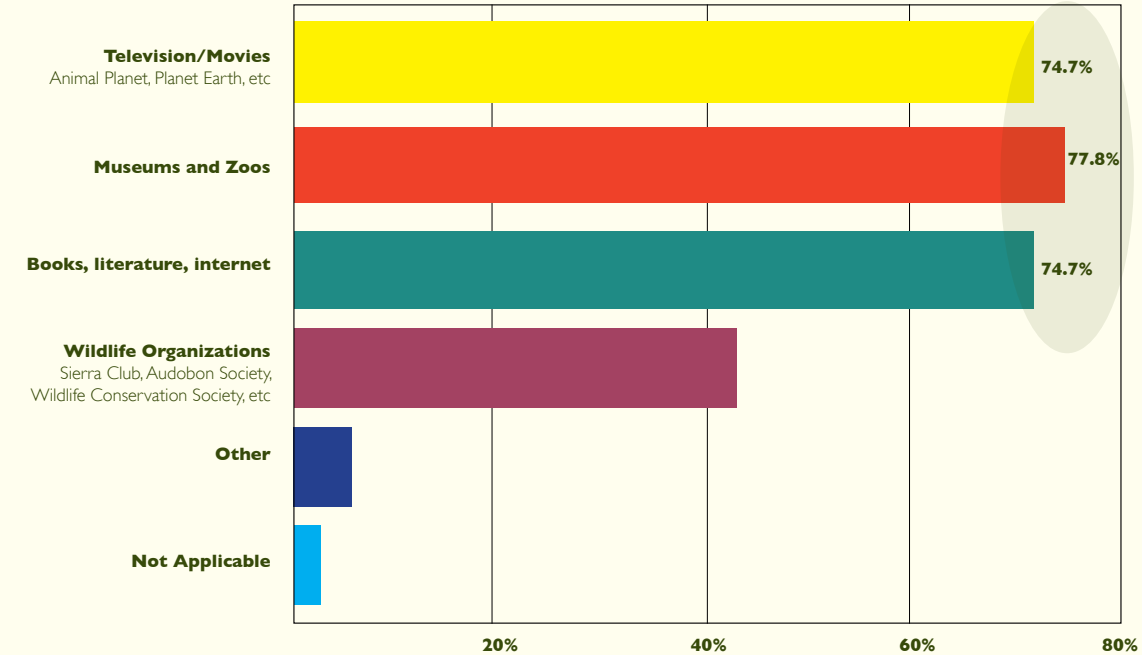
- 1) What is the primary kind of experience visitors expect when they visit a zoo or aquarium?
- 2) How much responsibility do visitors feel zoos and aquariums have to show their visitors how they can help with animal and conservation efforts?
- 3) How well do visitors feel zoos and aquariums demonstrate what they can do to help conserve animals and their habitats?

78% of respondents look to zoos and aquariums to teach them how to help the environment.

1) Are you interested in learning more about what you can do to help conserve endangered animals?

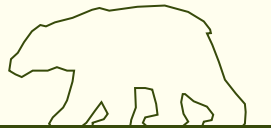
Yes 72.7% No 17.3%

2) What sources would you use to learn about what you can do to help with animal and environmental conservation efforts? Please check all that apply.



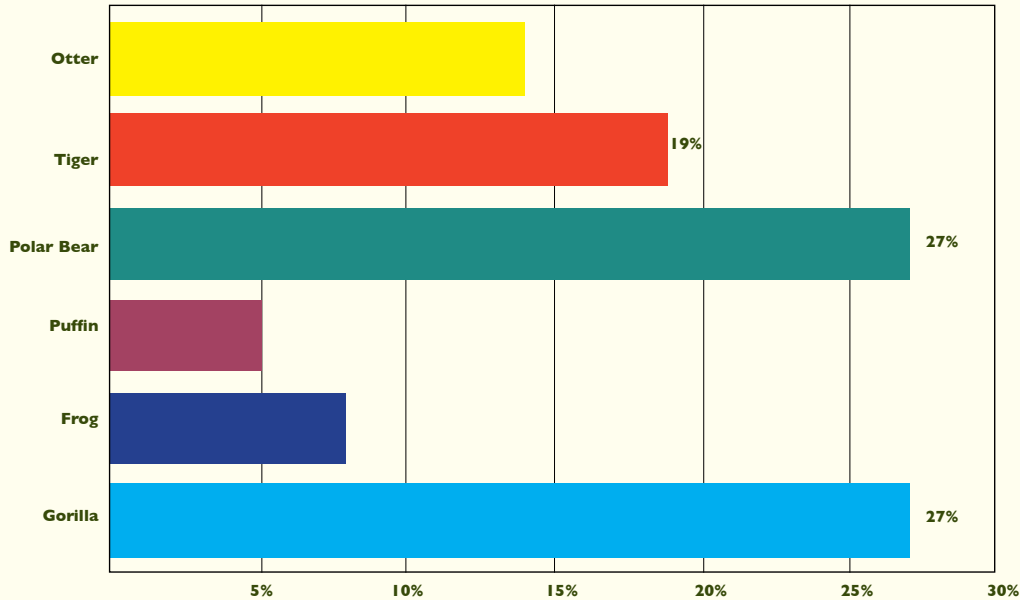
3) What is the primary kind of experience you or the group you are with expect when you visit a zoo or aquarium? (please select one)

Experience Type	Percentage
Entertaining experience	19.0%
Learning experience	17.0%
Interactive experience	5.0%
All of the Above	59.0%



Case Study

4) Of the animals below, which would you be most interested in learning about what conservation actions you can take to help save it? Please select one.



89.8% of visitors are interested in at least or *DOING MORE THAN READING* about their favorite animal.

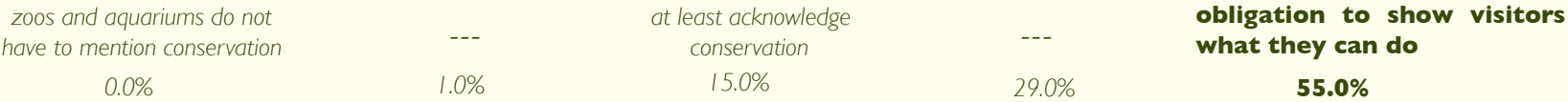
5) How interested are you in learning about the survival needs of the animal you selected? (this includes what the animal needs in its daily life to survive in the wild, such as habitat, specific foods, climate conditions, tools, etc).

please rate your level of interest-



6) How much responsibility do you feel zoos and aquariums have to show visitors how they can help with animal and environmental conservation efforts?

Please rate the level of responsibility-

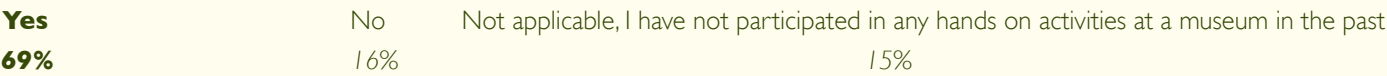


7) Apart from watching the animals, which activity would be the most appealing to you or your group while at a specific animal exhibit?

Please select one



8) If you have participated in any kind of hands-on activity at a museum in the past, can you recall what you learned about at that activity?



9) Of the following options, what would you say is the primary message of a zoo or aquarium?

Please rate how strongly you perceive the following messages.

	I do not perceive this message	---	I am occasionally aware of this message.	---	I strongly percieve this message.
■ Some animals and their environments are in danger.	2%	6.1%	30.3%	31.3%	30.3%
■ We all have an obligation to help conserve animals and thier environments.	6.1%	12.1%	36.4%	24.2%	21.2%
■ Zoos and aquariums are here to help show what actions you can take to conserve animals and the environment.	8.1%	26.3%	34.3%	19.2%	12.1%
■ The way we live affects animals, our environment, and our selves.	6.1%	15.2%	30.3%	27.3%	21.2%
■ I am aware of a message, but I am not sure what it is.	33.3%	24.4%	27.8%	10.0%	4.4%
■ I perceive no message in particular from zoos or aquariums.	62.6%	12.1%	14.3%	8.8%	2.2%

10. How well do you feel zoos and aquariums demonstrate what you can do to help animal and environmental conservation efforts?



60% of visitors think zoos do a less than moderate job

Part 4

Case Study Conclusions

What Are The Next Steps?

The three institutions in these case studies are among the most credible, proactive, and effective zoos in the country in regards to their conservation efforts towards animals and their ability to create engaging visitor experiences. Their visitors already know, or the institutions have successfully made them aware, about conservation needs for the animals and habitats on exhibit. Information from evaluations from all three exhibits, as well as the extensive 2007 AZA study on the impacts of zoos and aquariums on visitors, prove that **visitors care and want to do their part to help the save animals and their habitats**. 61% of visitors identified with the phrase “There is a lot I can do to conserve”. (Falk et al 2007). Of 100 individuals who were polled in the online survey, **84% believe that zoos and aquariums have an obligation to do more than acknowledge a need for conservation efforts** (Mosley, 2011). The majority of that number believes zoos and aquariums have an obligation to show their visitors exactly what they can do to help conserve animals and their habitats.

Zoos are successfully telling visitors what they can do on a larger scale-such as telling them to donate money, voting with animal rights in mind, being informed about what scientists are doing to conserve, how to be green consumers, plant more trees, and to recycle. But few zoos and aquariums if any have yet to allow visitors to participate in demonstrations of what they can do at an immediate level, other than contributing money. Since most visitors are “explorers” and “facilitators”, and come to the zoo looking for a combination of entertaining, educational, and interactive experiences, it is imperative to consider their expectations in order to engage them in a learning activity and bring about a positive change in behavior towards conservation efforts. These case studies and survey point towards the idea that communicating a preliminary, immediate message of what the animal's needs are and how to conserve those needs could be best demonstrated through the use of interactives.

“Since most visitors are ‘explorers’ and ‘facilitators’ . . . it is imperative to consider their expectations”

Participating in an animal related conservation activity while at the zoo could bridge the link between empathy and action. **In general, exhibit experiences that involve high interactivity** (often physical manipulation of an exhibit item, especially outdoors) **are most effective** (Smith, 2011). There seems to be an argument that if zoo and aquariums apply visitor motivations to the experiences they create, they will have the potential to enhance visitor's knowledge, and facilitate a sense of magic, insight, and empathy that create “epiphanies” that are valuable, if not necessary for humanity (Vining 2003). Evidence from these case studies strongly suggests that zoos and aquariums have yet to bring their visitors to an “epiphany” of action towards conservation efforts, and that this could be done through hands-on interactive learning experiences.

Through attempting to engage visitors in an action that immediately demonstrates what they can do to help conserve the animals and habitats they came to visit, the visitor will have already taken their first steps in helping conserve that animal.



Positive visitor responses to proximity to tigers at Big Cat Falls.

Based on informal interviews and observations, visitors understand the importance of the big picture ideas such as recycling, planting more trees, and donating money. However, **61% of visitors reported that they feel zoos and aquariums do a less than moderate job** of demonstrating to them what their visitors can do to help with conservation efforts (Mosley, 2011). Zoos are successfully bridging the physical gap between animals and visitors with innovative exhibit design. This is working to establish and strengthen empathetic relationships, but there is still a lack of initiation to advance from empathy to action. Empathy needs to be viewed as a component in a larger approach to behavioral change (Falk 2009). For this reason institutions should explore the idea of employing that empathy and providing the visitor a chance to experience the preliminary steps of what he or she can do to work towards that behavioral change. To do this designers, developers, and educators should design exhibits that enable visitors to experience ideas as fully as they do activity

(Hennes, 2003); in effect merging conservation messages with conservation actions, and providing a role for visitors. This would significantly aid in bridging the gap between empathy and action. Engaging visitors in a role as a participant in a conservation action makes them a part of Hederger's “experimental process”. Integrating a participatory role and individual input into conservation interactive experiences could also be a powerful catalyst in enabling visitors to further acknowledge the more global-scale conservation actions that many zoos and aquariums are already communicating. ■



Part 5

Exhibit Design Meets Educational Opportunities

Educate Through Interactivity

The study at the former *Great Ape House* at the Lincoln Park Zoo was one example that confirmed that visitors are naturally drawn to multisensory, multidimensional methods of learning. Science museums have been teaching through the use of interactives for years. Due to the difficulty of maintaining heavily used interactives and tough outdoor conditions, zoos seem to be hesitant to incorporate them into their exhibits (O’Conner 2010). However if the correct message and animal were selected, and the interactive element is simple and intuitive, it could be a very successful way to communicate an animal’s conservation needs and enable visitors to learn through experience what they can do to help.

One example of an interactive in a zoo setting was developed at the Philadelphia Zoo using the PISEC Perspective, (the Philadelphia-Camden Informal Science Education Collaborative). This study was developed to create a tool for measuring family learning. The primary outcome of the project was the creation and testing of seven characteristics

of family-friendly exhibits in the Philadelphia and Camden area. The zoo developed an exhibit about naked mole rats and applied each of the seven characteristics. The final result was a simple interactive graphic station that was multi-sided, multi-user, accessible for varying heights, multi-outcome, multi-modal for different learning styles, readable, and cognitively relevant. Thirteen years later, the exhibit is still there, with only one repair, a replacement for a slightly faded vinyl overlay. Parents and children still utilize the exhibit frequently, and read several if not all of the ten fact cards about naked mole rats. The exhibit is simple, small to medium scale, intuitive, and fun.

Exhibit designers, developers, and educators seek to enable visitors to achieve what psychologists Csikszentmihalyi and Rathunde define as a point of “flow experience” (Packer 2006). This is when visitors lose sense of time, forget about museum fatigue, and forget about anything else except the activity in which they are involved. People experience flow when they are interested, engaged,

open to discovery, and involved at their own level, (Csikszentmihalyi and Hermanson 1995). Zoos and aquariums naturally facilitate these experiences, given the existing conditions of animals and recreated natural habitats. These elements lend themselves to a dynamic and entertaining informal learning environment. Entertainment, in educational terms, can be divided into two categories- **passive enjoyment**: being happy and satisfied; and **education**: being mentally stimulated, expanding one’s interests (Packer 2006). A study conducted about visitors’ interest in “learning for fun” found that 70% of visitors say they learn something during their museum experience whether they intended to or not. The study also concluded that visitors require four conditions to consider something a “fun experience”. Those conditions are as follows- **sense of discovery; appealing to multiple senses; appearance of effortlessness; and availability of choice**. Visitors value this form of learning because it can be transformative, affect or change their lives, and alter their world-view (Packer 2006). If this kind

of behavioral change is what zoos and aquariums seek to convey about conservation, then perhaps conservation should be communicated in a fun, multisensory interactive learning experience.

Conservation is an issue that realistically requires community and global action. However, it is important to begin with what the individual can do as a preliminary action to achieving the larger ambitions and actions that many institutions already tell and model for their visitors. Several examples of these actions have already been mentioned, and also might include driving less frequently, contributing to wildlife organizations, participating in community clean ups, and adopting a zoo animal. All of these actions ameliorate the situation of the environment, but visitors’ engagement in these actions could be stronger. To achieve those larger goals, zoos and aquariums can begin by establishing a more substantial link between visitors’ experiential expectations, and conservation messages that relate to an activity they can perform on site at the exhibit. **Participating in a brief interactive**

experience will fulfill a variety of visitor expectations, including entertainment, educational, and interactive. By performing an act (or representation) of conservation on site, visitors will have already begun a behavioral change, making it easier for them to do so after they leave.

It seems as if many institutions are telling visitors what they should do, but not providing a fun, immediate, animal-experience based example of how they can help. 61% of visitors feel zoos and aquariums do a less than moderate job of showing them what they can do to help conservation efforts. Visitors are smart enough to not need a demonstration, but their expectations seem to demand it. They seek to engage multiple senses (Ross and Lukas 2005), to have fun while learning, (Packer 2006), and look to zoos and aquariums to tell them what they can do to help (Falk et al 2007), and could learn most effectively by learning about specific opportunities to act on behalf of conservation (Wagner et al 2009). Visitors’ expectations and desired delivery methods

of conservation messages provide the perfect opportunity to utilize interactive elements to instigate the behavioral changes that zoos and aquariums are working towards.

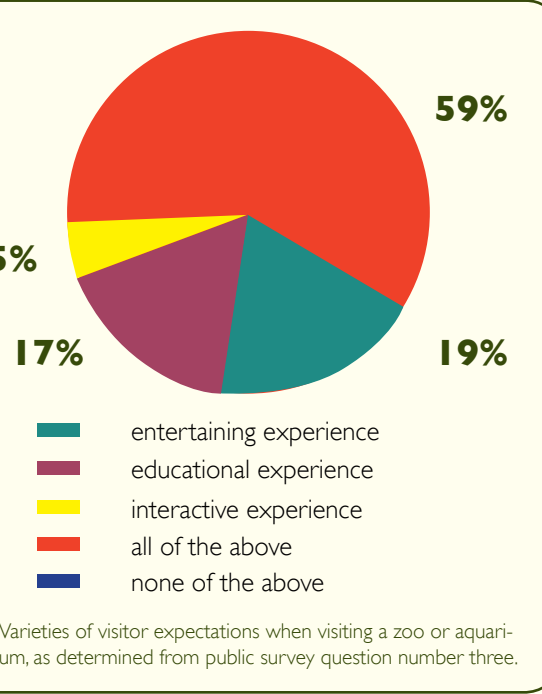


Exhibit Design Meets Educational Opportunities

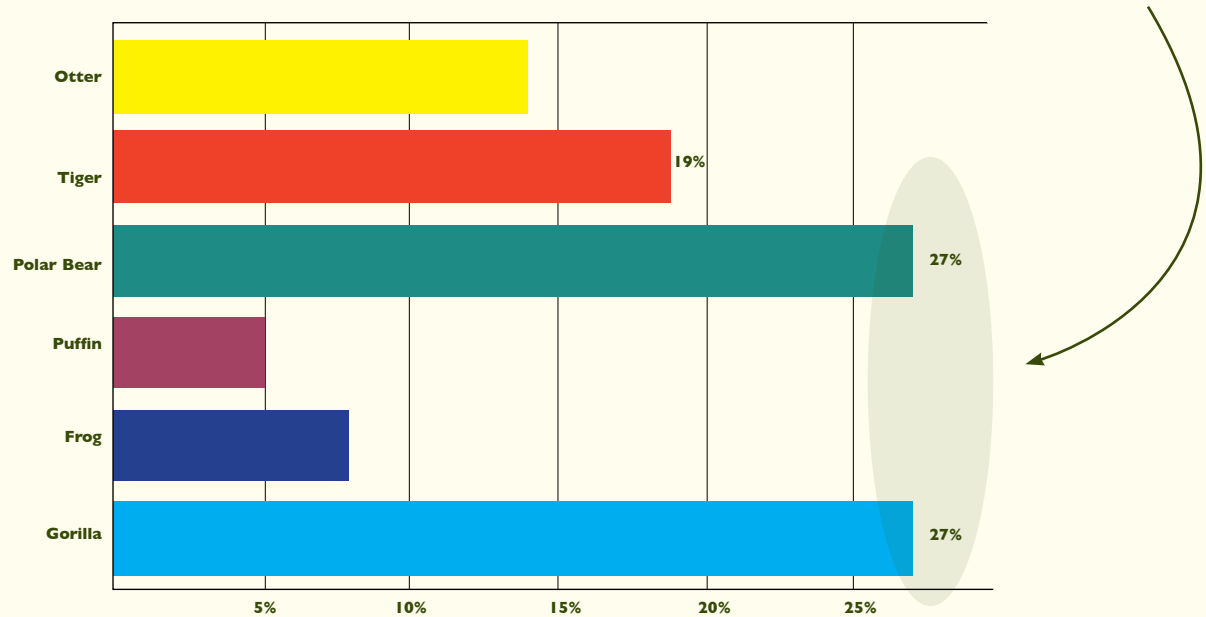
Connecting To a Specific Species

In order to impact a visitor without overpowering them with global conservation obligations, a logical approach is to select an individual animal to which the visitor is emotionally connected, and to ideally demonstrate just one of its needs. It is suggested that caring about a specific animal may lead to caring more deeply about the natural world (Vining 2003). A study of 171 children ages four to fourteen found that children form conceptual links between their favorite animal and that animal's specific conservation needs. In effect, caring about an individual animal may be a starting point towards caring about the livelihood of the entire species and its habitat (Myers et al 2003). Since there is evidence of a relationship between emotion and behavioral intentions, it is important that zoos and aquariums capitalize on the "equal opportunity" animals for the most impactful effect (Falk 2009). In a survey of 100 individuals, most visitors had stronger emotional connections with popular mega-fauna, such as polar bears and gorillas, compared to smaller animals such as otters, frogs, and puffins (Mosley, 2011).

Zoos are making great progress in providing examples of achievable conservation actions, and even applying those to specific animals (O'Conner 2010). The relationship between those actions and the visitor's experience at the zoo could be strengthened by applying an animal as the interpreter of its

conservation message. By carefully selecting a specific animal and developing an interactive experience based on its conservation needs, zoos could allow visitors to build upon pre-existing visitor empathy while making a direct correlation with that animal's needs and their own actions.

Mega-fauna are most likely the best candidates for effective conservation interactives



Instigating Behavioral Change

Visitors as a whole are recognizing that efforts need to be put forth to save many of the species and habitats they visit at zoos and aquariums, and they are interested in helping (Falk et al 2007; O'Conner 2010; Randi Korn et al 2009). Several studies have concluded what methods would most successfully lead visitors to become motivated towards behavioral change. Three of the most influential methods of visitor motivation for conservation are viewing rare animals, having fun, and learning what to do to help (Wagner et al 2009). Applying these methods with targeted audiences and targeted messages could be extremely powerful. Research supports a hypothesis that a new potential method of instigating behavioral change would be to target visitors' motivations, (such as "explorers" and "facilitators"), specify an animal to which visitors connect strongly, target a specific message about what the animal's needs are, develop a demonstration that relates the animal's need to visitor's experiential expectations, and finally, enable

the visitor to participate in that demonstration to capitalize on their empathy and translate that emotion into action.

The objective of using an interactive to talk about conservation is to engage visitors in an experience that builds upon their existing relationship to the animal and demonstrates what it needs to survive and what the visitor can do to save it. By having participated in an activity that involves the visitor in an aspect of the animal's life, empathy and activity are maximized. This **empathy will translate into action when conservation practices are carried out on site**, (either in actuality or through representation). By incorporating a gesture or model of the conservation action into an interactive, visitors will have already physically engaged in the first necessary step on their journey to the larger community and globally-based conservation goals that many zoos and aquariums are already modeling for their visitors. ■

“61% of visitors identified with the phrase “There is a lot I can do to conserve”

-Falk et al, 2007

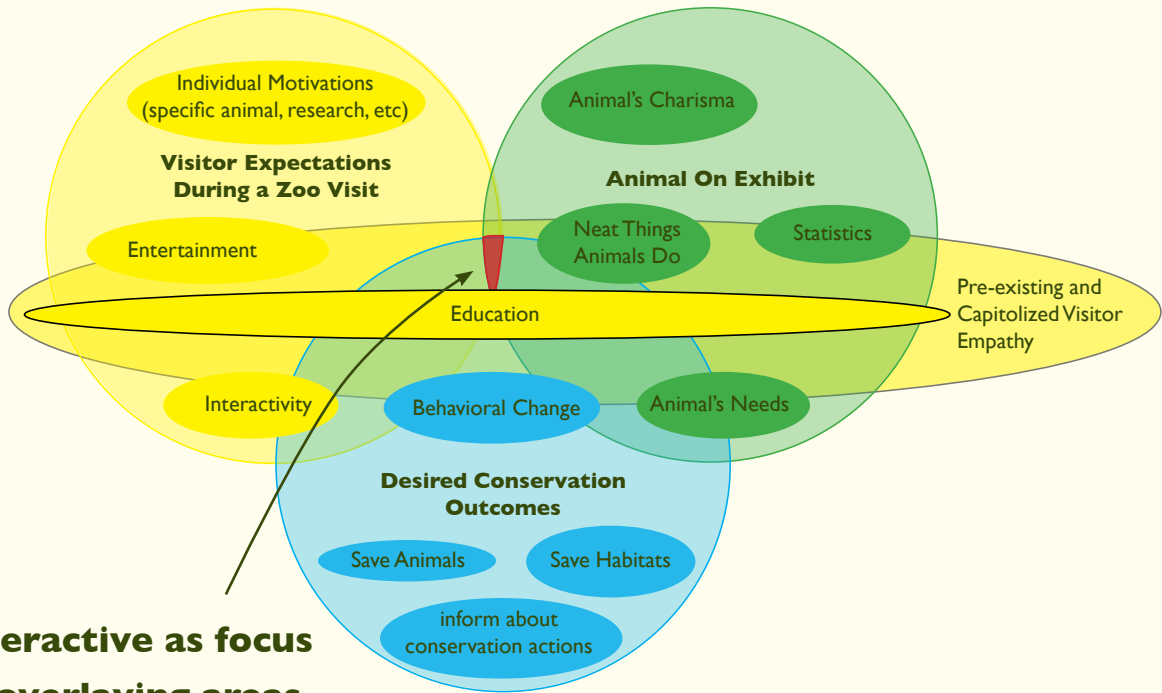
Part 6

Framework For Success

Acknowledging Overlaying Areas

Three Key Pre-existing Elements at Zoos and Aquariums-

- Expectations
- Outcomes
- Animals



Interactive as focus
of overlaying areas

Interactive Goals and Objectives

Goals

- 1) Enable the visitor to build upon an emotional attachment to the animal by understanding what it needs to survive.
- 2) Allow the animal to be the “interpreter” of what it needs, and how what it needs can be conserved. (so as not to rely independently upon interpretive graphics)
- 3) Provide a simple participatory demonstration or representation of a conservation action that serves as a springboard to larger scale community and global actions.

Objectives

- 1) Ensure that visitors visually engage with the animal while participating in the activity
- 2) Facilitate a dialogue by engaging multiple users
- 3) Enable visitors to learn what the animal's needs are by allowing them to engage in or replicate a daily activity relevant to the animal on exhibit
- 4) Faciliate multiple outcomes

Proposed Animal/Action Matrix

	Connection to visitor	Relation to visitor's expectations while at the zoo
Animal		
Animal Need		
Threat to animal's need		
Human action to save need		

Necessary Charactieristics

The 2006 Conference on Ocean Literacy established that it is imperative to create experiences that involve heads, hearts, and hands (Falk 2007). Understandably this equation applies to all kinds of informal learning institutions. As proven in the study at the Lincoln Park Zoo *Great Ape House*, visitors are drawn to multisensory objects. If more than one sense is used in communication or design, then it will reach more people, and perhaps almost everyone (Chalk et al 2005). Zoos have the good fortune of **engaging several senses** including visual, auditory, and olfactory. Occasionally the tactile comes into play and is extremely popular. Examples include a graphic

panel with scaled primate hands at the Philadelphia Zoo, bronze sculptural heads the Lincoln Park Zoo, stingray exhibits at aquariums, and petting zoos. **Zoos and aquariums should design exhibits in which the visitors get to participate in the landscape where the animal lives** (O’Conner 2010). The tactile sense could be the most appropriate of the senses for actively communicating messages of conservation about animals, their needs, and their habitats. Other elements that are helpful to drawing visitors towards an interactive learning experience about conservation are sense, scale, space, and simplicity.

Sense, Scale, Space, Simplicity

- 1) What senses does the animal use and how can those be incorporated? Tactile, olfactory, auditory, vocal, cognitive- such as trial and error? other senses?
- 2) Appropriate scale for children, adults, single, or multiple users
- 3) Providing a momentary space where visitors can linger to discuss the animal and the conservation action being demonstrated at the interactive
- 4) Simple designs and durable mechanical parts made with both visitor and zoo conditions in mind.

Framework For Success

Importance of Intuition

The overall objective of communicating conservation through interactivity is to not rely heavily upon interpretive graphics and text for explanation. Due to the complexity of conservation issues and active nature of an interactive, focusing on just one animal need is imperative, to help clarify the visitor's take away message. One such example of a simple and intuitive interactive would



Fixed in place at an estimated 30" height, the viewscopes at *Madagascar!* are very intuitive and beckon visitors to examine what the focus of attention is. Concise text ensures visitors don't miss the main idea.

the view scopes at the *Madagascar!* exhibit. The exhibit emphasizes the importance of trees. Multiple view scopes are fixed in place, informing the viewer that whatever the view scopes are pointing to is of importance. Simple aluminum tubes point directly at lemur scratches in the trees, quickly informing the visitors that lemurs communicate by leaving different scratch marks. Without these trees, lemurs



would have fewer places to live and would have much more difficulty communicating to each other. Minimal text is discreetly placed inside the view scopes, which are placed low enough to work well for children, but also alluring enough to draw in adults. This is an excellent example of providing simple physical cues on how to operate the interactive, an essential part of the design process (McLean 1993).

Multimedia can sometimes be intuitive. However it is important to note that in zoo environments visitors often resist multimedia, or only engage with it momentarily (Mosley, 2011, case studies, and survey). The Design Museum of London did a study of visitor behavior with mechanical and electronic interactives and discovered that an exhibit must respond to the visitor's input within the first few seconds. This initial 'hand-shake' is vital to a successful interaction between visitor and exhibit (Gammon, 1999). The longer the delay the less likely visitors are to engage. Delays can be caused by

issues such as learning a computer interface, lengthy instructions, and dated electronics that run slowly. However, well designed multimedia elements can be an excellent tool to clarify or demonstrate a well thought out concept. The major hesitation with multimedia are the limitations of those elements



Simple intuitive use of multimedia at the Franklin is comprised of limited options and immediate results that teach visitors about ocean levels through out the earth's history.

in outdoor conditions. Few computers and touch screens are designed for outdoor use, and those that are, are very expensive. Many zoos design outdoor computer kiosks with air ventilation, however computers still over heat. Often the water proof metal casing can bake electronics on hot summer days. For this reason it is strongly suggested that outdoor interactives be comprised of simple mechanical elements.

Placement in the physical context

In recent decades zoos have made great efforts to bring visitors and animals closer together through physical exhibit design. This has enabled zoos to partake in visitors' growing sense of connectedness to animals when the animals pay attention to them or other people (Myers et al 2004). Based on that information and years of informal observations, it is reasonable to predict that the closer the animal is to the visitor, the greater the visitor interest (Bitgood, 1999). In the case of an interactive

about conservation, it would be ideal to place the interactive element where the animal can watch the visitor, instead of the visitor watching the animal. This would maximize visitor empathy for the animal through proximity, and further **empower the animal as a “spokesperson” for its own needs**. Unimpeded views are important to visitors (Wagner et al 2009), so it is imperative to not block any viewing areas. Above all, it seems primary that while visitors participate in an interactive that demonstrates what an animal does or needs to survive, that they can **visually engage with the animal**. ■

Part 7

Proposed Prototype

Specific Animal Paired With Specific Conservation Message

The animal and message selected for this prototype were derived from visitor surveys, conversations with zoo educators, conservation staff, and exhibit developers. It was decided that for the purposes of this prototype **animal needs** should be categorized into areas of **food, habitat, and space**.

Proposed Animal/Action Matrix

	Connection to visitor	Relation to visitor's expectations while at the zoo
Polar Bear	Charasmatic mega-fauna	They're going to see it anyway
Habitat	Living beings need habitat	Visitors are already kind of aware of issue
Melting Habitat	Humans aid in melting process	Visitors will learn how to help conservation efforts
Using less electricity	Everyday actions we can take	Visitors will measure their own polar bear habitat



Polar bears are happy when we use less electricity.



Polar bears are nervous when we aren't mindful of our usage.

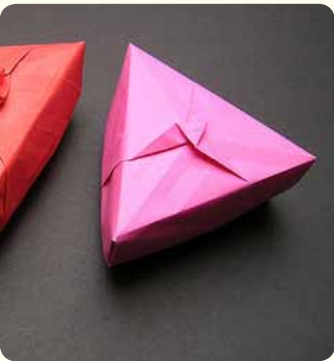


Polar bears would be sad if we are not mindful of our choices.

Gestalt and Materiality



Rotation



multi-sided

Changing images



Simplicity



Durability

Proposed Prototype

Concept and Schematic Images



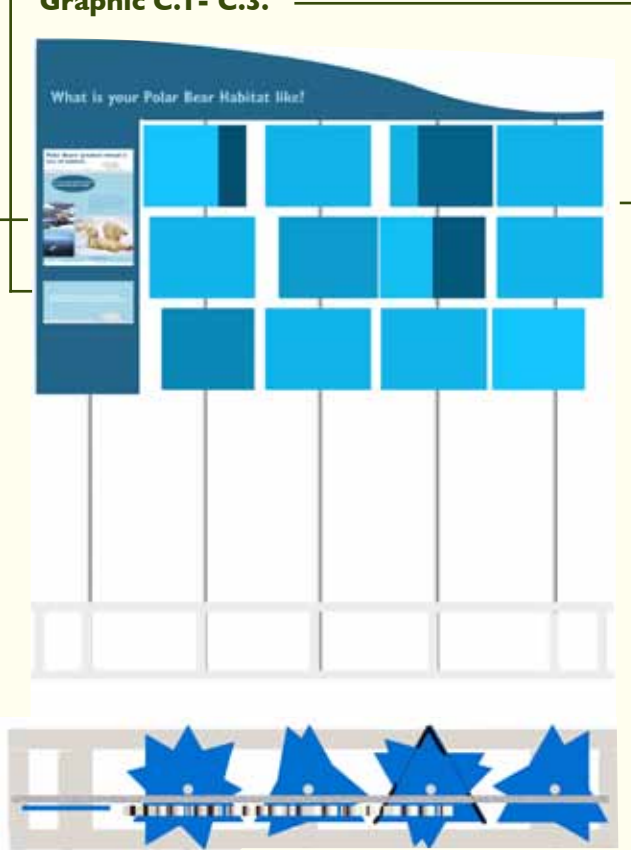
The main idea is to **relate visitors' daily choices to polar bear habitats** through creating and measuring their own version of a polar bear habitat derived from segmented background images. Each triangular segment corresponds to an appliance and how frequently it is turned on or plugged in. By turning these appliances off or



unplugging everyday appliances when not in use, energy is saved which results in fewer carbon dioxide emmsions from electrical plants. Less carbon dioxide in the air means **longer lasting polar bear habitats**, and happy polar bears.



Graphic A.
Graphic B.
Graphic C.1 - C.3.



Graphic A.



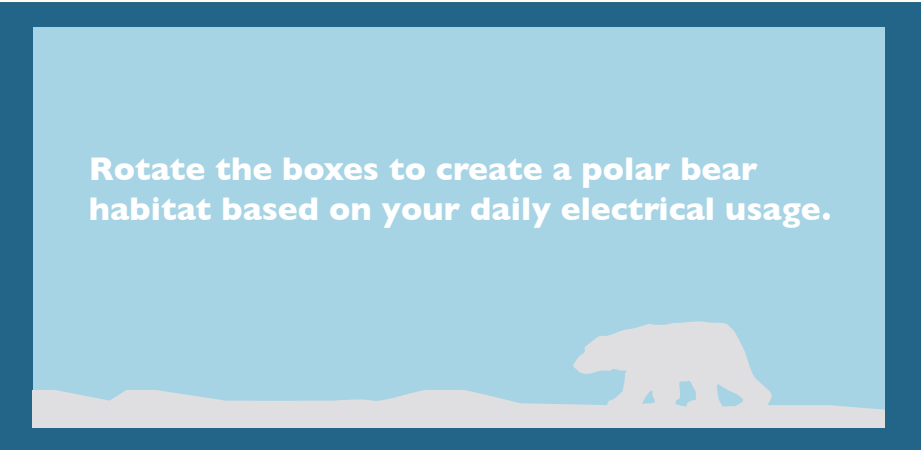
Characteristics according to PISEC study-

- Multi-sided* — several people can cluster around
- Multi-user* — the scale of the interactive engages multiple people to complete it
- Accessible* — higher and lower cubes, a step could be added for easier access
- Multi-outcome* — every family's image will look different based on their electrical usage
- Multi-modal* — text, various levels of informative images appeal to multiple learning styles
- Readable* — text is minimal and in large typeface
- Relevant* — the exhibit addresses conservation issues and provides actions to take

Graphic Interpretation

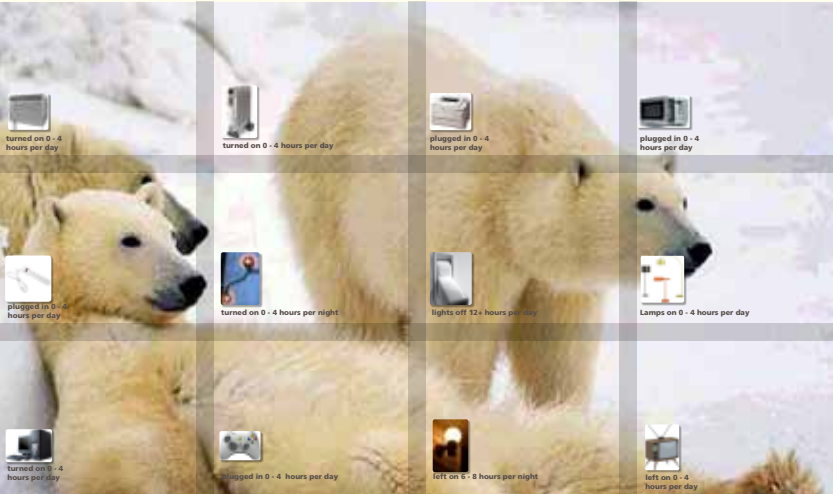


Graphic B.



Proposed Prototype

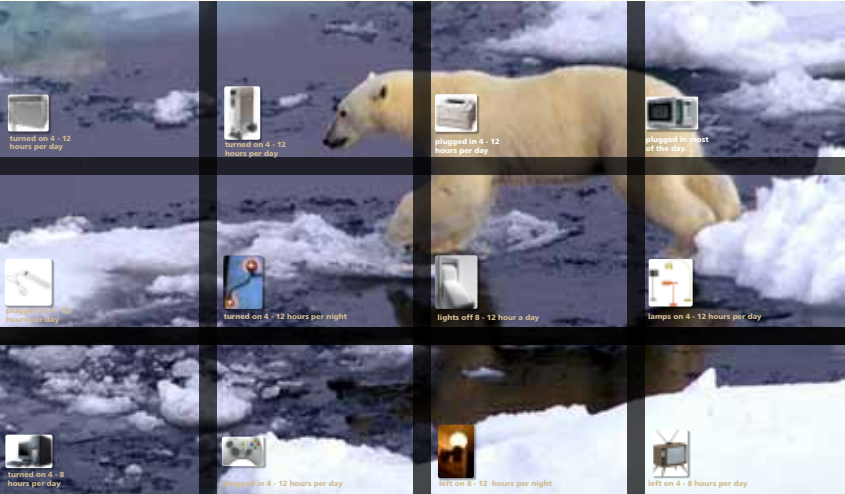
Graphic C.1



Polar bears enjoying their habitat if we are conscious of our actions.

Everyday appliances represent objects that visitors can unplug or turn off when not in use to help emit fewer green house gases, thus helping slow the melting of the polar caps (WAZA 2011).

Graphic C.2

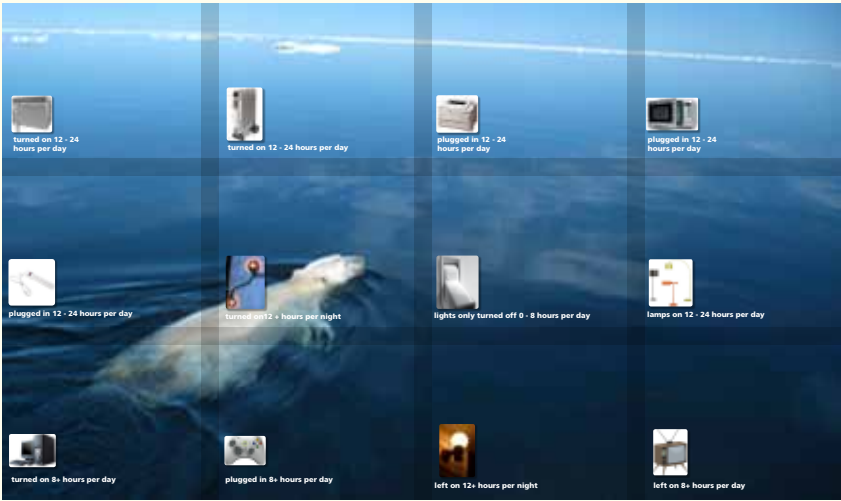


Nervous polar bears in a melting habitat if we are mildly conscious of our actions.

Application of everyday appliance to each of the 12 boxes-

Air conditioner	Heater	Printer	Microwave
Multi-outlet	Christmas lights	Light Switches	Lamps
Computer	Video games	Porch Lights	Television

Graphic C.3



Polar bears without any habitat if we pay no mind to our actions.

“Apart from watching the animals, visitors are most likely to enage with a hands-on activity.”

-Survey question seven, page 27

Sample Composite



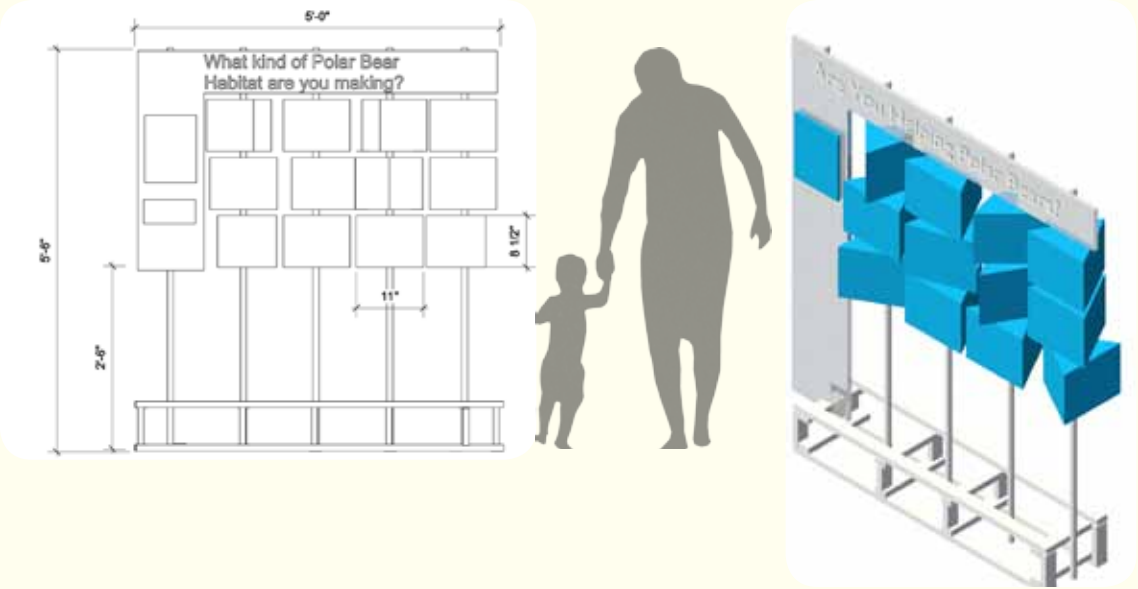
Polar bears' composite habitat as a result of one person's or family's daily actions. This is a mostly happy polar bear habitat with a few areas of improvement, such as unplugging electrical strips and turning lights off more frequently.

Proposed Prototype

Interactive in Context

Exhibit Scale

(Base not necessary. Ideally this kind of interactive would have posts that go directly into the ground.)



A placement in context where visitors can have an interactive experience while visually engaging with the animal is ideal, such as the this example. The intereractive is out of the way of the animal, and becomes a secondary or tertiary exhibit element.



North Carolina Zoo

In many cases there is not space where visitors can engage with the interactive while visually connecting with the animal. In this case suggestions include-

- Discreet placement in existing context
- Proximity to benches
- Seek a space where visitors have can to linger
- Base height between 30 and 36 inches
- Color palette similar to existing graphics
- Potentially creating a roof or shaded area



Philadelphia Zoo



Bronx Zoo

Part 8
Prototype Testing

Big Ideas

Animal-
Polar bear

Threat-
Melting habitat

Visitor Action-
Lowering green house gases emitted by everyday appliances,
helping to slow the melting of polar bear habitats.



Production



Interactive Survey

1) What big Idea would you say this is about?

- responsible use of energy and its affect on the environment
- how my everyday energy use affects the world around us
- we are screwing up the habitat
- my electrical usage affects other living things
- conservation

2) What is the least clear part about this activity?

- lack of new techological equipment options
- that it is supposed to reflect my own usage
- that I'm actually putting a puzzle together
- difference between plugged in/turned on; lamps versus lights

3) What is the most clear part about this activity?

- the images are appropriate
- damage is being done to the environment
- realize the effects of our actions
- pictures helped me know what to look for
- what each box represented, amount of time I left something on

4) What might you tell a friend about this interactive?

- this will help you learn about your electrical usage
- its a sobering interactive, brings something to your attention
- make sure your polar bears look happier than mine
- I would make them do it, and talk about unplugging my microwave
- not sure

5) Would you say you learned about any simple actions you can take to help conservation efforts?

- Yes, I can unplug printers portable heaters
- Absolutely, I want to see what my landlord would do
- Yes, turning things off
- Definitely, I can be more eco-concious, unplug my microwave
- Yes

- energy, conservation, its affect on the environment
- being environmentally concious
- awareness of lifestyle
- household energy decisions have environmental consequences
- how electricity I use can affect the habitat of polar bears

- that I wasn't creating just one big picture like the ones I saw
- some of the objects- radiator looked like a modem, printer looked like a fax
- what to actually do with it, but figured it out quickly
- placement of informative panel
- If I am supposed to recreate one of the pictures I see

- the purpose, less energy helps conservation
- it's about energy use
- that you turn the boxes to create a picture
- what to do- match up a picture,
- that I needed to rotate the boxes to show my usage

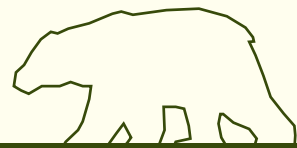
- it's cool
- that my polar bear is more happy than their's
- my polar bear was almost happy, there's still a bit more I can do
- you will feel more engaged
- one person's use of electricity can affect the habitat of polar bears

- Yes, but a lot of it was stuff I already knew
- Yes, being mindful of the enerfy I use
- Yes, unplugging things when I'm not using them
- Yes, unplug the microwave
- Yes, I can unplug my microwave and power strips

Prototype Testing

Comments

General Comments	Specific Comments From Participants
<ul style="list-style-type: none">• Average time spent was between 3 and 4 minutes• Most visitors took about one minute to realize they were not replicating an image, but infact creating their own and measuring it.• Nearly all groups thought to measure their own image to the “happy polar bears”.• Both groups, and individuals were tested• to date only 10 groups/individuals have participated, mostly students• 100% of visitors understood the concept that simple daily choices can positively affect polar bear habitats, specifically how one can use less energy• Children and families have yet to test the exhibit• Unplugging the microwave was the biggest “wow” for most participants• Even individuals who did not participate were very supportive of the idea of helping polar bears• The title changed from “Everyday Actions for Happy Habitats,” to “How Does Your Polar Bear Habitat Look?”	<ul style="list-style-type: none">• “It’s hard to tell the difference between the “nervous” polar bears and the “sad” polar bears, their panels look very similar.”• “What if I use CFL bulbs already? What about the actions I’m already taking?”• “It would be nice if there was more information I could take with me.”• “Some of the appliances were unclear.” *in most cases it was the heater; printer; christmas lights, and off switch• “It took me a second to realize I couldn't create a perfect polar bear habitat.”• “If we did this . . . (adjusted their actions by rotating the boxes), we could have happier polar bears.”



Successes and Failures

In general participants responded positively to the interactive. After the first few sessions, participants were asked to to what degree they felt guilty versus more aware, as guilt was not something the interactive is intended to achieve. The question only came up after several testings and therefore was not measurable over the entire testing group, but those who were asked said that on a scale from 1 to 5, one being “guilty” and five being “more aware”, they felt close to a 4. This can be rated as successful.

Failures include the prolonged amount of time it took participants to realize they were creating a compilation habitat, not recreating a photo. However, even if people just started replicating an image, “completing a puzzle”, they soon realized what they were doing. Several people started spinning the boxes, which drew more people over and began a conversation about what they were doing. Most people, or at least one per group, read the thirty seven words of interpretive text, or at least the instructions about creating their own polar bear habitat. .

Further Considerations

In the future careful attention should be paid to the images- not all participants were thrilled by christmas lights. Other problematic images included technological appliances. How modern should visitors be assumed to be? Front end evaluations to specify images is recommended. Careful attentions should also be paid and awarded to what visitors are already doing; such as using more efficient light bulbs, or buying “smarter” appliances.

This interactive attempted to state that even if a more efficient light bult is left on all night, it is none the less, left on all night, which uses more electricity, emits more carbon dioxide, and aids in melting polar bear habiats. It is suggested to research sources such as *Polar Bears International* and the *World Association of Zoos and Aquariums* to include more factual data about what specifically is needed to positively affect polar bear habitats. Lastly, for future interactives about conservation, careful consideration should be applied as to what degree one can stretch an idea to communicate what actions visitors can take.



With hundreds of zoos and aquariums across the globe, there could very well be successful interactives discussing conservation already in existence. However research over a ten-month period concludes that there is still a need to make zoological experiences more active and engaging. Several existing elements of zoos and aquariums can be built upon to achieve more engaging and dynamic results in visitor conservation behavior, such as empathy and pre-existing visitor “favorites”. Visitors have deep emotional connections to specific animals, and zoos and aquariums should maximize those connections for more successful proactive conservation behavior outcomes.

That being said, conservation can often border with guilt within visitors, which is not something zoos and aquariums look to instill. A delicate balance exists between informing a visitor of a serious situation, and informing them find out what they can do to make the situation better. With that delicate balance in mind, it proved extremely difficult to find an animal and a survival need that fit the parameters of what make a successful interactive exhibit. There is great difficulty in creating an interactive that is true enough to be believed but exaggerated enough to show results. Even with a framework for success and a check-list of considerations, an interactive about conservation will inevitably not always successfully convey what developers may hope it will.

The prototype created for this thesis tested extremely well, with all participants coming away with a knowledge that their daily choices have an affect on an animal they were fond of. Capitalizing that pre-existing empathy aroused a desire for those participants to take action, and the interactive simultaneously provided them with actions they could take. It would be ideal to have visitors engage in an even more direct pro-conservation action, but for this circumstance a representation was the most feasible alternative, and successfully executed the interactive's objective.

Solid research shows that visitors will most often respond quickly, positively, and sincerely to the larger and more popular animals, or charismatic mega-fauna. Enabling these species to be the “spokespersons” for other animals mimics the umbrella effect of nature's system, as does a lion in the African Savannah. Visitors pay attention to animals, not text panels. Why not give in and embrace the “particular relationship between animals and their visitors?” ■

-H. Hediger, 1969

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